HOME FIRES INVOLVING HEATING EQUIPMENT

John R. Hall, Jr.

January 2010

National Fire Protection Association
Fire Analysis and Research Division

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Abstract

In 2007, heating equipment was involved in an estimated 66,400 reported home structure fires, 580 civilian deaths, 1,850 civilian injuries, and $608 million in direct property damage. The numbers of fires, deaths, and injuries were all higher than in 2006 but fit into a largely level trend over the past few years, coming after a sharp decline from the early 1980s to the late 1990s.

In 2003-2007, most home heating fire deaths (79%) and injuries (62%) and half (49%) of associated direct property damage involved stationary or portable space heaters.

Space heating poses a much higher risk of fire, death, injury, and loss per million users than central heating.

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

Acknowledgements

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

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

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

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Executive Summary

In 2007, heating equipment was involved in an estimated 66,400 reported U.S. home structure fires, with associated losses of 580 civilian deaths, 1,850 civilian injuries, and $608 million in direct property damage. The estimated home heating fire total was up 4% from the previous year but down 72% from its peak in 1982. Associated deaths were up 9% from 2006 but down 49% from their 1982 peak. Associated civilian injuries were up by a third (32%) compared to 2006 but down by 50% from their 1983 peak. Direct property damage adjusted for inflation was down by one-third (37%) from 2006 and by two-thirds (69%) from the 1980 peak. "Homes" refers to one- and two-family homes (which include manufactured homes) and apartments (which include townhouses).

Fixed (stationary) and portable space heaters, excluding fireplaces, chimneys, and chimney connectors, but including wood stoves, accounted for one-third (32%) of reported 2003-2007 U.S. home heating fires, four out of five (79%) associated civilian deaths, three-fifths (62%) of associated civilian injuries, and half (49%) of associated direct property damage. Another 23% of 2003-2007 home heating fires were identified by incident type as confined to heating equipment but had no equipment or non-heating equipment coded under equipment involved in ignition.

Gas-fueled heating devices, particularly space heaters, pose a higher risk of death due to non-fire carbon monoxide poisoning. In 1998, 2000, 2001 and 2003, there were 2.5 electrocution deaths per year involving electric water heaters and 1.8 electrocution deaths per year involving electric furnaces. Heating equipment accounted for 62,900 injuries reported to hospital emergency rooms in 2008.

Creosote is a sticky, oily, combustible substance created when wood does not burn completely. It rises into the chimney as a liquid and deposits on the chimney wall. A conservative best estimate of creosote fires would combine failure-to-clean confined chimney or flue fires with failure-to-clean fires involving solid-fueled space heaters, fireplaces, chimneys and chimney connectors. This produces estimates of 14,720 reported creosote fires (22% of the total) per year with associated losses of four civilian deaths, 24 civilian injuries, and $33 million in direct property damage per year.

The leading factors contributing to ignition in home heating equipment fires were failure to clean (25%), unclassified mechanical failure or malfunction (13%), and heat source too close to combustibles (13%). Heat source too close to combustibles accounted for the largest share (46%) of associated deaths.

The leading items first ignited for home heating equipment fires were unclassified item (19%), flammable or combustible gas or liquid (15%), structural member or framing (8%), and film or residue (8%).

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

Comparisons of different fuel or power options within central heating equipment do not show any types to be clearly and consistently better or clearly worse for all types of loss.

- Among central heating equipment, gas-fueled units show a higher rate of civilian fire deaths per user household but lower fire incident rates, civilian fire injuries, and property damage rates.

- Liquid-fueled equipment had the highest rates for fire incidents and direct property damage.

Among space heating equipment, electric-powered device (portable or fixed) show the lowest rates of fires and civilian fire deaths. There are no other clear differences.

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 leading area of origin for confined or non-confined home heating fires is heating room or area (21%), followed by living room, family room or den (9%) and kitchen (9%).

Home heating fires peak in the mid-morning and in the mid-evening. Home heating fires are less common during 1:00 to 6:00 a.m. This could reflect the practice in many homes of turning down the heat overnight, allowing blankets and bedding to compensate, and of relying less on heating equipment in the middle of the day, when temperatures are at their daily highs and occupants are least likely to be at home (during school and work hours). It also reflects the fact that sleeping occupants are not actively interacting with the equipment, which is how fires begin.

Safe Heating Behaviors

- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
- Use heating equipment that has the label of a recognized testing laboratory.
- Install stationary space heating equipment, water heaters or central heating equipment according to the local codes and manufacturer's instruction. Have a qualified professional install the equipment.
- Make sure all fuel-burning equipment is vented to the outside to avoid carbon monoxide poisoning. CO is created when fuels burn incompletely. CO poisoning can cause illness and even death. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.

Table of Contents

List of Tables and Figures

List of Tables and Figures (Continued)

List of Tables and Figures (Continued)

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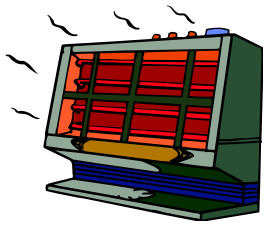
U.S. Home Heating Equipment Fires

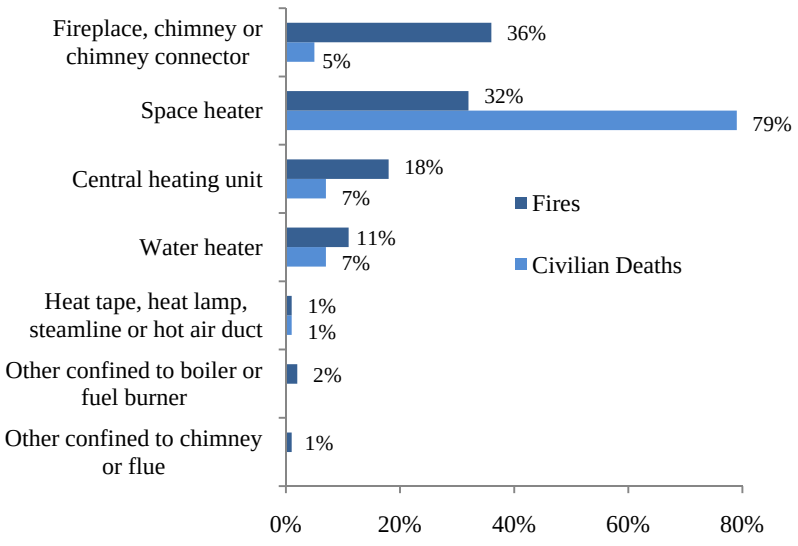
In 2007, U.S. fire departments responded to **66,400** home[1] structure fires that involved heating equipment. These fires caused

- 580 civilian fire deaths
- 1,850 civilian fire injuries
- $608 million in direct property damage

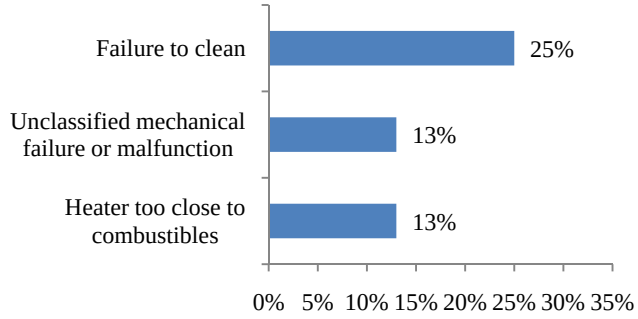


- Heating equipment fires accounted for 17% of all reported home fires in 2007 (second behind cooking) and 20% of home fire deaths.
- In 2003-2007, the leading factor contributing to home heating fires (25%) was failure to clean, principally creosote from solid-fueled heating equipment, primarily chimneys.
- The leading factor contributing to ignition for home heating fire deaths (46%) was heating equipment too close to things that can burn, such as upholstered furniture, clothing, mattress, or bedding.
- Half (49%) of all home heating fires occurred in December, January and February in 2003-2007.
- Home heating fires peak during 6:00 to 8:00 p.m., and associated deaths peak during 2:00 to 4:00 a.m.

U.S. Home Heating Fires by Equipment Involved: 2003-2007



Leading Factors in Home Heating Fires 2003-2007



- Creosote is estimated to be involved in 14,720 home heating fires per year, or 22% of total home heating fires in 2003-2007.
- Creosote fires are estimated to involve 4 civilian deaths, 24 civilian injuries, and $33 million in direct property damage per year.

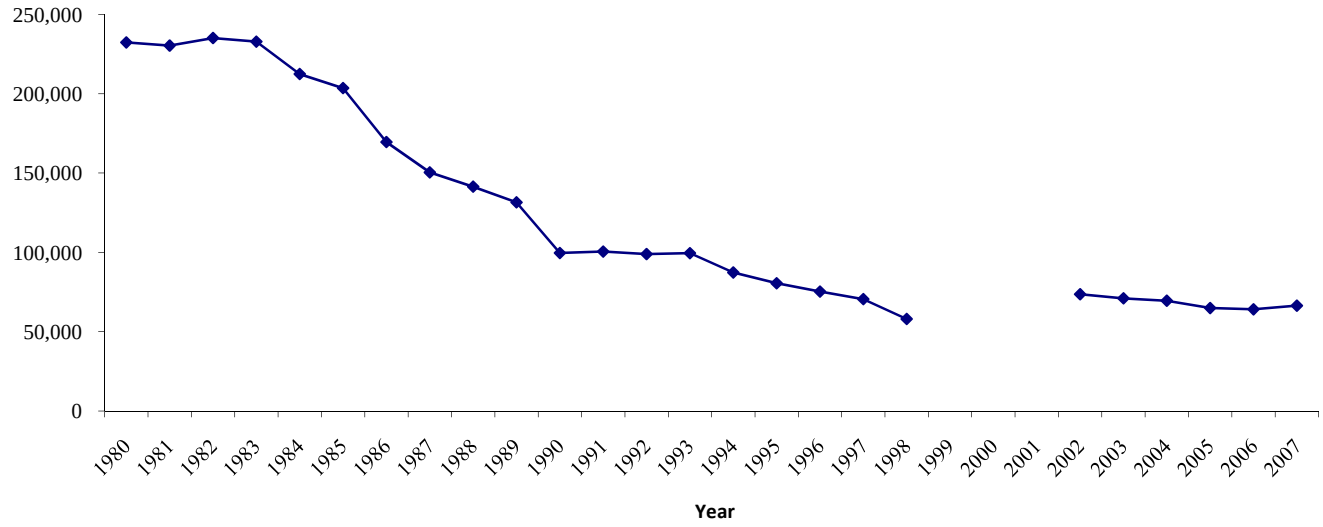
[1]Homes are dwellings, duplexes, manufactured homes, apartments, townhouses, rowhouses and condominiums.

Section 1. Overview of Heating Equipment Fires

In 2007, heating equipment was involved in an estimated 66,400 reported U.S. home structure fires, with associated losses of 580 civilian deaths, 1,850 civilian injuries, and $608 million in direct property damage.

The home heating fire total was up 4% from the previous year but down 72% from its peak in 1982. (See Figure 1.1.) Associated deaths were up 9% from 2006 but down 49% from their 1982 peak. (See Table 1.1.) Associated civilian injuries were up by a third (32%) compared to 2006 but down by 50% from their 1983 peak. Direct property damage adjusted for inflation was down by one-third (37%) from 2006 and by two-thirds (69%) from the 1980 peak. "Homes" refers to one- and two-family homes (which include manufactured homes) and apartments (which include townhouses).

Figure 1.1. Home Fires Involving Heating Equipment, 1980-2007, by Year



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. 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. Confined fires reported as confined to chimney, flue, fuel burner, or boiler and involving heating equipment are analyzed separately but are included above. *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 (1999-2007) and from NFPA survey.

Space heaters accounted for the second largest share of fires, for most associated civilian deaths and injuries, and for half of associated direct property damage. In 2007, heating equipment fires accounted for one-sixth (17%) of all reported home fires, ranking second to cooking equipment among major causes.

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 20% of the associated civilian deaths and 8% of the direct property damage, also much lower than the shares in the first half of the 1980's. Heating equipment fires accounted for 14% 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 in the same period. Cooking equipment has been the leading cause of home fires ever since.

Fireplaces, chimneys, and chimney connectors accounted for the largest share (36%) of 2003-2007 home heating equipment fires.

Table 1.A includes water heaters, heat lamps, and heat tape as types of heating equipment. Heat pumps are not included in this report but are grouped for analysis in the report on air conditioning equipment and fans.

Table 1.A. Home Fires Involving Heating Equipment, by Type of Equipment
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined to Heating Equipment)

	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Fireplace, chimney, or chimney connector	23,870	(36%)	33	(5%)	122	(7%)	$209	(25%)
Space heater	21,190	(32%)	486	(79%)	1,021	(62%)	$418	(49%)
Central heating unit	11,830	(18%)	45	(7%)	148	(9%)	$76	(9%)
Water heater	7,480	(11%)	44	(7%)	322	(19%)	$121	(14%)
Heat lamp	510	(1%)	7	(1%)	21	(1%)	$14	(2%)
Heat tape	370	(1%)	0	(0%)	7	(0%)	$7	(1%)
Steamline or hot air duct	50	(0%)	0	(0%)	0	(0%)	$1	(0%)
Confined to boiler or fuel burner but coded as or non-heating equipment involved	1,450	(2%)	0	(0%)	10	(1%)	$0	(0%)
Confined to chimney or flue but coded as no equipment or non-heating equipment involved	470	(1%)	0	(0%)	7	(0%)	$1	(0%)
All non-confined fires	*28,020*		*614*		*1,532*		*$831*	
All fires confined to boiler or fuel burner	*15,820*		*1*		*87*		*$4*	
All fires confined to chimney or flue	*23,380*		*0*		*40*		*$11*	
Total	67,220	(100%)	615	(100%)	1,658	(100%)	$846	(100%)

Note: These are national estimates of fire 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 ten, 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 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. Also, fires reported as confined to chimney/flue or fuel burner/boiler but with no equipent involved in ignition are assumed to be fires in the chimney or furnace enclosures and are allocated to chimneys and central heating units, respectively. Totals may not equal sums because of rounding error.

Source: Data from NFIRS Version 5.0 and NFPA survey.

In this report, sections are grouped as follows and sequenced as shown here:

- Space heaters, including wood and other heating stoves; catalytic, oil-filled, and other heaters; fireplaces with inserts; and local furnaces
  - Subdivided for some analyses by gas, liquid, solid, and electric;
- Central heating units, including furnaces and boilers
  - Subdivided for some analyses by gas, liquid, and electric;
- Water heaters
  - Subdivided for some analyses by gas and electric;
- Fireplaces, chimneys, and chimney connectors
  - Subdivided for some analyses by gas and solid;
- Heat tape and heat lamps; steamlines and heat pipes do not have enough fires to justify detailed examination.

Some fires are difficult to assign for analysis purposes. These include fires coded as confined to boiler or fuel burner (incident type 116) or confined to chimney or flue (incident type 114) but with equipment involved in ignition coded either as none or as some type of specific equipment other than heating equipment. (See Table 1.B.)

Table 1.B. Home Structure Fires Reported as Confined to Boiler, Fuel Burner, Chimney or Flue, by Equipment Involved in Ignition Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Equipment Involved in Ignition	Confined to Boiler or Fuel Burner Code 116		Confined to Chimney or Flue Code 114		Combined	
Heating equipment	13,870	(88%)	9,670	(41%)	23,540	(60%)
No equipment	500	(3%)	13,240	(57%)	13,740	(35%)
Specific equipment other than heating equipment	1,450	(9%)	470	(2%)	1,920	(5%)
Total	15,820	(100%)	23,380	(100%)	39,200	(100%)

Note: These are national estimates of fire 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. Fires are rounded to the nearest ten. Damage has not been adjusted for inflation. Figures reflect a proportional share of home fires with equipment involved in ignition unknown 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.

Over half (57%) of the confined chimney or flue fires are coded as no equipment involved. This suggests the heat of ignition came from a fire set in a fireplace using a match or lighter, which became an unwanted and uncontrolled fire when it ignited something in the chimney, most likely creosote. These fires are relevant to the fire safety of the chimney and are included in chimney fires analyzed in this report.

Nearly 2,000 fires reported as confined to chimney, flue, fuel burner or boiler are reported as involving equipment other than heating equipment. Most of them specifically involved fires reported as confined to fuel burner or boiler. The leading types of such equipment were clothes dryers (510 fires per year including 330 confined to fuel burner or boiler and 180 confined to chimney or flue), ranges (280 fires per year), and heat pumps (180 fires per year). Heat pumps can be used for heating or cooling but are analyzed as part of the NFPA report on air conditioning and related equipment. There are also appliances that can be used for both heating and cooking. These appliances may account for the range fires, as well as the 9,990 fires per year coded as confined cooking vessel fires with heating stove as equipment involved in ignition.

The special problem of identifying chimney fires related to wood stoves

These are the specific types of equipment that are assigned NFIRS codes in the range that includes fireplaces, chimneys, and chimney connectors:

- NFIRS equipment involved in ignition code 120 – fireplace, chimney, other
- Code 121 – Fireplace, masonry
- Code 122 – Fireplace, factory-built
- Code 123 – Fireplace, insert/stove
- Code 124 – Stove, heating
- Code 125 – Chimney connector, vent connector
- Code 126 – Chimney: brick, stone, masonry
- Code 127 – Chimney: metal. Includes stovepipes and flues.

The name of NFIRS code 120 says it contains "other" (which should mean unclassified and could be interpreted to include unknown-type) equipment that belongs with fireplaces (code 121 or 122) or chimneys (code 126 or 127). However, it is not clear whether code 120 also relates to fireplace with insert (code 123), which is normally considered a type of space heater rather than a type of decorative fireplace; chimney connector (code 125), which is part of a chimney system; and heating stove (code 124), because code 120 suggests a partial unknown that should be allocated to all of the devices with codes in the 121-129 range. Heating stove is the only code in that group that does not have a name containing "fireplace" or "chimney", but heating stoves use chimneys as much as or more than fireplaces do.

Notwithstanding these considerations, this report introduces the use of a "fireplace and chimney" category, defined by NFIRS codes 120, 121, 122, 125, 126, and 127. If code 120 is being used to capture some unknown-type heating equipment related to fireplaces with inserts or heating stoves, then this approach will understate the number of fires related to wood stoves as compared with other types of space heaters. In 1980-1998, when chimney was also a code under area of origin, there were twice as many chimney-area fires involving space heaters as chimney-area fires involving fireplaces. In 2003-2007, for fires confined to chimney or flue, fires involving wood stoves or fireplaces with inserts outnumber fires involving masonry or factory-built fireplaces by more than 3-to-1, but far more fires are coded as chimney, chimney connector or unclassified fireplace or chimney, and even more are coded as no equipment involved, a scenario that seems more likely with a decorative fireplace than with a space heater.

It seems clear we are missing a large number of fires (though not much associated loss) related to solid-fueled space heaters, but we have no good options to estimate how many such fires are missing. Instead, there is discussion at points in the report, where this omission is particularly important, especially in the comparative risk analysis.

Fixed (stationary) and portable space heaters accounted for 32% of reported 2003-2007 U.S. home heating fires (including fires reported as confined fires).
The term "space heater" is used to describe equipment intended to heat one room or similar space. As used here, "space heater" excludes fireplaces, chimneys and chimney connectors but includes wood stoves. Space heaters also accounted for 79% of associated civilian deaths, 62% of associated civilian injuries, and 49% of associated direct property damage.

In 2003-2007, the central heating shares were 18% of reported U.S. home heating fires, 7% of associated civilian deaths, 9% of associated civilian injuries, and 9% of associated direct property damage.

Gas-fueled heating devices pose a higher risk of death due to non-fire carbon monoxide poisoning.[1]
Studies by the U.S. Consumer Product Safety Commission (CPSC) provide 1980-2006 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 1.2). Gas-fueled heating equipment accounted for most of these deaths. Electric-powered heating units do not have this risk at all, of course.

In 1998, 2000, 2001, and 2003, there were 2.5 electrocution deaths per year involving electric water heaters and 1.8 electrocution deaths per year involving electric furnaces.[2]
These are the only years with separate statistics for water heaters and furnaces. In 1995-1997, statistics were provided for furnaces and water heaters together, and the combined average in those years was higher (5.0) than the combined average (4.3) in the four years cited.

Heating equipment accounted for 62,900 injuries reported to hospital emergency rooms in 2008.
Fireplaces accounted for 24% of the injuries, followed by space heaters (23%), furnaces (13%), and ductwork for heating and/or cooling (12%). (See Table 1.C.) Smaller shares were accounted for by water heaters (7%), chimneys (2%), heat lamps (0%), and heat tape (0%). Unclassified or unknown-type heating equipment accounted for 16% of the injuries.[3]

CPSC's National Electronic Injury Surveillance System

The CPSC's National Electronic Injury Surveillance System (NEISS) collects information about all injuries seen in a weighted statistical sample of hospital emergency rooms. Information about the injury cause is obtained from the patient. No allocation of unknown data was done for the NEISS results presented here. No filters on property use location of victim were used.

[1] Matthew V. Hnatov, "Non-Fire Carbon Monoxide Deaths Associated with the Use of Consumer Products," U.S. Consumer Product Safety Commission, www.cpsc.gov, July 8, 2008, Table 1, and previous reports in series.
[2] Risana T. Chowdbury, "2003 Electrocutions Associated with Consumer Products," December 2006, Table 2, www.cpsc.gov, and previous reports in the series.

Thermal burns and anoxia combined accounted for 29% of the injuries, while lacerations accounted for 27%. Anoxia means a lack of oxygen, which may occur in a fire-affected atmosphere or when carbon monoxide from malfunctioning equipment crowds out oxygen.

Table 1.C. Injuries Reported to Hospital Emergency Rooms and Involving Heating Equipment, 2008

	Total	Thermal Burns	Anoxia	Lacerations
Fireplace or chimney	16,380	1,710	350	8,860
Space heater	14,210	6,430	840	2,360
Furnace	8,420	980	4,300	960
Ductwork for heating or cooling	7,510	250	30	4,920
Water heater	4,250	690	210	1,030
Outdoor patio manufactured heater or firepit	1,920	1,090	0	580
Heat lamp	100	30	0	0
Heat tape	60	0	0	0
Unclassified or unknown-type heating equipment	10,030	2,910	950	2,730
Total	62,900	14,090	6,670	21,450

Source: CPSC's National Electronic Injury Surveillance System

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

The author conducted an unpublished special study of 1988-1992 data and 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. In NFIRS Version 5.0, there no longer is a separate code for explosions with no after-fire.

Table 1.D. Comparative Risk of Central and Space Heating Equipment Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	394 - 589	131 - 145	3 - 4 times
Civilian deaths (per million user households)	9.0 - 13.5	0.5	18 - 25 times
Civilian injuries (per million user households)	19.0 - 28.4	1.7-1.8	11 - 16 times
Direct property damage (per user household)	$7.8 - $11.6	$0.9	9 - 13 times

[3] On-line queries of National Electronic Injury Surveillance system (NEISS) at www.cpsc.gov.

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

Table 1.3 provides statistics on 2005 usage of different types of central or space heating equipment from the 2005 Residential Energy Consumption Survey. Table 1.D shows the results in these broad categories, and Tables 1.E to 1.F compare risks by type of fuel or power for space heaters and central heating equipment, respectively.

Table 1.E. Comparative Risk of Space Heating Equipment for Different Types of Fuel or Power Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Wood Stove or Other Solid-Fueled	Portable Kerosene Heater or Other Liquid-Fueled	LP or Natural Gas-Fueled	Portable or Fixed Electric-Powered
Fires (per million user household)	407 - 942	1,255 - 1,455	425 - 730	353 - 401
Civilian deaths (per million user households)	10.9 - 30.9	25.6 - 29.4	8.2 - 18.4	5.9 - 7.1
Civilian injuries (per million user households)	7.4 - 21.0	43.1 - 49.5	14.9 - 33.1	22.4 - 27.0
Direct property damage (per user household)	$6.0 - $16.9	$13.6 - $15.7	$8.0 - $17.8	$7.1 - $8.6

Note: There is no "best" estimate within the ranges, because the ends primarily represent the inclusion or exclusion of statistics on usage of "other" heating devices that cannot be classified with confidence as central heating units vs. space heaters based on available data. Fires are analyzed by type of equipment and then for each device by type of equipment power; this is done separately for non-confined fires, fires confined to boiler or fuel burner, and fires confined to chimney or flue.

Table 1.F. Comparative Risk of Central Heating Equipment for Different Types of Fuel or Power Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Oil or Other Liquid-Fueled	Electric-Powered	Gas-Fueled
Fires (per million user households)	579 - 633	191 - 230	52 - 56
Civilian deaths (per million user households)	0.0	0.2	0.3 - 0.4
Civilian injuries (per million user households)	1.9 - 2.1	2.1 - 2.4	1.4 - 1.5
Direct property damage (per million user households)	$1.4 - $1.5	$0.9 - $1.1	$0.7

Note: There is no "best" estimate within the ranges, because the ends represent the inclusion or exclusion of certain "other" heating devices that either are or are not central heating devices but cannot be classified with confidence based on available data. Fires are analyzed by type of equipment and then for each device by type of equipment power; this is done separately for non-confined fires, fires confined to boiler or fuel burner, and fires confined to chimney or flue.

Comparisons of different fuel or power options within central heating equipment do not show any specific type to be clearly and consistently better or worse for all types of loss.

- Among central heating equipment, gas-fueled units show a higher rate of civilian fire deaths per user household but lower fire incident rates, civilian fire injury rates, and property damage rates.

- Liquid-fueled equipment has the highest rates for fire incidents and direct property damage.

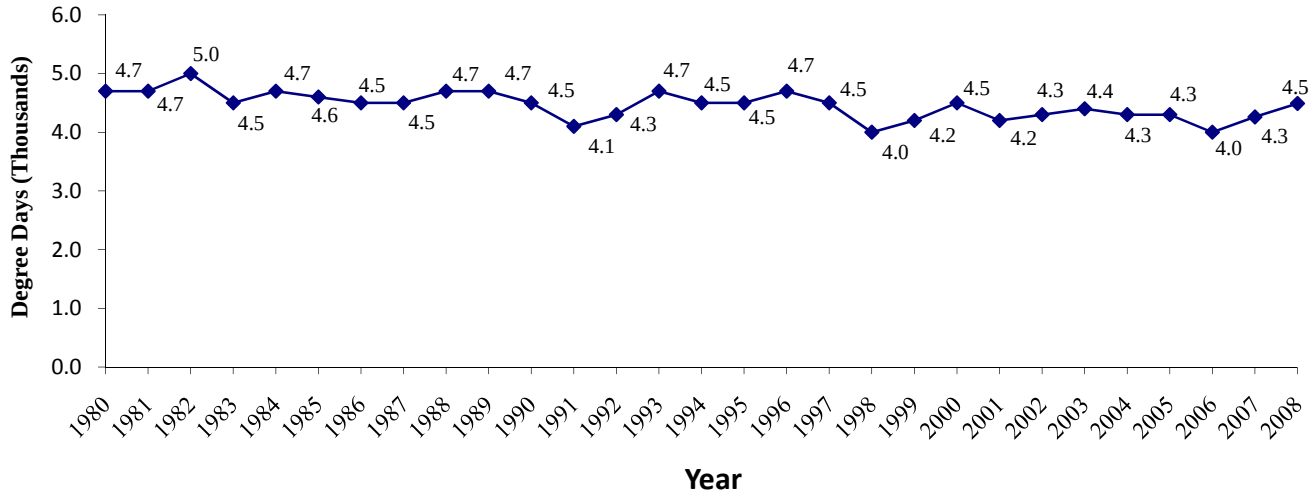
Among space heating equipment, electric-powered device (portable or fixed) show the lowest rates of fires and civilian fire deaths. There are no other clear differences that apply for all types of loss.

Water heaters show very large differences with gas-fueled equipment showing higher rates per million population than electric-powered equipment for fires (88 vs. 48), civilian fire deaths (0.7 vs. 0.1), civilian fire injuries (4.8 vs. 0.9), and direct property damage ($1.8 vs. $0.4).

The decline in home heating fires since 1980 may be partly attributable to the slight and inconsistent decline in annual heating degree days.

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 each day with average temperature below 65ºF, assigned a number of degree days equal to the difference between the average temperature and 65ºF. For example, a day with an average temperature of 70ºF would register no degree days, a day with an average temperature of 60ºF would register five degree days, and a day with an average temperature of 50ºF would register 15 degree days. Sum degree days for all days in the year, and you have an annual total. National heating-degree day statistics are estimated from individual measurement stations weighted by the population in the areas nearest those stations.

Figure 1.2. U.S. Demand for Heating in Thousands of Heating Degree Days, 1980-2008



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

Figure 1.2 shows the history of heating degree days for the contiguous 48 states.

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.[4]) 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.[5] 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.

(Decorative fireplaces are not designed for extended use as a heating device. Fireplace inserts, like a metal box, provide a structure that can safely absorb heat from extended use and will efficiently generate convected heat when so heated.)

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 one.[6] 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.

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[4] "Gasoline Retail Prices," *World Almanac 2005*, World Almanac Books, New York, p.71.

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

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

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 usage of portable kerosene heaters, which occurred in the early 1980s, may seem surprising, because 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.[7] 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).[8]

Another report on the same data, by Gomberg and Clark, provides more details.[9] 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.

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 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.[10] More recent studies have confirmed that the heating equipment share of home fire deaths continues to be much higher in the South than in other regions.[11]

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[7] 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.

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

[9] 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.

[10] See for example, "Preview: Residential Fire 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.

[11] Michael J. Karter, Jr., *U.S. Fire Experience by Region, 2002-2006*, NFPA Fire Analysis and Research Division, April 2008, Table ;11.

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). Recent usage data (for 2007) confirms that space heating constitutes a much larger share of main heating equipment in the South than in other regions.[12]

The leading factor contributing to ignition in 2003-2007 home heating equipment fires is failure to clean, which presumably refers primarily to creosote build-up.
Failure to clean was cited for 16,510 home heating fires per year in 2003-2007, or 25% of all confined or non-confined home heating fires. (See Table 1.G.)

The second leading factor was unclassified mechanical failure or malfunction, cited in 9,040 home heating fires per year or 13% of all confined or non-confined home heating fires. 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.

The third leading factor was heat source too close to combustibles, cited in 8,810 home heating fires per year or 13% of all confined or non-confined home heating fires and 46% 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).

Creosote and Chimney Fires

Creosote is a sticky, oily combustible substance created when wood does not burn completely. It rises into the chimney as a liquid and deposits on the chimney wall. A fire starting in creosote can appropriately be reported as a fire with failure to clean as Factor Contributing to Ignition and film or residue as Item First Ignited. The former appears to be used more consistently in fire incident reports.

A conservative best estimate of creosote fires would combine failure-to-clean confined chimney or flue fires with failure-to-clean fires involving solid-fueled space heaters, fireplaces, chimneys and chimney connectors. **This produces estimates of 14,720 reported creosote fires (22% of the total) per year with associated losses of four civilian deaths, 24 civilian injuries, and $33 million in direct property damage per year.**

Some analysts prefer the simplicity of estimating creosote fires by total confined chimney or flue fires – 23,380 fires, no deaths, 40 civilian injuries, and $11 million in direct property damage per year. Combining the two approaches (without double-counting the overlaps) gives a high estimate of 24,010 fires, four civilian deaths, 53 civilian injuries, and $39 million in direct property damage per year.

[12] U.S. Departments of Commerce and Housing and Urban Development, *American Housing Survey for the United States: 2007*, September 2008, Table 2-4.

Table 1.G. Leading Factors Contributing to Ignition for Home Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure to clean	16,510	(25%)	12	(2%)	34	(2%)	$43	(5%)
Unclassified mechanical failure or malfunction	9,040	(13%)	30	(5%)	119	(7%)	$95	(11%)
Heat source too close to combustibles	8,810	(13%)	284	(46%)	587	(35%)	$271	(32%)
Unclassified factor	4,060	(6%)	31	(5%)	65	(4%)	$40	(5%)
Equipment unattended	2,970	(4%)	32	(5%)	208	(13%)	$89	(11%)
Total	67,220		615		1,658		$846	

Note: Statistics are calculated separately for fires reported as non-confined fires, confined to chimney or flue, or confined to fuel burner or boiler. 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 ten, 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. Statistics are calculated separately for fires reported as non-confined fires, confined to chimney or flue, or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 1.4 shows factors contributing to ignition for all heating equipment for *non-confined* fires. These statistics are missing most fire incidents but include most associated deaths, injuries, and damages. Equipment unattended is another high-ranking factor (10% of non-confined home heating equipment fires) that, like heat source too close to combustibles, can be addressed by safe heating rules, which direct users to turn off certain space heaters when leaving a room or going to sleep. Improper fueling technique (6% of non-confined home heating equipment fire deaths) also leads directly to a safe heating rule.

Table 1.5 shows the human factors contributing to ignition for non-confined home heating equipment fires. The leading factor is unattended or unsupervised person (reported for 8% 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.

One out of 12 (8%) 2003-2007 home heating fires, including confined fires, began with ignition of film or residue, including creosote.
The leading item first ignited also could refer to creosote – unclassified item first ignited (19%). (See Table 1.H.) The second leading item – flammable or combustible gas or liquid (15%) – primarily consists of fires confined to boiler of fuel burner and so would fit with a confined furnace blowback scenario.

Table 1.H. Leading Items First Ignited for Home Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified item	12,640	(19%)	15	(3%)	65	(4%)	$33	(4%)
Flammable or combustible gas or liquid	10,220	(15%)	100	(16%)	343	(21%)	$75	(9%)
Structural member or framing	5,150	(8%)	83	(14%)	99	(6%)	$210	(25%)
Film or residue	5,070	(8%)	5	(1%)	10	(1%)	$4	(1%)
Wire or cable insulation	3,870	(6%)	12	(2%)	45	(3%)	$19	(2%)
Total	67,220		615		1,658		$846	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined fires, confined to chimney or flue, or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 1.6 shows the leading items first ignited for *non-confined* fires. Home heating fires begin with ignition of a wide variety of combustibles. Excluding confined fires, structural member or framing accounts for the largest share of items first ignited (17%), followed by cooking materials (10%), wire or cable insulation (8%), and flammable or combustible gas or liquid (8%).

The large share for cooking materials seems surprising. There are available appliances designed for dual use as heating stoves and cooking stovetops, but these devices are in very limited use. Alternatively, there may be considerable use of heating equipment for cooking purposes. It is also possible 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. As noted earlier, roughly 10,000 fires a year reported as confined to cooking equipment involve heating stove.

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.[13]

[13] 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.

Regionally, the percent using stove or 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.[14]

One-third (35%) of reported home heating fires began in and were confined to a chimney or flue.

This share may be significantly understated because chimney is not a choice for area of origin, which means all the non-confined home heating fires beginning in chimneys must be coded as a space like chimney (e.g., unclassified area), a space that contains a chimney (e.g., living room, family room or den), or a space adjacent to a chimney. (See Table 1.I.) The living room, family room, or den, (32%) accounted for the largest share of associated civilian fire deaths. (See Table 1.7.)

Table 1.8 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. The majority of fatal victims were considered to have been involved in the ignition, but the majority were also located outside the area of origin when fire began.

Table 1.I. Leading Areas of Origin for Home Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Chimney or flue (confined)	23,380	(35%)	0	(0%)	40	(2%)	$11	(1%)
Heating equipment room or area	12,720	(19%)	34	(6%)	235	(14%)	$90	(11%)
Kitchen	5,960	(9%)	69	(11%)	396	(24%)	$82	(10%)
Living room, family room, or den	2,930	(4%)	197	(32%)	206	(12%)	$109	(13%)
Crawl space or substructure space	2,140	(3%)	24	(4%)	52	(3%)	$50	(6%)
Total	67,220		615		1,658		$846	

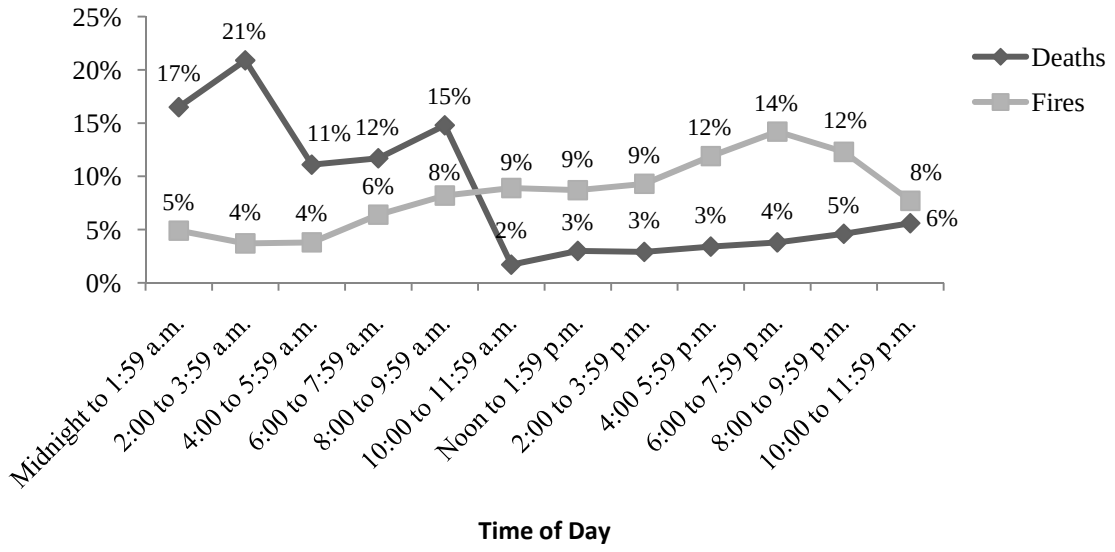
Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, 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. Statistics are calculated separately for fires reported as non-confined fires, confined to chimney or flue, or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

[14] "Use of Unvented Residential Heating Appliances – 1988-1994," MMWR, December 26, 1997, 46, pp. 1221-1224, http//www.cdc.gov/mmwr/preview/mmwrhtm1/00050535.htm.

Home heating fires (including fires reported as confined fires) peak in the mid-evening (6:00 to 8:00 pm) while associated deaths peak just after midnight (2:00 to 4:00 am).
Home heating fires are less common during midnight to 6:00 a.m. This could reflect the practice in many homes of turning down the heat overnight, allowing blankets and bedding to compensate, and of relying less on heating equipment in the middle of the day, when temperatures are at their daily highs and occupants are least likely to be at home (during school and work hours). It also reflects the fact that sleeping occupants are not actively interacting with the equipment, which is how many fires begin.

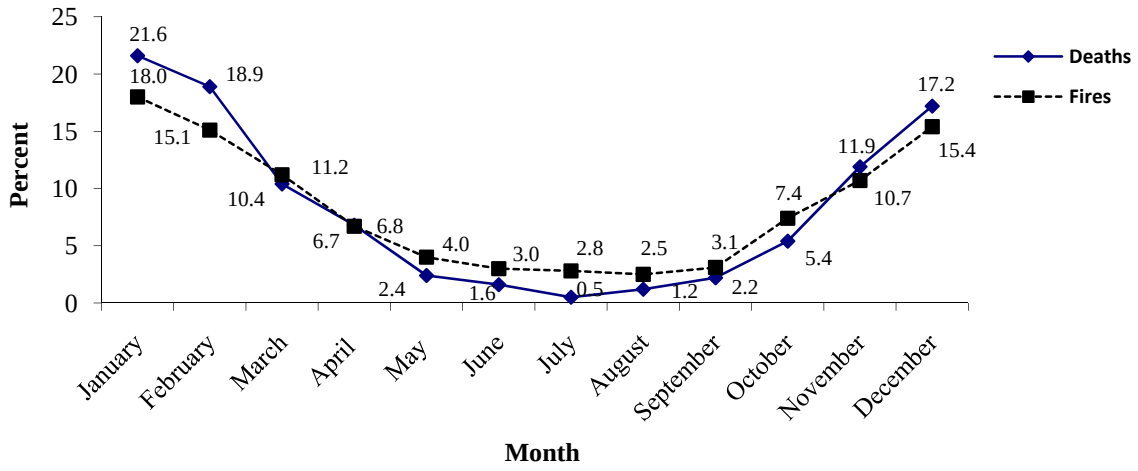
Figure 1.3. Home Heating Fires, by Time of Day, 2003-2007
(Rolling 2-Hour Periods)



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 1.9 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 49% of the fires (compared to 25% if every block of three months had an equal share of fires). The December to February share is 46% for central heating units and 49% for space heaters, but it is 61% for fireplaces, chimneys and chimney connectors. As Figure 1.4 shows, the seasonality is even more pronounced for home heating fire deaths, with December through February accounting for 58% of those fire deaths.

Figure 1.4. Home Heating Fires and Fire Deaths, by Month



Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 1.G. 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	13%	10%	7%
5-14	7%	8%	14%
15-34	12%	14%	28%
35-64	37%	40%	39%
65 and over	31%	28%	12%

B. Civilian Injuries

Age Group	Percent Home Heating Fire Injuries	Percent All Fire Injuries	Percent Population
Under 5	5%	5%	7%
5-14	6%	7%	14%
15-34	32%	33%	28%
35-64	44%	43%	39%
65 and over	13%	13%	12%

Source: Data from NFIRS Version 5.0 and NFPA survey

Home heating fire deaths (2003-2007) show more younger and older victims than total home fire deaths (2003-2007).

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, and both groups have higher relative risk (compared to other age groups) for heating equipment than for all causes combined. Relative risk is measured by percent of fire deaths divided by percent of population. Risk by age group (of those shown) for non-fatal injuries are nearly the same for home heating equipment fires. (See Table 1.G.)

Safe Heating Behaviors

Messages from NFPA Educational Messaging Advisory Committee

General heating-related messages

- Have a three-foot kid-free zone around open fires and heaters.
- 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.
- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
- Use heating equipment that has the label of a recognized testing laboratory.
- Never use your oven for heating.
- Install stationary space heating equipment, water heaters or central heating equipment according to the local codes and manufacturer's instructions. Have a qualified professional install the equipment.
- Make sure all fuel-burning equipment is vented to the outside to avoid carbon monoxide poisoning. CO is created when fuels burn incompletely. CO poisoning can cause illness and even death. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.
- For home energy assistance, contact the National Energy Assistance Referral line at 1-866-674-6327.

Portable electric space heaters

- Turn heaters off when you go to bed or leave the room.
- Use and purchase portable space heaters with an auto shut off so if they're tipped over they will shut off.
- Place space heater on solid, flat surface.
- Plug power cords directly into outlets and never into an extension cord.
- Inspect for cracked or damaged, broken plugs or loose connections. Replace before using.

Fuel burning space heaters

- Always use the proper fuel as specified by the manufacturer.
- When refueling, allow the appliance to cool and refuel outside or in a well-ventilated area.
- When using the heater, open a window to ensure adequate venting.

- In portable kerosene or other liquid-fueled space heaters always use the proper grade of the proper fuel.
- All new unvented gas-fired space heaters have an oxygen depletion sensor that detects a reduced level of oxygen in the area where the heater is operating and shuts off the heater before a hazardous level of carbon monoxide accumulates. If you have an older heater without this feature, replace it.
- If the pilot light of your gas heater goes out, allow 5 minutes or more for the gas to go away before trying again, do not allow gas to accumulate, and light the match before you turn on the gas to the pilot to avoid risk of flashback.
- If you small gas in your gas heater, do not attempt to light the appliance. Turn off all the controls and open doors and window. Call a gas service person.

Wood burning stoves

- Install the stove, chimney connectors and chimneys following manufacturer's instructions or have a professional do the installation.
- Wood stoves should bear the label of a recognized testing laboratory.
- In wood stoves, burn only dry, seasoned wood. In pellet stoves, burn only dry, seasoned wood pellets.
- Start the fire with newspaper or kindling, never with a flammable liquid, such as lighter fluid, kerosene or gasoline.
- Keep the doors of your wood stove closed unless loading or stoking the live fire.
- Allow ashes to cool before disposing. Dispose of ashes in a tightly covered metal container and keep the ash container at least 10 feet away from the home and any other nearby buildings. Douse and saturate with water. Chimneys and vents need to be cleaned and inspected at least once a year.

Additional safety tips for heating

- Select a space heater that is rated by the manufacturer for the size space you intend to heat.
- Check for product recalls at www.cpsc.gov.
- Do not position electric-powered space heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
- For wood-fueled equipment, burn only 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. 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, the annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.
- Do not use or store flammable or combustible liquid near or in rooms with heaters, in order to avoid a vapor ignition and possible flash fire.

- The annual inspection can best be timed for just before the beginning of a new heating season. 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.
- Select a space heater that is rated by the manufacturer for the size space you intend to heat.

Table 1.1 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 2007 Dollars)	
1980	232,300		1,020		3,550		$766		$1,931	
1981	230,300		990		3,030		$624		$1,421	
1982	235,100		1,190		3,480		$851		$1,828	
1983	232,800		1,120		3,710		$848		$1,764	
1984	212,400		870		2,880		$786		$1,568	
1985	203,500		1,190		3,260		$892		$1,717	
1986	169,500		810		2,710		$700		$1,326	
1987	150,400		850		2,860		$662		$1,208	
1988	141,400		920		3,440		$824		$1,446	
1989	131,500		800		2,970		$838		$1,404	
1990	99,600		810		2,470		$749		$1,191	
1991	100,500		670		2,570		$1,006*		$1,532*	
1992	98,900		650		2,570		$721		$1,067	
1993	99,500		680		2,910		$729		$1,047	
1994	87,300		620		2,290		$738		$1,033	
1995	80,500		570		2,120		$747		$1,017	
1996	75,300		810		2,070		$843		$1,115	
1997	70,500		580		1,590		$756		$977	
1998	58,000		500		1,720		$664		$846	
1999	78,700	(45,200)	180	(180)	2,080	(2,080)	$813	($756)	$1,012	($941)
2000	72,500	(40,300)	810	(810)	1,980	(1,890)	$929	($908)	$1,120	($1,094)
2001	71,900	(35,600)	410	(410)	1,670	(1,580)	$849	($830)	$995	($973)
2002	73,600	(35,100)	660	(660)	1,580	(1,550)	$1,310	($1,288)	$1,511	($1,486)
2003	71,000	(29,100)	550	(550)	1,750	(1,620)	$961	($940)	$1,083	($1,058)
2004	69,500	(27,600)	670	(670)	1,660	(1,520)	$922	($907)	$1,012	($995)
2005	64,900	(27,700)	730	(730)	1,630	(1,510)	$966	($943)	$1,026	($1,002)
2006	64,100	(27,000)	540	(540)	1,400	(1,300)	$943	($937)	$970	($964)
2007	66,400	(28,800)	580	(580)	1,850	(1,710)	$608	($601)	$608	($601)

* 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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey.

Table 1.2. 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	2000-2004 Average
LP gas-fueled heating equipment	138	104	84	65	33
Natural gas-fueled heating equipment	64	61	50	47	36
Water heater (gas-fueled)	14	10	11	6	3
Liquid-fueled heating equipment	17	17	15	9	7
Solid-fueled heating equipment	14	5	17	6	4

Heating device	2000	2001	2002	2003	2004	2005	2006	2002-2006 Average
LP gas-fueled heating equipment	28	27	46	26	37	31	21	32
Natural gas-fueled heating equipment	43	32	36	32	40	13	25	29
Water heater (gas-fueled)	3	1	1	7	2	6	4	4
Liquid-fueled heating equipment	8	6	10	6	4	5	3	6
Solid-fueled heating equipment	2	6	4	2	4	4	0	3

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. Report in 2008 provided revised data for 2000-2004.

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, September 2009, Table 1. Additional information from previous reports in this series.

Table 1.3. Low and High Estimates of 2005 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	58.1 natural gas/warm air-44.7 natural gas/piped steam or hot water-8.2 LP gas/warm air-4.1 natural gas/secondary use/central warm air-1.1	62.8 Low estimate plus natural gas/secondary use/"other" device-0.7 LP gas/primary use/"other" device-0.8 natural gas/primary use/"other" device-0.9 LP gas/secondary use/all devices -2.3
Central heating unit	Liquid	7.5 fuel oil/warm air-2.8 fuel oil/piped steam or hot water-4.7	8.2 Low estimate plus fuel oil/primary use/"other"device-0.3 fuel oil/secondary use/all devices-0.4
Central heating unit	Electricity	16.0 warm air-16.0	19.2 Low estimate plus primary use/ "other" device-1.9 secondary use/"other" device-1.3
Water heater	Gas	58.7	58.7
Water heater	Electricity	43.1	43.1
Space heater	Gas	5.7 natural gas /primary use/room heater -2.0 LP gas/primary use/room heater-0.9 natural gas/primary use/floor, wall, or pipeless furnace-2.3 natural gas/secondary use/room heater-0.5	9.8 Low estimate plus LP gas/secondary use/all devices-2.3 LP gas/primary use/"other" device-1.0 natural gas/secondary use/"other" device-0.8
Space heater	Liquid	2.0 kerosene heater/primary use-0.7 kerosene heater/secondary use-0.9 fuel oil /secondary use/all devices-0.4	2.3 Low estimate plus fuel oil/primary use/"other" device-0.3
Space heater	Solid	5.1 wood/primary use/all devices-2.9 wood/secondary use/heating stove-2.2 wood/secondary use/ "other" device-0.0	11.8 Low estimate plus secondary use/fireplace-6.7
Space heater	Electricity	23.2 portable heater/secondary use-16.0 built-in units/primary use-5.0 built-in unit/secondary use-2.2	26.4 Low estimate plus "other" device/primary use-1.9 "other" device/secondary use-1.3

Source: *2005 Residential Energy Consumption Survey*, Table HC5.4 and Table HC2.8, from U.S. Department of Energy web site, http://www.eia.doe.gov/emeu/recs.

Table 1.4. Home Heating Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 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	7,820	(28%)	284	(46%)	585	(38%)	$270	(33%)
Unclassified mechanical failure or malfunction	2,940	(10%)	30	(5%)	84	(6%)	$93	(11%)
Equipment unattended	2,760	(10%)	32	(5%)	208	(14%)	$89	(11%)
Installation deficiency	1,590	(6%)	18	(3%)	33	(2%)	$48	(6%)
Leak or break	1,390	(5%)	64	(10%)	83	(5%)	$49	(6%)
Unclassified electrical failure or malfunction	1,390	(5%)	20	(3%)	36	(2%)	$29	(3%)
Failure to clean	1,090	(4%)	12	(2%)	20	(1%)	$38	(5%)
Unspecified short circuit arc	1,040	(4%)	10	(2%)	22	(1%)	$16	(2%)
Unclassified factor	1,020	(4%)	31	(5%)	55	(4%)	$38	(5%)
Unclassified misuse of material or product	1,000	(4%)	16	(3%)	84	(5%)	$23	(3%)
Unintentionally turned on or not turned off	790	(3%)	0	(0%)	41	(3%)	$17	(2%)
Unclassified operational deficiency	780	(3%)	17	(3%)	22	(1%)	$24	(3%)
Worn out	770	(3%)	4	(1%)	16	(1%)	$19	(2%)
Abandoned or discarded material or product	740	(3%)	0	(0%)	59	(4%)	$12	(1%)
Construction deficiency	690	(2%)	5	(1%)	10	(1%)	$23	(3%)
Equipment not being operated properly	510	(2%)	16	(3%)	50	(3%)	$16	(2%)
Flammable liquid or gas spilled	440	(2%)	14	(2%)	71	(5%)	$25	(3%)
Short circuit arc from defective or worn insulation	410	(1%)	4	(1%)	8	(1%)	$6	(1%)
Unclassified design, manufacturing, or installation deficiency	390	(1%)	0	(0%)	12	(1%)	$19	(2%)
Automatic control failure	360	(1%)	11	(2%)	11	(1%)	$8	(1%)
Arc or spark from operating equipment	340	(1%)	32	(5%)	11	(1%)	$8	(1%)
Improper container or storage	340	(1%)	3	(1%)	28	(2%)	$6	(1%)
Design deficiency	250	(1%)	4	(1%)	6	(0%)	$8	(1%)
Water caused short circuit arc	230	(1%)	0	(0%)	2	(0%)	$1	(0%)
Unclassified fire spread or control factor	180	(1%)	9	(1%)	13	(1%)	$10	(1%)
Improper fueling technique	170	(1%)	36	(6%)	22	(1%)	$8	(1%)
Equipment overloaded	170	(1%)	0	(0%)	11	(1%)	$5	(1%)
Equipment used for not intended purpose	160	(1%)	16	(3%)	10	(1%)	$5	(1%)

Table 1.4. Home Heating Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 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)	
Short circuit arc from mechanical damage	150	(1%)	0	(0%)	6	(0%)	$2	(0%)
Arc from faulty contact or broken conductor	140	(1%)	0	(0%)	0	(0%)	$1	(0%)
Other known factor	1,150	(4%)	72	(12%)*	100	(7%)	$39	(5%)
Total fires excluding confined fires	28,020	(100%)	614	(100%)	1,532	(100%)	$831	(100%)
Total factor entries	31,230	(111%)	759	(124%)	1,719	(112%)	$957	(115%)

* Leading factor not shown is collision, knockdown, or overturn (5% of deaths).

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 ten, 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.

Table 1.5. Home Heating Fires, by Human Factor Contributing to Ignition
Annual Average of 2003-2007 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	2,120	(8%)	34	(6%)	129	(8%)	$53	(6%)
Asleep	1,260	(4%)	181	(29%)	210	(14%)	$58	(7%)
Age was a factor	410	(1%)	55	(9%)	99	(6%)	$17	(2%)
Possibly impaired by alcohol or drugs	240	(1%)	55	(9%)	32	(2%)	$9	(1%)
Multiple persons involved	180	(1%)	46	(8%)	42	(3%)	$10	(1%)
Possibly mentally disabled	120	(0%)	6	(1%)	13	(1%)	$3	(0%)
Physically disabled	100	(0%)	43	(7%)	16	(1%)	$7	(1%)
None reported	24,020	(86%)	310	(51%)	1,096	(72%)	$697	(84%)
Total fires excluding confined fires	28,020	(100%)	614	(100%)	1,532	(100%)	$831	(100%)
Total factor entries	28,430	(101%)	730	(119%)	1,636	(107%)	$853	(103%)

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 ten, 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 1.6. Home Heating Fires, by Item First Ignited
Annual Average of 2003-2007 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	4,680	(17%)	83	(14%)	99	(6%)	$209	(25%)
Cooking materials	2,840	(10%)	10	(2%)	260	(17%)	$40	(5%)
Wire or cable insulation	2,360	(8%)	12	(2%)	32	(2%)	$18	(2%)
Flammable or combustible gas or liquid	2,190	(8%)	100	(16%)	290	(19%)	$74	(9%)
Interior wall covering	1,390	(5%)	28	(5%)	61	(4%)	$49	(6%)
Unclassified item	1,330	(5%)	15	(3%)	40	(3%)	$29	(4%)
Clothing	1,240	(4%)	44	(7%)	122	(8%)	$31	(4%)
Floor covering	1,150	(4%)	39	(6%)	63	(4%)	$33	(4%)
Unclassified structural component or finish	970	(3%)	19	(3%)	26	(2%)	$49	(6%)
Appliance housing or casing	860	(3%)	9	(1%)	30	(2%)	$10	(1%)
Insulation within structural area	780	(3%)	0	(0%)	23	(2%)	$15	(2%)
Mattress or bedding	750	(3%)	71	(12%)	80	(5%)	$32	(4%)
Exterior wall covering or finish	660	(2%)	10	(2%)	14	(1%)	$17	(2%)
Cabinetry	590	(2%)	0	(0%)	34	(2%)	$28	(3%)
Upholstered furniture	510	(2%)	39	(6%)	54	(4%)	$29	(4%)
Box or bag	510	(2%)	0	(0%)	41	(3%)	$17	(2%)
Multiple items first ignited	470	(2%)	12	(2%)	36	(2%)	$30	(4%)
Unclassified soft goods	440	(2%)	13	(2%)	20	(1%)	$14	(2%)
Interior ceiling covering	430	(2%)	26	(4%)	13	(1%)	$22	(3%)
Household utensil	390	(1%)	0	(0%)	12	(1%)	$3	(0%)
Unclassified furniture or utensil	380	(1%)	22	(4%)	36	(2%)	$10	(1%)
Papers	310	(1%)	19	(3%)	11	(1%)	$11	(1%)
Dust, fiber, or lint	300	(1%)	0	(0%)	2	(0%)	$3	(0%)
Linen other than bedding	280	(1%)	0	(0%)	21	(1%)	$3	(0%)
Unclassified organic material	250	(1%)	3	(1%)	6	(0%)	$4	(1%)
Trash or waste	200	(1%)	0	(0%)	8	(1%)	$2	(0%)
Curtain or drape	200	(1%)	25	(4%)	19	(1%)	$8	(1%)
Exterior roof covering	180	(1%)	0	(0%)	2	(0%)	$11	(1%)
Pipe, duct, conduit or hose	140	(1%)	0	(0%)	9	(1%)	$2	(0%)
Other known item	1,240	(4%)	14	(2%)	66	(4%)	$27	(3%)
Total fires excluding confined fires	28,020	(100%)	614	(100%)	1,532	(100%)	$831	(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 ten, 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 1.7. Home Heating Fires, by Area of Origin
Annual Average of 2003-2007 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	5,360	(19%)	69	(11%)	391	(26%)	$82	(10%)
Heating equipment room or area	4,290	(15%)	34	(6%)	189	(12%)	$88	(11%)
Living room, den, or family room	2,640	(9%)	197	(32%)	199	(13%)	$109	(13%)
Bedroom	1,990	(7%)	123	(20%)	172	(11%)	$71	(8%)
Wall assembly or concealed space	1,760	(6%)	20	(3%)	42	(3%)	$72	(9%)
Crawl space or substructure space	1,290	(5%)	24	(4%)	42	(3%)	$50	(6%)
Laundry room or area	1,250	(4%)	8	(1%)	79	(5%)	$26	(3%)
Unclassified function area	1,230	(4%)	55	(9%)	102	(7%)	$42	(5%)
Attic or other space above top story	1,080	(4%)	0	(0%)	20	(1%)	$49	(6%)
Bathroom	850	(3%)	4	(1%)	52	(3%)	$18	(2%)
Garage*	820	(3%)	4	(1%)	70	(5%)	$51	(6%)
Closet	790	(3%)	2	(0%)	17	(1%)	$12	(1%)
Duct for HVAC, cable, exhaust, heating or air conditioning	730	(3%)	2	(0%)	29	(2%)	$17	(2%)
Ceiling/floor assembly or space between stories	610	(2%)	5	(1%)	10	(1%)	$19	(2%)
Unclassified structural area	570	(2%)	11	(2%)	7	(0%)	$26	(3%)
Exterior wall surface	380	(1%)	0	(0%)	3	(0%)	$11	(1%)
Unclassified area of origin	310	(1%)	17	(3%)	12	(1%)	$7	(1%)
Unclassified storage area	270	(1%)	0	(0%)	14	(1%)	$8	(1%)
Storage room	220	(1%)	2	(0%)	9	(1%)	$5	(1%)
Unclassified equipment or service area	220	(1%)	0	(0%)	3	(0%)	$7	(1%)
Exterior roof surface	170	(1%)	0	(0%)	5	(0%)	$11	(1%)
Hallway or corridor	150	(1%0	15	(2%)	10	(1%)	$7	(1%)
Other known area of origin	1,030	(4%)	21	(3%)	54	(4%)	$42	(5%)
Total fires excluding confined fires	28,020	(100%)	614	(100%)	1,532	(100%)	$831	(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 ten, 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 1.8. Home Heating Fire Deaths and Injuries, by Victim Location at Ignition and Major Equipment Group
Percentage of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)

A. Civilian Deaths

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	96 (16%)	0 (0%)	3 (7%)	93 (19%)	0 (0%)
Not in area of origin and not involved	146 (24%)	17 (38%)	15 (35%)	111 (23%)	3 (10%)
Not in area of origin but involved	185 (30%)	4 (10%)	2 (5%)	150 (31%)	24 (73%)
In area of origin and involved	187 (30%)	23 (52%)	23 (52%)	133 (27%)	5 (16%)
In area of origin	283 (46%)	23 (52%)	26 (59%)	225 (46%)	5 (16%)
Not in area of origin	331 (54%)	21 (48%)	18 (41%)	261 (54%)	28 (84%)
Involved in ignition	371 (61%)	27 (62%)	27 (57%)	283 (58%)	29 (10%)
Not involved in ignition	241 (39%)	17 (38%)	19 (43%)	203 (42%)	3 (90%)
Total	615 (100%)	44 (100%)	44 (100%)	486 (100%)	33 (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	443 (27%)	29 (20%)	68 (21%)	288 (28%)	45 (42%)
Not in area of origin and not involved	400 (24%)	56 (38%)	98 (30%)	211 (19%)	29 (27%)
Not in area of origin but involved	171 (10%)	12 (8%)	21 (6%)	117 (11%)	17 (16%)
In area of origin and involved	643 (39%)	51 (34%)	136 (42%)	404 (41%)	16 (15%)
In area of origin	1,086 (66%)	80 (54%)	203 (63%)	692 (69%)	62 (58%)
Not in area of origin	572 (34%)	68 (46%)	118 (37%)	328 (31%)	46 (33%)
Involved in ignition	814 (49%)	63 (43%)	156 (49%)	522 (51%)	33 (31%)
Not involved in ignition	844 (51%)	85 (57%)	165 (51%)	500 (49%)	74 (69%)
Total	1,658 (100%)	148 (100%)	322 (100%)	1,021 (100%)	108 (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. All home fireplace fire deaths had victim location unknown.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 1.9. Home Heating Fires, by Month and Major Equipment Group
Percentage of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)

	All Heating Equipment	Central Heating	Water Heater	Space Heater	Fireplace, Chimney or Chimney Connector
January	12,130 (18.0%)	2,140 (18.9%)	780 (10.4%)	3,930 (18.5%)	2,790 (26.2%)
February	10,160 (15.1%)	1,730 (15.3%)	590 (7.9%)	3,310 (15.6%)	1,870 (17.6%)
March	7,560 (11.2%)	1,390 (12.2%)	690 (9.3%)	2,490 (11.8%)	1,410 (13.2%)
April	4,540 (6.8%)	770 (6.8%)	560 (7.5%)	1,320 (6.2%)	670 (6.3%)
May	2,690 (4.0%)	490 (4.3%)	640 (8.6%)	800 (3.8%)	200 (1.8%)
June	1,990 (3.0%)	450 (4.0%)	630 (8.4%)	680 (3.2%)	70 (0.6%)
July	1,850 (2.8%)	290 (2.6%)	640 (8.6%)	560 (2.6%)	50 (0.4%)
August	1,670 (2.5%)	210 (1.9%)	590 (7.4%)	510 (2.4%)	40 (0.3%)
September	2,120 (3.1%)	430 (3.8%)	620 (8.4%)	630 (3.0%)	150 (1.4%)
October	4,950 (7.4%)	960 (8.5%)	630 (8.4%)	1,500 (7.1%)	530 (5.0%)
November	7,220 (10.7%)	1,150 (10.2%)	620 (8.3%)	2,250 (10.6%)	1,030 (9.7%)
December	10,330 (15.4%)	1,310 (11.6%)	520 (6.9%)	3,200 (15.1%)	1,840 (17.3%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are estimated to the nearest ten.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Section 2. Space Heaters

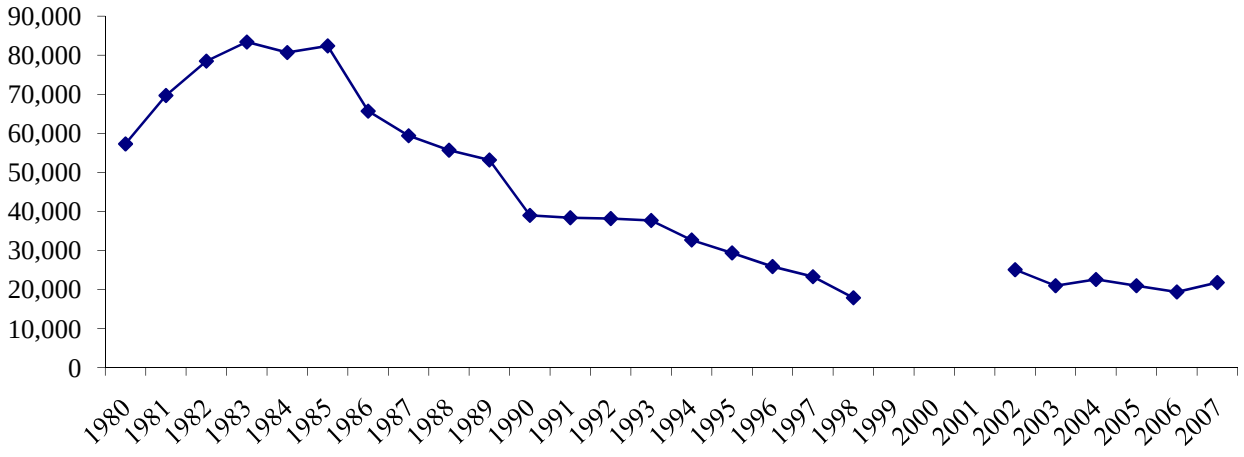
In 2007, an estimated 21,800 reported home structure fires involving stationary or portable space heaters resulted in 490 civilian deaths, 1,180 civilian injuries, and $330 million in direct property damage.

From 1980 to 2007, estimated fires declined by 62% (and by 74% from the peak in 1983) but have been essentially level since 2003. (See Figure 2.1.) Civilian deaths increased by 2% from 1980 to 2007 but decreased by 39% from the peak in 1985; there has been no clear trend up or down since 2000. (See Table 2.1.) Civilian injuries decreased by 1% from 1980 to 2007 and by 30% from 1983. Direct property damage adjusted for inflation declined by 47% from 1980 to 2007 and by 56% from the peak in 1982; the total for 2007 was the second lowest in the 28 years studied.

Space heaters can be portable or stationary (fixed) and can have any type of fuel or power. In this report, space heaters include the following NFIRS-defined types of equipment involved in ignition: (See Table 2.A):

- 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; and
- Fireplace inserts.

Figure 2.1. Home Fires Involving Portable or Stationary (Fixed) Space Heaters, 1980-2007, 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 (1999-2007) and from NFPA survey.

Table 2.A. Home Space Heater Fires, by Type of Device or Type of Fuel or Power
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)

1. Type of Device

Device	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating stove	8,570	(40%)	190	(39%)	454	(44%)	$139	(33%)
Heater (including catalytic and oil-filled)	6,150	(29%)	233	(48%)	429	(42%)	$195	(47%)
Local furnace	4,290	(20%)	39	(8%)	87	(9%)	$47	(11%)
Fireplace with insert	2,180	(10%)	24	(5%)	51	(5%)	$37	(9%)
Total	21,190	(100%)	486	(100%)	1,021	(100%)	$418	(100%)

2. Type of Fuel or Power

Fuel or Power	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Electric-powered	9,310	(44%)	165	(34%)	626	(61%)	$199	(48%)
Solid-fueled	4,800	(23%)	158	(32%)	107	(10%)	$86	(21%)
Gas-fueled	4,160	(20%)	105	(22%)	189	(18%)	$101	(24%)
Liquid-fueled	2,910	(14%)	59	(12%)	99	(10%)	$31	(8%)
Total	21,190	(100%)	486	(100%)	1,021	(100%)	$418	(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 ten, 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. Equipment powered by something other than gas, liquid, or solid fuel or electricity are not shown but are included in the totals.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Two-fifths (44%) of home space heater fires in 2003-2007 involved electric-powered equipment.

The electric space heater share is even larger for civilian injuries (61%) and direct property damage (47%) but not for civilian deaths (34%). (See Table 2.A.)

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 for all types of loss. Electric-powered devices (portable and fixed) had the lowest rates of fires and civilian fire deaths. (See Tables 2.B and 2.C.)

Fire risk is analyzed using a range of usage estimates.

Table 2.B. Comparative Risk of Central and Space Heating Equipment Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	394 - 589	131 - 145	3-4 times
Civilian deaths (per million user households)	9.0 - 13.5	0.5	18-25 times
Civilian injuries (per million user households)	19.0 - 28.4	1.7 - 1.8	11-16 times
Direct property damage (per user household)	$7.8 - $11.6	$0.9	9-13 times

Table 2.C. Comparative Risk of Space Heating Equipment For Different Types of Fuel or Power Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Wood Stove or Other Solid-Fueled	Portable Kerosene Heater or Other Liquid-Fueled	LP or Natural Gas-Fueled	Portable or Fixed Electric Powered
Fires (per million user household)	407 - 942	1,255 - 1,455	425 - 730	353 - 401
Civilian deaths (per million user households)	10.9 - 30.9	25.6 - 29.4	8.2 - 18.4	5.9 - 7.1
Civilian injuries (per million user households)	7.4 - 21.0	43.1 - 49.5	14.9 - 33.1	22.4 - 27.0
Direct property damage (per user household)	$6.0 - $16.9	$13.6 - $15.7	$8.0 - $17.8	$7.1 - $8.6

Note: There is no "best" estimate within the ranges, because the ends primarily represent the inclusion or exclusion of statistics on usage of devices that cannot be classified with confidence as central heating units vs. space heaters based on available data. Fires are analyzed by type of equipment and then for each device by type of equipment power; this is done separately for non-confined fires, fires confined to boiler or fuel burner, and fires confined to chimney or flue.

Six heating devices are included in this section on space heaters:

- Heating stoves (8,570 reported confined and non-confined fires per year in 2003-2007).
- Heaters excluding catalytic or oil-filled (4,430 fires per year),
- Local furnaces (4,290 fires per year),
- Fireplace inserts (2,180 fires per year),
- Oil-filled heaters (1,370 fires per year), and
- Catalytic heaters (360 fires per year).

Two-fifths (40%) of home space heater fires, involve devices coded as heating stoves. Heaters including oil-filled or catalytic heaters accounted for the largest share of associated civilian deaths (48%) and of direct property damage (47%). Heating stoves also had the largest share of civilian injuries (42%). (See Tables 2.2 and 2.3.)

Heating stoves. The principal types of heating stoves for homes are gas-fueled and solid (wood)-fueled, but 48% of home heating stove fires involved electric-powered equipment.

Many electric-powered heating stoves are advertised for use in heating and cooking. Most fires involving heating stoves and cooking materials as item first ignited involved electric-powered devices and nearly all involved gas or electric units, which are the primary power types for cooking stoves but not for heating stoves. This is further evidence that a large share of the reported heating stove fires are a mix of stoves designed for heating or cooking and cooking stoves incorrectly reported as heating stoves.

Solid-fueled stoves accounted for 34% of home heating stove fires and 71% of associated deaths. The fuel is nearly always wood as opposed to coal.

Gas-fueled stoves accounted for 15% of home heating stove fires and 18% of associated deaths. The fuel is usually natural gas as opposed to LP gas.

Liquid-fueled stoves accounted for 3% of home heating stove fires and 3% of associated deaths. 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 confined or non-confined home fires starting with heaters, including oil-filled or catalytic heaters, break down as 59% electric-powered, 23% liquid-fueled (which nearly all involved kerosene, diesel fuel, or number 1 or 2 fuel oil), 16% gas-fueled (which involved both natural and LP gas in significant shares of fires), and 1% solid-fueled.

Oil-filled heaters use oil as a heating medium but are actually electric-powered. However, reported home fires starting with oil-filled heaters are more often reported as liquid-fueled than 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.

Local furnaces. Reported home fires starting with local furnaces break down as 39% gas-fueled, 31% liquid-fueled, 29% electric-powered, and 1% solid-fueled. Gas-fueled devices usually involved natural gas as opposed to LP gas.

Fireplace inserts. Reported home fires starting with fireplace inserts break down as 81% solid-fueled (nearly always wood), 10% gas (usually natural gas rather than LP gas), and 8% electric-powered.

Space heaters accounted for 14,210 injuries reported to hospital emergency rooms in 2008.

For specific devices, wood or coal stoves accounted for 7,030 injuries, electric baseboard heaters for 1,770 injuries, kerosene or oil heaters for 1,530 injuries, other or unknown-type

electric-powered heaters 1,150 injuries, other or unknown-type gas-fueled heaters 1,140 injuries, portable electric heaters 1,020 injuries, portable natural or LP gas heaters 330 injuries, and floor furnaces 250 injuries.[15]

One-fifth (21%) of home space heater fires involve heat source too close to combustibles as a factor contributing to ignition.
Table 2.D shows other leading factors, including failure to clean (12%), which is probably dominated by the creosote build-up in dirty chimneys supporting wood-fueled space heaters such as wood stoves and fireplaces with inserts.

Heat source too close to combustibles is also the leading factor contributing to ignition for associated deaths (52%), injuries (36%), and direct property damage (37%). (See Table 2.4, which includes breakdowns for *non-confined* fires and associated losses for all space heaters and for electric-powered, gas-fueled, solid-fueled, and liquid-fueled devices.)

The leading item first ignited in home space heater fires were flammable or combustible gas or liquid (14%) and cooking materials (13%).
Table 2.E shows other leading items first ignited include unclassified item (10%), and structural member or framing (8%).

Nearly all of the cooking material fires specifically involved heating stoves. These fires involve an unknown combination of heating stoves used for cooking, dual heating/ cooking stoves used for cooking, and cooking stovetop fires miscoded under the only equipment code with "stove" in its name. (See Table 2.5, which includes breakdowns for *non-confined* fires and losses for all space heaters and for electric-powered, gas-fueled, solid-fueled, and liquid-fueled devices.)

Creosote and Chimney Fires

Creosote is a sticky, oily combustible substance created when wood does not burn completely. It rises into the chimney as a liquid and deposits on the chimney wall. A fire starting in creosote can appropriately be reported as a fire with failure to clean as Factor Contributing to Ignition and film or residue as Item First Ignited. The former appears to be used more consistently in fire incident reports.

A conservative best estimate of creosote fires would combine failure-to-clean confined chimney or flue fires with failure-to-clean fires involving solid-fueled space heaters, fireplaces, chimneys and chimney connectors. **This produces estimates of 14,720 reported creosote fires (22% of the total) per year with associated losses of four civilian deaths, 24 civilian injuries, and $33 million in direct property damage per year.**

Some analysts prefer the simplicity of estimating creosote fires by total confined chimney or flue fires – 23,380 fires, no deaths, 40 civilian injuries, and $11 million in direct property damage per year. Combining the two approaches (without double-counting the overlaps) gives a high estimate of 24,010 fires, four civilian deaths, 53 civilian injuries, and $39 million in direct property damage per year.

[15] All statistics from CPSC's National Electronic Injury Surveillance System, at www.cpsc.gov.

Table 2.D. Leading Factors Contributing to Ignition for Home Space Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	4,640	(21%)	251	(52%)	365	(36%)	$156	(37%)
Failure to clean	2,700	(12%)	7	(1%)	12	(1%)	$9	(2%)
Equipment unattended	2,670	(12%)	30	(6%)	207	(20%)	$80	(19%)
Unclassified mechanical failure or malfunction	2,590	(12%)	22	(5%)	53	(5%)	$32	(8%)
Unclassified misuse of product or material	820	(4%)	5	(1%)	55	(5%)	$12	(3%)
Total	21,650		486		1,026		$418	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined, confined to chimney or flue or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 2.E. Leading Items First Ignited for Home Space Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	2,880	(14%)	57	(12%)	129	(13%)	$23	(6%)
Cooking materials	2,860	(13%)	10	(2%)	268	(26%)	$41	(10%)
Unclassified item first ignited	2,100	(10%)	8	(2%)	36	(4%)	$11	(3%)
Structural member or framing	1,620	(8%)	39	(8%)	48	(5%)	$64	(15%)
Interior wall covering	790	(4%)	30	(6%)	32	(3%)	$30	(7%)
Total	21,650		486		1,026		$418	

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 ten 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. Statistics are calculated separately for fires reported as non-confined, confined to chimney or flue, or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

One-seventh (14%) of home space heater fires begin in a chimney or flue.
The true share could be much higher, because NFIRS Version 5.0 has no code for chimney as an area of origin. Table 2.F shows that the leading area of origin as reported is kitchen (25%). Most home space heater fire deaths involve fires that began in the living room, family room, or den (also 10% of fires) or bedroom (8% of fires). *Non-confined* home space heater fires are shown by area of origin (without chimney as an option) in Table 2.6, which includes breakdowns for all space heaters and for electric-powered, gas-fueled, solid-fueled, and liquid-fueled devices.

Table 2.F. Leading Areas of Origin for Home Space Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	5,280	(25%)	61	(13%)	367	(36%)	$75	(18%)
Chimney or flue (confined)	2,900	(14%)	0	(0%)	9	(1%)	$2	(0%)
Heating equipment room or area	2,420	(11%)	9	(2%)	21	(2%)	$14	(3%)
Living room, den, or family room	2,130	(10%)	184	(38%)	155	(15%)	$69	(16%)
Bedroom	1,790	(8%)	114	(23%)	159	(16%)	$65	(16%)
Total	21,650		486		1,026		$418	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined, confined to chimney or flue or confined to fuel burner or boiler.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Safe Heating Behaviors

Messages from NFPA Educational Messaging Advisory Committee

General heating-related messages

- Have a three-foot kid-free zone around open fires and heaters.
- 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.
- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
- Use heating equipment that has the label of a recognized testing laboratory.
- Never use your oven for heating.

- Install stationary space heating equipment according to the local codes and manufacturer's instructions. Have a qualified professional install the equipment.
- Make sure all fuel-burning equipment is vented to the outside to avoid carbon monoxide poisoning. CO is created when fuels burn incompletely. CO poisoning can cause illness and even death. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.
- For home energy assistance, contact the National Energy Assistance Referral line at 1-866-674-6327.

Portable electric space heaters

- Turn heaters off when you go to bed or leave the room.
- Use and purchase portable space heaters with an auto shut off so if they're tipped over they will shut off.
- Place space heater on solid, flat surface.
- Plug power cords directly into outlets and never into an extension cord.
- Inspect for cracked or damaged, broken plugs or loose connections. Replace before using.

Fuel burning space heaters

- Always use the proper fuel as specified by the manufacturer.
- When refueling, allow the appliance to cool and refuel outside or in a well-ventilated area.
- When using the heater, open a window to ensure adequate venting.
- In portable kerosene or other liquid-fueled space heaters always use the proper grade of the proper fuel.
- All new unvented gas-fired space heaters have an oxygen depletion sensor that detects a reduced level of oxygen in the area where the heater is operating and shuts off the heater before a hazardous level of carbon monoxide accumulates. If you have an older heater without this feature, replace it.
- If the pilot light of your gas heater goes out, allow 5 minutes or more for the gas to go away before trying again, do not allow gas to accumulate, and light the match before you turn on the gas to the pilot to avoid risk of flashback.
- If you smell gas in your gas heater, do not attempt to light the appliance. Turn off all the controls and open doors and windows. Call a gas service person.

Wood burning stoves

- Install the stove, chimney connectors and chimneys following manufacturer's instructions or have a professional do the installation.
- Wood stoves, should bear the label of a professional testing laboratory.
- In wood stoves, burn only dry, seasoned wood. In pellet stoves, burn only dry, seasoned wood pellets.
- Start the fire with newspaper or kindling, never with a flammable liquid, such as lighter fluid, kerosene or gasoline.
- Keep the doors of your wood stove closed unless loading or stoking the live fire.
- Allow ashes to cool before disposing. Dispose of ashes in a tightly covered metal container and keep the ash container at least 10 feet away from the home and any other nearby buildings. Douse and saturate with water. Chimneys and vents need to be cleaned and inspected at least once a year.

Additional safe behaviors for space heating.

- 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.
- Check for product recalls at www.cpsc.gov.
- Do not position electric-powered space heaters near water or where there is danger of water being spilled, to avoid serious risk of electric shock.
- For wood-fueled equipment, burn only 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. 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.
- 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.
- For wood-fueled equipment, the annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.
- 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.

Table 2.1. 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 As Reported		Damage (in Millions) In 2007 Dollars	
1980	57,300		480		1,190		$249		$627	
1981	69,700		490		1,110		$201		$457	
1982	78,500		650		1,410		$352		$757	
1983	83,400		800		1,690		$321		$667	
1984	80,700		550		1,270		$307		$612	
1985	82,400		810		1,510		$366		$705	
1986	65,700		570		1,250		$279		$529	
1987	59,400		580		1,290		$260		$475	
1988	55,700		680		1,590		$330		$579	
1989	53,200		630		1,670		$347		$581	
1990	39,000		520		1,170		$272		$433	
1991	38,400		500		1,070		$361*		$550*	
1992	38,200		400		1,260		$312		$461	
1993	37,700		520		1,530		$290		$416	
1994	32,700		450		1,050		$317		$444	
1995	29,400		380		1,000		$290		$395	
1996	25,900		540		1,010		$348		$460	
1997	23,300		410		760		$283		$365	
1998	17,900		320		790		$247		$315	
1999	26,400	(19,500)	180	(180)	1,730	(1,730)	$308	($306)	$383	($381)
2000	26,800	(19,500)	490	(490)	1,250	(1,190)	$430	($423)	$518	($510)
2001	23,700	(16,700)	280	(280)	1,230	(1,180)	$403	($400)	$472	($469)
2002	25,100	(17,000)	590	(590)	1,140	(1,140)	$854	($849)	$985	($979)
2003	21,000	(14,100)	400	(400)	1,010	(980)	$432	($428)	$486	($482)
2004	22,600	(14,200)	610	(610)	1,060	(1,030)	$407	($404)	$447	($443)
2005	21,000	(15,000)	530	(530)	1,020	(960)	$509	($505)	$540	($537)
2006	19,400	(14,000)	390	(390)	820	(800)	$478	($477)	$492	($491)
2007	21,800	(15,100)	490	(490)	1,180	(1,140)	$330	($328)	$330	($328)

*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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey.

Table 2.2. Home Fires Involving Portable or Stationary Space Heaters, by Type of Device and Type of Fuel or Power
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)
Percentages Shown by Type of Fuel or Power, for Each Type of Device

A. Fires

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	4,110	(44%)	3,660	(39%)	1,350	(14%)	190	(2%)	9,310	(100%)
Solid	2,950	(61%)	60	(1%)	50	(1%)	1,770	(37%)	4,800	(100%)
Gas	1,270	(31%)	1,000	(24%)	1,660	(40%)	220	(5%)	4,160	(100%)
Liquid	230	(8%)	1,430	(49%)	1,230	(42%)	10	(0%)	2,910	(100%)
Total	8,570	(40%)	6,150	(29%)	4,290	(20%)	2,180	(10%)	21,190	(100%)

B. Civilian Deaths

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace inserts		All space heaters	
Electric	16	(9%)	145	(87%)	3	(2%)	3	(2%)	165	(100%)
Solid	135	(86%)	0	(0%)	0	(0%)	21	(14%)	158	(100%)
Gas	35	(33%)	36	(35%)	33	(32%)	0	(0%)	105	(100%)
Liquid	5	(9%)	51	(86%)	3	(5%)	0	(0%)	59	(100%)
Total	190	(39%)	233	(48%)	39	(8%)	24	(5%)	486	(100%)

C. Civilian Injuries

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled		Local furnace		Fireplace inserts		All space heaters	
Electric	321	(51%)	271	(43%)	25	(4%)	7	(1%)	626	(100%)
Solid	67	(61%)	0	(0%)	2	(2%)	40	(37%)	107	(100%)
Gas	59	(31%)	71	(38%)	55	(29%)	3	(2%)	189	(100%)
Liquid	7	(7%)	87	(88%)	5	(5%)	0	(0%)	99	(100%)
Total	454	(44%)	429	(42%)	87	(9%)	51	(5%)	1,021	(100%)

D. Direct Property Damage (in Millions)

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	$57	(29%)	$128	(65%)	$11	(5%)	$1	(1%)	$199	(100%)
Solid	$57	(65%)	$2	(3%)	$1	(2%)	$27	(31%)	$86	(100%)
Gas	$22	(22%)	$40	(39%)	$31	(31%)	$8	(8%)	$101	(100%)
Liquid	$2	(8%)	$25	(81%)	$4	(11%)	$0	(0%)	$31	(100%)
Total	$139	(33%)	$195	(47%)	$47	(11%)	$37	(9%)	$418	(100%)

Table 2.2. Home Fires Involving Portable or Stationary Space Heaters, by Type of Device and Type of Fuel or Power Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments (Including Fires Reported as Confined Fires) Percentages Shown by Type of Fuel or Power, for Each Type of Device (Continued)

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 unknown-type heating or air conditioning equipment. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home space heater fires with type of fuel or power unknown have also been allocated proportionally, and then fires have been allocated to specific types of space heaters. Fires by specific type of space heater include devices with known power source other than gas, liquid, solid or electric, and are calculated without the step of analysis by power type; for this reason, sums do not equal totals in column.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 2.3. Home Fires Involving Portable or Stationary Space Heaters, by Type of Fuel or Power and Type of Device
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reported as Confined Fires)
Percentages Shown by Type of Device, for Each Type of Fuel or Power

A. Fires

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	4,110	(48%)	3,660	(59%)	1,350	(31%)	190	(8%)	9,310	(44%)
Solid	2,950	(34%)	60	(1%)	50	(1%)	1,770	(81%)	4,800	(23%)
Gas	1,270	(15%)	1,000	(16%)	1,660	(39%)	220	(10%)	4,160	(20%)
Liquid	230	(3%)	1,430	(23%)	1,230	(29%)	10	(0%)	2,910	(14%)
All	8,570	(100%)	6,150	(100%)	4,290	(100%)	2,180	(100%)	21,190	(100%)

B. Civilian Deaths

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	16	(8%)	145	(62%)	3	(8%)	3	(13%)	165	(34%)
Solid	135	(71%)	0	(0%)	0	(0%)	21	(87%)	158	(32%)
Gas	35	(18%)	36	(16%)	33	(84%)	0	(0%)	105	(22%)
Liquid	5	(3%)	51	(22%)	3	(8%)	0	(0%)	59	(12%)
All	190	(100%)	233	(100%)	39	(100%)	24	(100%)	486	(100%)

C. Civilian Injuries

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	321	(71%)	271	(63%)	25	(29%)	7	(14%)	626	(61%)
Solid	67	(15%)	0	(0%)	2	(2%)	40	(79%)	107	(10%)
Gas	59	(13%)	71	(17%)	55	(64%)	3	(7%)	189	(18%)
Liquid	7	(2%)	87	(20%)	5	(5%)	0	(0%)	99	(10%)
All	454	(100%)	429	(100%)	87	(100%)	51	(100%)	1,021	(100%)

D. Direct Property Damage (in Millions)

Fuel or Power	Heating stove		Heater (including catalytic and oil-filled)		Local furnace		Fireplace insert		All space heaters	
Electric	$57	(41%)	$128	(66%)	$11	(23%)	$1	(4%)	$199	(48%)
Solid	$57	(41%)	$2	(1%)	$1	(3%)	$27	(74%)	$86	(21%)
Gas	$22	(16%)	$40	(20%)	$31	(67%)	$8	(22%)	$101	(24%)
Liquid	$2	(2%)	$25	(13%)	$4	(8%)	$0	(0%)	$31	(8%)
All	$139	(100%)	$195	(100%)	$47	(100%)	$37	(100%)	$418	(100%)

Table 2.3. Home Fires Involving Portable or Stationary Space Heaters, by Type of Fuel or Power and Type of Device Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments (Including Fires Reported as Confined Fires) Percentages Shown by Type of Device, for Each Type of Fuel or Power (Continued)

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 unknown-type heating or air conditioning equipment. Fires reported as "no equipment" but lacking a confirming specific heat source (codes 40-99) are also treated as unknown equipment and allocated. Home space heater fires with type of fuel or power unknown have also been allocated proportionally, and then fires have been allocated to specific types of space heaters. Fires by specific type of space heater include devices with known power source other than gas, liquid, solid or electric, and are calculated without the step of analysis by power type; for this reason, sums do not equal totals in column.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Space Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	4,500	(31%)	251	(52%)	365	(37%)	$156	(38%)
Equipment unattended	2,600	(18%)	30	(6%)	207	(21%)	$80	(19%)
Unclassified mechanical failure or malfunction	1,040	(7%)	22	(5%)	42	(4%)	$32	(8%)
Unintentionally turned on or not turned off	720	(5%)	0	(0%)	30	(3%)	$15	(4%)
Unclassified misuse of material or product	670	(5%)	5	(1%)	55	(6%)	$12	(3%)
Abandoned or discarded material or product	640	(4%)	0	(0%)	50	(5%)	$10	(2%)
Installation deficiency	630	(4%)	11	(2%)	18	(2%)	$23	(5%)
Unclassified electrical failure or malfunction	570	(4%)	11	(2%)	20	(2%)	$17	(4%)
Unclassified factor	560	(4%)	16	(3%)	36	(4%)	$19	(5%)
Leak or break	420	(3%)	25	(5%)	23	(2%)	$12	(3%)
Failure to clean	410	(3%)	7	(1%)	2	(0%)	$9	(2%)
Unspecified short circuit arc	370	(3%)	3	(1%)	16	(2%)	$11	(3%)
Equipment not being operated properly	330	(2%)	16	(3%)	38	(4%)	$12	(3%)
Unclassified operational deficiency	320	(2%)	18	(4%)	20	(2%)	$6	(1%)
Flammable liquid or gas spilled	210	(1%)	6	(1%)	31	(3%)	$6	(1%)
Short circuit arc from defective or worn insulation	200	(1%)	4	(1%)	2	(0%)	$4	(1%)
Worn out	190	(1%)	4	(1%)	15	(1%)	$4	(1%)
Arc or spark from operating equipment	140	(1%)	34	(7%)	8	(1%)	$4	(1%)
Improper fueling technique	130	(1%)	33	(7%)	22	(2%)	$6	(1%)
Unclassified design, manufacturing, or installation deficiency	120	(1%)	0	(0%)	8	(1%)	$4	(1%)
Equipment overloaded	120	(1%)	0	(0%)	9	(1%)	$3	(1%)
Construction deficiency	110	(1%)	0	(0%)	5	(1%)	$4	(1%)
Automatic control failure	110	(1%)	4	(1%)	7	(1%)	$1	(0%)
Equipment used for not intended purpose	100	(1%)	16	(3%)	8	(1%)	$3	(1%)
Improper container or storage	90	(1%)	3	(1%)	8	(1%)	$1	(0%)
Unclassified fire spread or control	80	(1%)	9	(2%)	13	(1%)	$3	(1%)
Playing with heat source	80	(1%)	6	(1%)	6	(1%)	$2	(0%)
Collision, knockdown, or overturn	80	(1%)	29	(6%)	8	(1%)	$3	(1%)

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

A. All Space Heaters (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Short circuit arc from mechanical damage	70	(1%)	0	(0%)	6	(1%)	$2	(0%)
Other known factor	460	(3%)	39	(8%)*	34	(3%)	$14	(3%)
Total fires excluding confined fires	14,460	(100%)	486	(100%)	983	(100%)	$415	(100%)
Total factor entries	16,080	(111%)	605	(124%)	1,110	(113%)	$477	(115%)

* Leading factors not shown above are flammable liquid used to kindle (3% of fire deaths) and unclassified natural condition (3%).

B. Portable or Stationary Electric Space Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles.	2,340	(29%)	125	(76%)	212	(35%)	$77	(39%)
Equipment unattended	2,030	(25%)	18	(11%)	176	(29%)	$50	(25%)
Unintentionally turned on or not turned off	580	(7%)	0	(0%)	26	(4%)	$11	(5%)
Unclassified electrical failure or malfunction	530	(7%)	10	(6%)	19	(3%)	$14	(7%)
Abandoned or discarded material or product	490	(6%)	0	(0%)	46	(8%)	$6	(3%)
Unclassified misuse of material or product	380	(5%)	0	(0%)	31	(5%)	$7	(3%)
Unclassified mechanical failure or malfunction	370	(5%)	8	(5%)	22	(4%)	$8	(4%)
Unspecified short circuit arc	340	(4%)	3	(2%)	14	(2%)	$9	(5%)
Unclassified factor	320	(4%)	0	(0%)	22	(4%)	$6	(3%)
Short circuit arc from defective or worn insulation	190	(2%)	4	(2%)	0	(0%)	$4	(2%)
Equipment not being operated properly	170	(2%)	0	(0%)	38	(6%)	$6	(3%)
Failure to clean	130	(2%)	0	(0%)	0	(0%)	$2	(1%)
Arc or spark from operating equipment	120	(1%)	30	(18%)	4	(1%)	$3	(2%)
Unclassified operational deficiency	120	(1%)	0	(0%)	14	(2%)	$2	(1%)
Installation deficiency	90	(1%)	0	(0%)	5	(1%)	$3	(1%)
Flammable liquid or gas spilled	80	(1%)	0	(0%)	2	(0%)	$1	(1%)
Equipment overloaded	80	(1%)	0	(0%)	9	(1%)	$2	(1%)

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Portable or Stationary Electric Space Heaters (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Short circuit arc from mechanical damage	70	(1%)	0	(0%)	6	(1%)	$1	(1%)
Leak or break	60	(1%)	0	(0%)	4	(1%)	$1	(0%)
Worn out	50	(1%)	0	(0%)	2	(0%)	$0	(0%)
Arc from faulty contact or broken conductor	50	(1%)	0	(0%)	0	(0%)	$1	(0%)
Automatic control failure	40	(1%)	0	(0%)	0	(0%)	$0	(0%)
Equipment used for not intended purpose	40	(1%)	4	(3%)	3	(0%)	$1	(1%)
Other known factor	280	(3%)	0	(0%)	29	(5%)	$8	(4%)
Total fires excluding confined fires	8,100	(100%)	165	(100%)	608	(100%)	$197	(100%)
Total factor entries	8,930	(110%)	203	(123%)	684	(113%)	$222	(113%)

C. Gas-Fueled Space Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,180	(35%)	40	(38%)	92	(52%)	$40	(40%)
Unclassified mechanical failure or malfunction	450	(13%)	4	(4%)	7	(4%)	$15	(15%)
Equipment unattended	320	(10%)	6	(6%)	20	(11%)	$16	(16%)
Leak or break	240	(7%)	24	(23%)	13	(7%)	$6	(6%)
Unclassified misuse of material or product	200	(6%)	0	(0%)	9	(5%)	$2	(2%)
Installation deficiency	150	(4%)	6	(6%)	2	(1%)	$4	(4%)
Unintentionally turned on or not turned off	130	(4%)	0	(0%)	4	(2%)	$4	(4%)
Abandoned or discarded material or product	120	(3%)	0	(0%)	5	(3%)	$2	(2%)
Unclassified factor	110	(3%)	18	(17%)	8	(4%)	$8	(8%)
Failure to clean	100	(3%)	8	(8%)	2	(1%)	$1	(1%)
Unclassified operational deficiency	80	(2%)	0	(0%)	2	(1%)	$1	(1%)
Equipment not being operated properly	80	(2%)	6	(6%)	0	(0%)	$2	(2%)
Worn out	60	(2%)	4	(4%)	2	(1%)	$1	(1%)
Automatic control failure	50	(1%)	0	(0%)	5	(3%)	$1	(1%)
Improper container or storage	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Flammable liquid or gas spilled	30	(1%)	0	(0%)	5	(3%)	$2	(2%)

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

C. Gas-Fueled Space Heaters (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Playing with heat source	30	(1%)	6	(6%)	0	(0%)	$1	(1%)
Unclassified design, manufacturing or installation deficiency	30	(1%)	0	(0%)	4	(2%)	$1	(1%)
Equipment used for not intended purpose	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unspecified short circuit arc	20	(1%)	0	(0%)	0	(0%)	$1	(1%)
Construction deficiency	20	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified electrical failure or malfunction	20	(1%)	0	(0%)	0	(0%0	$3	(3%)
Improper startup	20	(1%)	0	(0%)	4	(2%)	$1	(1%)
Collision, knockdown or overturn	20	(1%)	0	(0%)	2	(1%)	$1	(1%)
Design deficiency	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known factor	130	(4%)	0	(0%)	7	(4%)	$2	(2%)
Total fires excluding confined fires	3,350	(100%)	105	(100%)	177	(100%)	$100	(100%)
Total factor entries	3,690	(110%)	123	(117%)	192	(108%)	$116	(115%)

D. Wood Stoves, Fireplace Inserts, and Other Solid-Fueled Space Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	630	(31%)	56	(35%)	39	(39%)	$26	(30%)
Installation deficiency	390	(19%)	7	(4%)	13	(13%)	$18	(21%)
Failure to clean	190	(9%)	0	(0%)	0	(0%)	$6	(7%)
Equipment unattended	130	(7%)	4	(3%)	0	(0%)	$8	(10%)
Unclassified operational deficiency	90	(5%)	22	(14%)	0	(0%)	$3	(4%)
Unclassified factor	90	(5%)	0	(0%)	4	(4%)	$4	(5%)
Leak or break	90	(5%)	0	(0%)	2	(2%)	$4	(5%)
Construction deficiency	80	(4%)	0	(0%)	3	(3%)	$3	(3%)
Unclassified mechanical failure or malfunction	80	(4%)	13	(8%)	4	(4%)	$5	(6%)
Unclassified design, manufacturing, or installation deficiency	70	(3%)	0	(0%)	2	(2%)	$3	(3%)
Worn out	60	(3%)	0	(0%)	7	(7%)	$3	(4%)
Equipment not being operated properly	60	(3%)	12	(8%)	0	(0%)	$3	(4%)

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

D. Wood Stoves, Fireplace Inserts, and Other Solid-Fueled Space Heaters (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified misuse of material or product	50	(2%)	6	(4%)	5	(5%)	$1	(1%)
Design deficiency	40	(2%)	5	(3%)	6	(6%)	$1	(1%)
Unclassified fire spread or control	40	(2%)	11	(7%)	2	(2%)	$1	(1%)
Flammable liquid used to kindle fire	30	(1%)	18	(11%)	7	(7%)	$1	(1%)
Abandoned or discarded material or product	20	(1%)	0	(0%)	0	(0%)	$1	(1%)
High wind	20	(1%)	7	(4%)	2	(2%)	$3	(4%)
Equipment overloaded	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Improper container or storage	20	(1%)	4	(3%)	3	(3%)	$0	(0%)
Improper fueling technique	20	(1%)	0	(0%)	2	(2%)	$1	(1%)
Equipment used for not intended purpose	20	(1%)	14	(9%)	3	(3%)	$1	(1%)
Improper startup	10	(1%)	0	(0%)	0	(0%)	$1	(1%)
Other known factor	70	(4%)	17	(11%)*	7	(7%)	$2	(2%)
Total fires excluding confined fires	2,050	(100%)	158	(100%)	100	(100%)	$85	(100%)
Total factor entries	2,320	(113%)	195	(124%)	111	(111%)	$100	(117%)

* Leading factors in fire deaths not shown above is unclassified natural condition (11%).

E. Liquid-Fueled Space Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	330	(36%)	16	(28%)	24	(25%)	$12	(40%)
Unclassified mechanical failure or malfunction	130	(14%)	0	(0%)	10	(11%)	$4	(12%)
Improper fueling technique	100	(11%)	29	(49%)	15	(17%)	$5	(15%)
Equipment unattended	90	(10%)	0	(0%)	5	(5%)	$4	(12%)
Flammable liquid or gas spilled	80	(9%)	6	(10%)	20	(22%)	$3	(11%)
Leak or break	30	(4%)	4	(6%)	6	(6%)	$1	(4%)
Unclassified operational deficiency	30	(4%)	0	(0%)	5	(5%)	$0	(0%)
Unclassified misuse of material or product	30	(3%)	0	(0%)	7	(7%)	$1	(4%)
Unclassified factor	30	(3%)	0	(0%)	3	(3%)	$1	(3%)
Equipment not being operated properly	20	(3%)	0	(0%)	0	(0%)	$1	(3%)

Table 2.4. Home Space Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

E. Liquid-Fueled Space Heaters (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Collision, knockdown or overturn	20	(3%)	29	(49%)	5	(5%)	$1	(3%)
Playing with heat source	20	(2%)	0	(0%)	2	(2%)	$0	(1%)
Improper fuel used	10	(2%)	0	(0%)	2	(2%)	$1	(2%)
Worn out	10	(2%)	0	(0%)	2	(2%)	$0	(1%)
Equipment used for not intended purpose	10	(1%)	0	(0%)	3	(3%)	$0	(0%)
Equipment overloaded	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Automatic control failure	10	(1%)	4	(8%)	0	(0%)	$0	(1%)
Arc or spark from operating equipment	10	(1%)	0	(0%)	4	(4%)	$1	(3%)
Installation deficiency	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Abandoned or discarded material or product	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Washing part or painting with flammable liquid	10	(1%)	0	(0%)	2	(3%)	$1	(2%)
Other known factor	40	(4%)	0	(0%)*	2	(2%)	$2	(6%)
Total fires excluding confined fires	920	(100%)	59	(100%)	93	(100%)	$31	(100%)
Total factor entries	1,060	(115%)	88	(149%)	115	(124%)	$39	(125%)

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 ten, 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.

Table 2.5. Home Space Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Space Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking materials	2,840	(20%)	10	(2%)	268	(27%)	$41	(10%)
Structural member or framing	1,560	(11%)	39	(8%)	48	(5%)	$64	(15%)
Flammable or combustible gas or liquid	790	(5%)	57	(12%)	114	(12%)	$23	(6%)
Interior wall covering	780	(5%)	30	(6%)	32	(3%)	$30	(7%)
Floor covering	680	(5%)	31	(6%)	38	(4%)	$23	(6%)
Clothing	620	(4%)	37	(8%)	57	(6%)	$14	(3%)
Mattress or bedding	610	(4%)	74	(15%)	79	(8%)	$27	(7%)
Wire or cable insulation	590	(4%)	10	(2%)	17	(2%)	$10	(2%)
Unclassified item	570	(4%)	8	(2%)	29	(3%)	$10	(2%)
Cabinetry	530	(4%)	0	(0%)	27	(3%)	$27	(7%)
Appliance housing or casing	480	(3%)	9	(2%)	23	(2%)	$6	(1%)
Upholstered furniture	430	(3%)	43	(9%)	45	(5%)	$25	(6%)
Unclassified structural component or finish	360	(3%)	6	(1%)	18	(2%)	$16	(4%)
Household utensil	320	(2%)	0	(0%)	13	(1%)	$3	(1%)
Unclassified furniture or utensil	320	(2%)	24	(5%)	15	(2%)	$9	(2%)
Box or bag	300	(2%)	0	(0%)	23	(2%)	$8	(2%)
Exterior wall covering or finish	280	(2%)	11	(2%)	12	(1%)	$10	(2%)
Multiple items first ignited	230	(2%)	13	(3%)	10	(1%)	$16	(4%)
Unclassified soft goods or clothing	220	(2%)	15	(3%)	13	(1%)	$8	(2%)
Insulation within structural area	220	(2%)	0	(0%)	7	(1%)	$5	(1%)
Linen other than building	210	(1%)	0	(0%)	16	(2%)	$2	(1%)
Papers	200	(1%)	18	(4%)	8	(1%)	$8	(2%)
Interior ceiling covering	190	(1%)	14	(3%)	6	(1%)	$5	(1%)
Curtain or drape	180	(1%)	24	(5%)	19	(2%)	$6	(2%)
Dust, fiber, or lint	100	(1%)	0	(0%)	2	(0%)	$2	(0%)
Trash or waste	100	(1%)	0	(0%)	2	(0%)	$1	(0%)
Unclassified organic material	90	(1%)	3	(1%)	0	(0%)	$1	(0%)
Other known item	640	(4%)	9	(2%)	39	(4%)	$12	(3%)
Total fires excluding confined fires	14,460	(100%)	486	(100%)	983	(100%)	$415	(100%)

Table 2.5. Home Space Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Portable or Electric Space Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking materials	2,470	(31%)	7	(4%)	248	(41%)	$34	(17%)
Wire or cable insulation	540	(7%)	10	(6%)	18	(3%)	$7	(4%)
Mattress or bedding	520	(6%)	59	(36%)	80	(13%)	$25	(13%)
Cabinetry	410	(5%)	0	(0%)	18	(3%)	$22	(11%)
Clothing	380	(5%)	3	(2%)	20	(3%)	$9	(4%)
Appliance housing or casing	320	(4%)	3	(2%)	19	(3%)	$4	(2%)
Interior wall covering	300	(4%)	12	(8%)	19	(3%)	$11	(5%)
Unclassified item	290	(4%)	0	(0%)	12	(2%)	$5	(2%)
Upholstered furniture	280	(4%)	33	(20%)	29	(5%)	$14	(7%)
Structural member or framing	280	(3%)	0	(0%)	13	(2%)	$10	(5%)
Floor covering	270	(3%)	0	(0%)	6	(1%)	$9	(4%)
Unclassified furniture or utensil	230	(3%)	19	(12%)	8	(1%)	$7	(3%)
Household utensil	210	(3%)	0	(0%)	13	(2%)	$2	(1%)
Box or bag	170	(2%)	0	(0%)	17	(3%)	$4	(2%)
Flammable or combustible gas or liquid	170	(2%)	0	(0%)	11	(2%)	$4	(2%)
Unclassified soft goods or clothing	140	(2%)	5	(3%)	11	(2%)	$5	(3%)
Curtain or drape	120	(1%)	10	(6%)	11	(2%)	$5	(2%)
Linen other than bedding	120	(1%)	0	(0%)	15	(2%)	$1	(1%)
Multiple items first ignited	110	(1%)	3	(2%)	6	(1%)	$6	(3%)
Papers	100	(1%)	0	(0%)	7	(1%)	$4	(2%)
Insulation within structural area	90	(1%)	0	(0%)	4	(1%)	$1	(1%)
Unclassified structural component or finish	90	(1%)	0	(0%)	4	(1%)	$2	(1%)
Dust, fiber, or lint	60	(1%)	0	(0%)	0	(0%)	$1	(0%)
Exterior wall covering	50	(1%)	0	(0%)	0	(0%)	$1	(0%)
Interior ceiling covering	50	(1%)	0	(0%)	2	(0%)	$1	(0%)
Other known item	290	(4%)	0	(0%)	17	(3%)	$5	(3%)
Total fires excluding confined fires	8,100	(100%)	165	(100%)	608	(100%)	$197	(100%)

Table 2.5. Home Space Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Gas-Fueled Space Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	490	(15%)	24	(23%)	11	(6%)	$24	(24%)
Cooking materials	360	(11%)	3	(3%)	20	(11%)	$5	(5%)
Flammable or combustible gas or liquid	300	(9%)	3	(3%)	32	(18%)	$8	(8%)
Interior wall covering	200	(6%)	12	(12%)	2	(1%)	$6	(6%)
Floor covering	190	(6%)	3	(3%)	8	(5%)	$7	(7%)
Clothing	180	(5%)	22	(21%)	29	(16%)	$4	(4%)
Appliance housing or casing	140	(4%)	5	(5%)	5	(3%)	$1	(1%)
Unclassified item	140	(4%)	3	(3%)	9	(5%)	$1	(1%)
Cabinetry	100	(3%)	0	(0%)	8	(5%)	$5	(5%)
Unclassified structural component or finish	100	(3%)	0	(0%)	8	(4%)	$7	(7%)
Box or bag	90	(3%)	0	(0%)	5	(3%)	$3	(3%)
Upholstered furniture	80	(2%)	0	(0%)	10	(6%)	$6	(6%)
Linen other than bedding	80	(2%)	0	(0%)	2	(1%)	$0	(0%)
Mattress or bedding	70	(2%)	0	(0%)	2	(1%)	$2	(2%)
Multiple items first ignited	70	(2%)	0	(0%)	0	(0%)	$2	(2%)
Unclassified furniture or utensil	70	(2%)	3	(3%)	7	(4%)	$2	(2%)
Unclassified soft goods or clothing	60	(2%)	4	(4%)	2	(1%)	$2	(2%)
Household utensil	60	(2%)	0	(0%)	0	(0%)	$1	(1%)
Exterior wall covering	60	(2%)	0	(0%)	2	(1%)	$1	(1%)
Wire or cable insulation	50	(2%)	0	(0%)	0	(0%)	$3	(3%)
Papers	50	(1%)	3	(3%)	2	(1%)	$3	(3%)
Insulation within structural area	40	(1%)	0	(0%)	2	(1%)	$1	(1%)
Curtain or drape	40	(1%)	13	(12%)	2	(1%)	$1	(1%)
Trash or waste	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Interior ceiling covering	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Dust, fiber or lint	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Toy or game	30	(1%)	0	(0%)	9	(5%)	$0	(0%)
Unclassified organic material	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Book	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	150	(5%)	4	(4%)	3	(2%)	$3	(3%)
Total fires excluding confined fires	3,350	(100%)	105	(100%)	177	(100%)	$100	(100%)

* Leading items for fire deaths not shown above are agricultural crop (4% of deaths) and mattress or bedding (4%).

Table 2.5. Home Space Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

D. Wood Stoves, Fireplace Inserts, and Other Solid-Fueled Space Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	720	(35%)	20	(12%)	23	(23%)	$28	(32%)
Interior wall covering	240	(12%)	6	(4%)	14	(14%)	$11	(12%)
Unclassified structural component or finish	140	(7%)	0	(0%)	2	(2%)	$7	(9%)
Floor covering	130	(6%)	38	(24%)	18	(18%)	$3	(4%)
Exterior wall covering	120	(6%)	16	(10%)	7	(7%)	$7	(8%)
Unclassified item	90	(4%)	0	(0%)	2	(2%)	$3	(3%)
Interior ceiling covering	90	(4%)	20	(13%)	4	(4%)	$3	(3%)
Insulation within structural area	70	(3%)	0	(0%)	0	(0%)	$2	(2%)
Unclassified organic material	50	(2%)	5	(3%)	0	(0%)	$1	(1%)
Multiple items first ignited	40	(2%)	13	(8%)	4	(4%)	$7	(9%)
Papers	30	(2%)	5	(3%)	0	(0%)	$1	(1%)
Flammable or combustible gas or liquid	30	(1%)	8	(5%)	7	(7%)	$1	(1%)
Trash or waste	30	(1%)	0	(0%)	2	(2%)	$0	(0%)
Upholstered furniture	30	(1%)	0	(0%)	0	(0%)	$3	(3%)
Exterior roof covering	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Clothing	30	(1%)	14	(9%)	3	(3%)	$1	(2%)
Box or bag	20	(1%)	0	(0%)	2	(2%)	$2	(2%)
Film or residue including creosote	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Chips	20	(1%)	0	(0%)	2	(2%)	$0	(0%)
Light vegetation including grass	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Decoration	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Exterior trim including doors	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	100	(5%)	13	(8%)*	9	(9%)	$4	(5%)
Total fires excluding confined fires	2,050	(100%)	158	(100%)	100	(100%)	$85	(100%)

* Leading items for fire deaths not shown above are agricultural crop (4% of deaths) and mattress or bedding (4%).

Table 2.5. Home Space Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

E. Liquid-Fueled Space Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	300	(33%)	39	(66%)	59	(63%)	$11	(36%)
Floor covering	90	(10%)	0	(0%)	6	(6%)	$4	(12%)
Structural member or framing	80	(8%)	0	(0%)	2	(2%)	$3	(8%)
Interior wall covering	50	(5%)	0	(0%)	0	(0%)	$2	(7%)
Exterior wall covering	50	(5%)	0	(0%)	4	(5%)	$1	(5%)
Upholstered furniture	40	(4%)	4	(7%)	3	(4%)	$2	(7%)
Unclassified item	40	(4%)	0	(0%)	0	(0%)	$1	(2%)
Unclassified furniture or utensil	20	(3%)	0	(0%)	0	(0%)	$1	(2%)
Clothing	20	(3%)	0	(0%)	0	(0%0	$0	(1%)
Unclassified structural component or finish	20	(3%)	5	(8%)	4	(5%)	$1	(2%)
Curtain or drape	20	(2%)	0	(0%)	6	(7%)	$1	(4%)
Insulation within structural area	20	(2%)	0	(0%)	2	(2%)	$1	(4%)
Multiple items first ignited	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Mattress or bedding	20	(2%)	3	(5%)	0	(0%)	$0	(1%)
Unclassified liquid, piping, or filter	10	(2%)	0	(0%)	4	(4%)	$0	(0%)
Papers	10	(2%)	8	(14%)	0	(0%)	$0	(2%)
Unclassified soft goods or clothing	10	(1%)	0	(0%)	0	(0%)	$1	(2%)
Appliance housing or casing	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Interior ceiling covering	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Trash or waste	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Cabinetry	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Other known item	50	(6%)	0	(0%)	2	(2%)	$1	(3%)
Total fires excluding confined fires	920	(100%)	59	(100%)	93	(100%)	$31	(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 ten, 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.

Table 2.6. Home Space Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	5,050	(35%)	61	(13%)	367	(37%)	$75	(18%)
Living room, den, or family room	1,820	(13%)	184	(38%)	155	(16%)	$69	(17%)
Bedroom	1,740	(12%)	114	(23%)	159	(16%)	$65	(16%)
Unclassified function area	830	(6%)	39	(8%)	82	(8%)	$27	(7%)
Wall assembly	690	(5%)	16	(3%)	23	(2%)	$27	(7%)
Heating equipment room or area	660	(5%)	9	(2%)	13	(1%)	$14	(3%)
Bathroom	590	(4%)	4	(1%)	36	(4%)	$12	(3%)
Crawl space or substructure space	470	(3%)	13	(3%)	16	(2%)	$21	(5%)
Garage*	370	(3%)	4	(1%)	39	(4%)	$23	(6%)
Attic or other space above top story	260	(2%)	0	(0%)	6	(1%)	$7	(2%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	250	(2%)	0	(0%)	15	(2%)	$9	(2%)
Ceiling/floor assembly or space between stories	240	(2%)	0	(0%)	7	(1%)	$5	(1%)
Unclassified structural area	230	(2%)	11	(2%)	4	(0%)	$12	(3%)
Laundry room or area	150	(1%)	0	(0%)	4	(0%)	$4	(1%)
Unclassified area of origin	150	(1%)	14	(3%)	5	(1%)	$4	(1%)
Exterior wall surface	140	(1%)	0	(0%)	3	(0%)	$3	(1%)
Hallway or corridor	120	(1%)	8	(2%)	5	(1%)	$6	(1%)
Lobby or entrance way	70	(1%)	0	(0%)	2	(0%)	$3	(1%)
Other known area of origin	640	(4%)	9	(2%)	43	(4%)	$27	(7%)
Total fires excluding confined fires	14,460	(100%)	486	(100%)	983	(100%)	$415	(100%)

* Excludes dwelling garages coded as separate property.

B. Portable or Stationary Electric Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	3,880	(48%)	21	(13%)	311	(51%)	$55	(28%)
Bedroom	1,440	(18%)	75	(46%)	124	(20%)	$51	(26%)
Living room, den, or family room	630	(8%)	44	(27%)	56	(9%)	$21	(10%)
Bathroom	470	(6%)	0	(0%)	26	(4%)	$9	(4%)
Unclassified function area	290	(4%)	4	(2%)	30	(5%)	$9	(5%)

Table 2.6. Home Space Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Portable or Stationary Electric Space Heaters (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	230	(3%)	0	(0%)	8	(1%)	$3	(2%)
Wall assembly or concealed space	160	(2%)	3	(2%)	11	(2%)	$15	(7%)
Crawl space or substructure space	130	(2%)	0	(0%)	0	(0%)	$6	(3%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	100	(1%)	0	(0%)	2	(0%)	$2	(1%)
Garage*	80	(1%)	0	(0%)	6	(1%)	$3	(2%)
Unclassified structural area	80	(1%)	9	(5%)	2	(0%)	$5	(3%)
Attic or other space above top story	70	(1%)	0	(0%)	0	(0%)	$1	(1%)
Laundry room or area	70	(1%)	0	(0%)	2	(0%)	$2	(1%)
Unclassified area of origin	60	(1%)	0	(0%)	2	(0%)	$2	(1%)
Ceiling/floor assembly or space between stories	60	(1%)	0	(0%)	2	(0%)	$2	(1%)
Other known area of origin	340	(4%)	8	(5%)	26	(4%)	$13	(7%)
Total fires excluding confined fires	8,100	(100%)	165	(100%)	608	(100%)	$197	(100%)

* Excludes dwelling garages coded as separate property.

C. Gas-Fueled Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen	1,000	(30%)	22	(21%)	42	(24%)	$15	(15%)
Living room, den, or family room	530	(16%)	26	(25%)	41	(23%)	$16	(16%)
Heating equipment room or area	260	(8%)	4	(4%)	3	(2%)	$6	(6%)
Unclassified function area	220	(7%)	8	(7%)	22	(12%)	$6	(6%)
Bedroom	190	(6%)	17	(16%)	25	(14%)	$11	(11%)
Crawl space or substructure space	180	(5%)	10	(10%)	3	(2%)	$7	(7%)
Wall assembly or concealed space	170	(5%)	4	(4%)	3	(2%)	$4	(4%)

Table 2.6. Home Space Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

C. Gas-Fueled Space Heaters (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Bathroom	100	(3%)	4	(4%)	10	(5%)	$3	(3%)
Garage*	100	(3%)	4	(4%)	9	(5%)	$10	(10%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	90	(3%)	0	(0%)	2	(1%)	$1	(1%)
Ceiling/floor assembly or space between stories	70	(2%)	0	(0%)	2	(1%)	$2	(2%)
Hallway or corridor	60	(2%)	0	(0%)	0	(0%)	$5	(5%)
Other known area of origin	370	(11%)	7	(7%)**	17	(9%)	$13	(13%)
Total fires excluding confined fires	3,350	(100%)	105	(100%)	177	(100%)	$100	(100%)

* Excludes dwelling garages coded as separate property.
** Leading areas for fire deaths not shown above are unclassified area of origin (4% of deaths) and unclassified structural area (2%).

D. Wood Stoves, Fireplace Inserts, and Other Solid-Fueled Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Living room, den, or family room	480	(24%)	88	(56%)	30	(30%)	$25	(29%)
Wall assembly or concealed space	340	(17%)	10	(6%)	10	(10%)	$9	(11%)
Unclassified function area	200	(10%)	18	(12%)	14	(14%)	$8	(10%)
Attic or other space above top story	160	(8%)	0	(0%)	5	(5%)	$5	(6%)
Garage*	100	(5%)	0	(0%)	3	(3%)	$4	(5%)
Ceiling/floor assembly or space between stories	90	(4%)	0	(0%)	2	(2%)	$1	(1%)
Crawl space or substructure space	90	(4%)	3	(2%)	8	(8%)	$6	(7%)
Heating equipment room or area	80	(4%)	6	(4%)	0	(0%)	$4	(4%)
Unclassified structural area	80	(4%)	0	(0%)	2	(2%)	$2	(3%)
Kitchen	70	(3%)	10	(6%)	5	(5%)	$2	(2%)
Exterior wall surface	60	(3%)	0	(0%)	2	(2%)	$3	(3%)
Other known area of origin	300	(14%)	24	(15%)**	21	(21%)	$16	(18%)

Table 2.6. Home Space Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

D. Wood Stoves, Fireplace Inserts, and Other Solid-Fueled Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Total fires excluding confined fires	2,050	(100%)	158	(100%)	100	(100%)	$85	(100%)

* Excludes dwelling garages coded as separate property.
** Leading areas for fire deaths not shown above are unclassified area of origin (6% of deaths), hallway or corridor (5%), and bedroom (4%).

E. Liquid-Fueled Space Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Living room, den, or family room	170	(19%)	31	(52%)	27	(29%)	$7	(23%)
Unclassified function area	110	(12%)	9	(15%)	17	(18%)	$3	(11%)
Bedroom	100	(10%)	10	(16%)	10	(10%)	$2	(8%)
Garage*	80	(9%)	0	(0%)	19	(20%)	$5	(17%)
Crawl space or substructure space	80	(9%)	0	(0%)	4	(4%)	$2	(7%)
Heating equipment room	80	(8%)	0	(0%)	0	(0%)	$1	(4%)
Kitchen	60	(7%)	10	(17%)	8	(9%)	$2	(5%)
Other known area of origin	230	(25%)	0	(0%)	9	(10%)	$8	(26%)
Total fires excluding confined fires	920	(100%)	59	(100%)	93	(100%)	$31	(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 ten, 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.

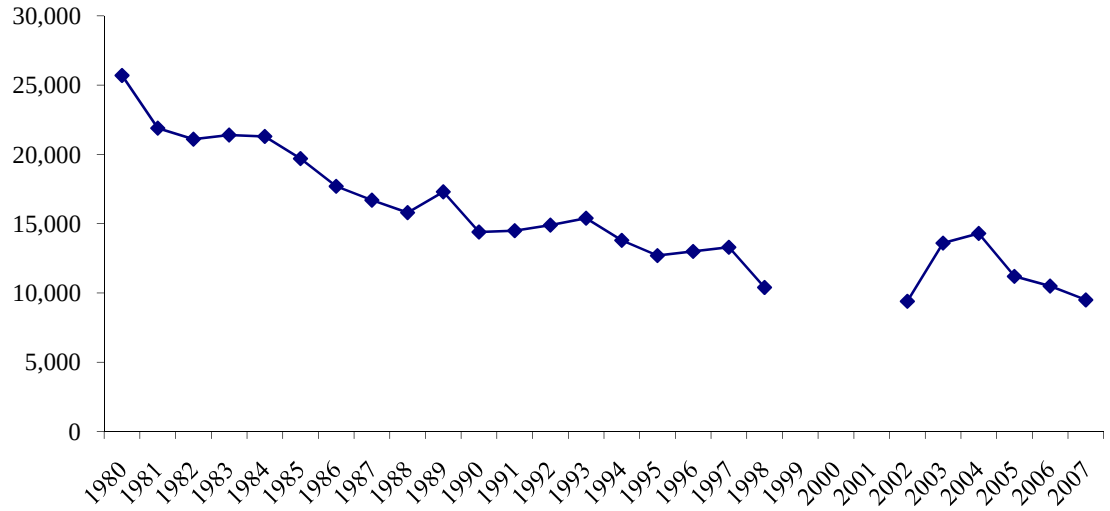
Source: Data from NFIRS Version 5.0 and NFPA survey.

Section 3. Central Heating Units

In 2007, an estimated 9,000 reported home structure fires involving central heating units resulted in 10 civilian deaths, 80 civilian injuries, and $36 million in direct property damage.

The number of fires declined sharply from 1980 to 1998. (See Figure 3.1.) There is some evidence of a resumption of a downward trend since 2004. (See Table 3.1.)

Figure 3.1. Home Fires Involving Furnaces, Boilers, or Other Central Heating Units, 1980-2007, 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 (1999-2007) and from NFPA survey.

Of the 2003-2007 central heating unit fires, including fires reported as confined fires, 40% involved liquid-fueled equipment, 31% electric-powered equipment, 28% gas-fueled equipment, and 1% solid-fueled equipment.

For gas-fueled equipment fires, natural gas outnumbered LP gas by nearly 8-to-1. For solid-fueled equipment fires, which were comparatively few, wood accounted for nearly all the non-confined fires and coal accounted for all the confined fires.

Central heating units accounted for 8,420 injuries reported to hospital emergency rooms in 2008.

For specific equipment, furnaces with unknown fuel or power accounted for 4,840 injuries, gas-fueled furnaces 1,270 injuries, oil-fueled furnaces 1,200 injuries, boilers 1,040 injuries, coal-fueled furnaces 70 injuries, and electric-powered furnaces no injuries.[16] Another 7,510 injuries were associated with ductwork for heating or cooling. (See Table 3.A.)

[16] All statistics from CPSC's National Electronic Injury Surveillance System, at www.cpsc.gov.

Table 3.A. Home Central Heating Equipment Fires, by Type of Fuel or Power
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Including Fires Reporting as Confined Fires)

Fuel or Power	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Liquid-fueled	4,750	(40%)	0	(0%)	16	(11%)	$11	(15%)
Electric-powered	3,670	(31%)	3	(7%)	39	(26%)	$17	(22%)
Gas-fueled	3,260	(28%)	21	(48%)	89	(60%)	$42	(56%)
Solid-fueled	150	(1%)	19	(43%)	4	(3%)	$5	(7%)
Total	11,830	(100%)	45	(100%)	148	(100%)	$76	(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. Equipment powered by something other than gas, liquid, or solid fuel or electricity are not shown but are included in the totals.

Source: Data from NFIRS Version 5.0 and NFPA survey.

In 1998, 2000, 2001, and 2003, there were 1.8 electrocution deaths per year involving electric furnaces.[17]
These are the only years with separate statistics for water heaters and furnaces. In 1995-1997, statistics were provided for furnaces and water heaters together, and the combined average in those years was higher (5.0) than the combined average (4.3) in the four years cited.

Space heaters result in far more fires and losses than central heating devices and have higher risks relative to usage.
Fire risk is analyzed using a range of usage estimates. (See Tables 3.B.)

Comparisons of different fuel or power options within central heating equipment do not show any specific types to be clearly and consistently better or worse for all types of loss.

- Among central heating equipment, gas-fueled units show a higher rate of civilian fire deaths per user household but lower fire incident rates, civilian fire injuries, and property damage rates. (See Table 3.C.)

- Liquid-fueled equipment has the highest rates for fire incidents and direct property damage.

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

Table 3.B. Comparative Risk of Central and Space Heating Equipment Based on Range of 2005 Usage Estimate and Average 2003-2007 Reported Fires

Risk Measure	Space Heating	Central Heating	How Much Higher Is Space Heating Risk Than Central Heating Risk?
Fires (per million user households)	394 - 589	131 - 145	3 - 4 times
Civilian deaths (per million user households)	9.0 - 13.5	0.5	18 - 25 times
Civilian injuries (per million user households)	19.0 - 28.4	1.7 - 1.8	11 - 16 times
Direct property damage (per user household)	$7.8 - $11.6	$0.9	9 - 13 times

Table 3C. Comparative Risk of Central Heating Equipment for Different Types of Fuel or Power Based on Range of 2005 Usage Estimates and Average 2003-2007 Reported Fires

Risk Measure	Oil or Other Liquid-Fueled	Electric-Powered	Gas Fueled
Fires (per million user household)	579 - 633	191 - 230	52 - 56
Civilian deaths (per million user households)	0.0	0.2	0.3 - 0.4
Civilian injuries (per million user households)	1.9 - 2.1	2.1 - 2.4	1.4 - 1.5
Direct property damage (per user household)	$1.4 - $1.5	$0.9 - $1.1	$0.7

Note: There is no "best" estimate within the ranges, because the ends primarily represent the inclusion or exclusion of statistics on usage of "other" heating devices that cannot be classified with confidence as central heating units vs. space heaters based on available data. Fires are analyzed by type of equipment and then for each device by type of equipment power; this is done separately for non-confined fires, fires confined to boiler or fuel burner, and fires confined to chimney or flue.

Automatic control failure was cited in one-seventh (14%) of all home central heating fires.

Backfire (9% was also a leading factor contributing to ignition. (See Table 3.D.)

Unclassified mechanical failure or malfunction was reported in 34% of all home central heating fires, 29% of the *non-confined* fires, and 11% of associated civilian deaths. Heat source too close to combustibles was reported in 16% of non-confined fires and 8% of associated civilian deaths. Automatic control failure was cited in 4% of non-confined home heating equipment fires compared to 9% of home fires confined to fuel burner of boiler, where it was the third leading factor contributing to ignition, behind unclassified mechanical failure or malfunction (35%) and backfire (10%). (See Table 3.2, which includes breakdowns for all central heating units and for gas-fueled, electric-powered, and liquid-fueled units.)

Table 3.D. Leading Factors Contributing to Ignition for Home Central Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure	4,010	(34%)	5	(11%)	20	(14%)	$28	(36%)
Automatic control failure	1,630	(14%)	0	(0%)	4	(3%)	$3	(4%)
Backfire	1,060	(9%)	0	(0%)	12	(8%)	$1	(2%)
Failure to clean	900	(8%)	0	(0%)	2	(1%)	$7	(9%)
Heat source too close to combustibles	660	(6%)	3	(8%)	27	(18%)	$12	(16%)
Total	11,830		45		148		$76	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with central heating equipment or no equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Nearly half (45%) of home central heating fires began with ignition of flammable or combustible gas or liquid.
This may often be the gas or liquid that fuels the equipment, because most of these fires are reported as confined to the equipment. (See Table 3.E.)

One-third (34%) of home central heating *non-confined* fires began with ignition of either wire or cable insulation (18%) or structural member or framing (16%). Flammable or combustible liquid or gas accounted for a large share of non-confined central heating fires also (13% for all central heating units, 7% for electric-powered units, 14% for gas-fueled units, and 40% for liquid-fueled units). Half (48%) of all associated deaths resulted from fires that began with ignition of structural member or framing. (See Table 3.3, which includes breakdowns for all central heating units and for gas-fueled, electric-powered, and liquid-fueled units.)

More than half (58%) of home central heating 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. (See Tables 3.F and 3.4, which covers only non-confined fires and includes breakdowns for all central heating units and for gas-fueled, electric-powered, and liquid-fueled units.)

Table 3.E. Leading Items First Ignited for Home Central Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	5,320	(45%)	11	(24%)	61	(41%)	$9	(11%)
Unclassified item first ignited	1,760	(15%)	7	(15%)	8	(5%)	$6	(8%)
Wire or cable insulation	1,240	(10%)	3	(6%)	8	(6%)	$3	(4%)
Unclassified or unknown-type liquid, piping or filter	460	(4%)	0	(0%)	3	(2%)	$4	(6%)
Structural member or framing	450	(4%)	22	(48%)	4	(3%)	$22	(28%)
Total	11,830		45		148		$76	

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 ten, 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 listed as unknown have also been allocated proportionally. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with central heating equipment or no equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 3.F. Leading Areas of Origin for Home Central Heating Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room	6,810	(58%)	15	(34%)	93	(63%)	$33	(44%)
Duct for heating or air conditioning	1,010	(9%)	3	(7%)	13	(9%)	$5	(7%)
Crawl or substructure space	780	(7%)	0	(0%)	8	(5%)	$7	(10%)
Unclassified service or equipment area	610	(5%)	0	(0%)	2	(1%)	$4	(5%)
Unclassified area of origin	390	(3%)	0	(0%)	0	(0%)	$0	(0%)
Total	11,830		45		148		$76	

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 ten, 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 area of origin unknown have also been allocated proportionally. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with central heating equipment or no equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Safe Heating Behaviors

Messages from NFPA Educational Messaging Advisory Committee

General heating-related messages

- Have a three-foot kid-free zone around open fires and heaters.
- 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.
- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
- Use heating equipment that has the label of a recognized testing laboratory.
- Never use your oven for heating.
- Install central heating equipment according to the local codes and manufacturer's instructions. Have a qualified professional install the equipment.
- Make sure all fuel-burning equipment is vented to the outside to avoid carbon monoxide poisoning. CO is created when fuels burn incompletely. CO poisoning can cause illness and even death. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Maintain heating equipment by having them cleaned and inspected annually by a qualified professional.
- For home energy assistance, contact the National Energy Assistance Referral line at 1-866-674-6327.

Central heating

- Furnaces need to be cleaned and inspected at least once a year by a qualified professional.
- Do not store things that can burn near the furnace and keep the furnace area clean and uncluttered.

Additional safe behaviors for central heating

- 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.

Table 3.1. Home Fires Involving Furnaces, Boilers, or Other Central Heating Units, by Year
Structure Fires Reported to U.S. Fire Departments

Year	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions) As Reported		In 2007 Dollars	
1980	25,700		110		470		$125		$315	
1981	21,900		130		620		$80		$181	
1982	21,100		120		530		$113		$243	
1983	21,400		80		450		$126		$262	
1984	21,300		100		340		$105		$210	
1985	19,700		150		450		$113		$217	
1986	17,700		70		280		$87		$165	
1987	16,700		60		320		$92		$168	
1988	15,800		100		390		$110		$193	
1989	17,300		50		350		$122		$205	
1990	14,400		90		310		$116		$184	
1991	14,500		30		360		$154*		$234*	
1992	14,900		50		340		$105		$155	
1993	15,400		60		360		$111		$160	
1994	13,800		80		350		$109		$153	
1995	12,700		110		320		$99		$135	
1996	13,000		50		300		$118		$157	
1997	13,300		30		280		$122		$158	
1998	10,400		50		260		$98		$125	
1999	8,700	(6,200)	0	(0)	90	(90)	$78	($76)	$97	($95)
2000	6,200	(3,900)	40	(40)	30	(0)	$76	($75)	$91	($90)
2001	7,900	(3,600)	20	(20)	130	(90)	$78	($77)	$92	($90)
2002	9,400	(3,800)	20	(20)	120	(120)	$128	($123)	$147	($142)
2003	13,600	(3,400)	20	(20)	210	(130)	$119	($115)	$134	($129)
2004	14,300	(2,900)	30	(30)	210	(120)	$129	($127)	$142	($139)
2005	11,200	(2,600)	110	(110)	140	(130)	$75	($71)	$80	($76)
2006	10,500	(2,300)	50	(50)	110	(100)	$53	($52)	$55	($54)
2007	9,500	(2,400)	10	(10)	80	(80)	$36	($35)	$36	($35)

* 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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey.

Table 3.2. Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Central Heating

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	790	(29%)	5	(11%)	6	(6%)	$27	(37%)
Heat source too close to combustibles	440	(16%)	3	(8%)	27	(25%)	$12	(16%)
Unclassified electrical failure or malfunction	220	(8%)	9	(20%)	11	(10%)	$4	(5%)
Unspecified short circuit arc	180	(7%)	3	(8%)	2	(2%)	$1	(1%)
Leak or break	150	(5%)	4	(8%)	8	(7%)	$4	(5%)
Worn out	130	(5%)	0	(0%)	2	(2%)	$2	(3%)
Failure to clean	130	(5%)	0	(0%)	2	(2%)	$7	(9%)
Installation deficiency	120	(4%)	0	(0%)	2	(2%)	$2	(2%)
Automatic control failure	110	(4%)	0	(0%)	4	(4%)	$3	(4%)
Unclassified operational deficiency	70	(3%)	0	(0%)	2	(2%)	$2	(3%)
Unclassified factor	70	(2%)	10	(24%)	11	(10%)	$4	(6%)
Arc or spark from operating equipment	60	(2%)	0	(0%)	4	(4%)	$2	(2%)
Equipment not being operated properly	60	(2%)	0	(0%)	7	(6%)	$3	(4%)
Short circuit arc from defective or worn insulation	40	(2%)	0	(0%)	2	(2%)	$0	(0%)
Backfire	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified misuse of material or product	30	(1%)	4	(10%)	0	(0%)	$0	(0%)
Short circuit arc from mechanical damage	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Improper startup	20	(1%)	5	(11%)	9	(8%)	$1	(2%)
Storm	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Arc from faulty contact or broken conductor	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Improper container or storage	20	(1%)	0	(0%)	7	(6%)	$1	(1%)
Flammable liquid or gas spilled	20	(1%)	0	(0%)	5	(5%)	$1	(1%)
Unclassified design, manufacturing or installation deficiency	20	(1%)	0	(0%)	0	(0%)	$1	(2%)
Construction deficiency	20	(1%)	5	(11%)	0	(0%)	$1	(1%)
Equipment overloaded	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Abandoned or discarded material or product	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unintentionally turned on or not turned off	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Washing part or painting with flammable liquid	20	(1%)	0	(0%)	4	(4%)	$0	(0%)

Table 3.2. Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

A. All Central Heating (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known factor	90	(3%)	0	(0%)	2	(2%)	$2	(3%)
Total fires excluding confined fires	2,730	(100%)	44	(100%)	111	(100%)	$73	(100%)
Total factor entries	2,980	(109%)	48	(111%)	117	(105%)	$82	(112%)

B. Gas-Fueled Central Heating

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	390	(29%)	0	(0%)	6	(9%)	$15	(36%)
Heat source too close to combustibles	310	(23%)	3	(14%)	20	(26%)	$11	(26%)
Leak or break	100	(7%)	3	(14%)	6	(8%)	$2	(6%)
Installation deficiency	70	(5%)	0	(0%)	0	(0%)	$1	(3%)
Automatic control failure	60	(4%)	0	(0%)	2	(3%)	$1	(2%)
Worn out	50	(4%)	0	(0%)	2	(3%)	$1	(2%)
Unclassified electrical failure or malfunction	50	(4%)	8	(35%)	11	(15%)	$2	(5%)
Unclassified operational deficiency	50	(4%)	0	(0%)	2	(3%)	$1	(4%)
Unclassified factor contributed to ignition	50	(3%)	0	(0%)	7	(10%)	$2	(5%)
Failure to clean	40	(3%)	0	(0%)	0	(0%)	$1	(3%)
Unspecified short circuit arc	40	(3%)	0	(0%)	0	(0%)	$0	(1%)
Equipment not being operated properly	40	(3%)	0	(0%)	0	(0%)	$3	(6%)
Flammable liquid or gas spilled	20	(2%)	0	(0%)	5	(7%)	$1	(2%)
Unclassified misuse of material or product	20	(2%)	4	(18%)	0	(0%)	$0	(0%)
Improper container or storage	20	(2%)	0	(0%)	5	(6%)	$1	(2%)
Arc or spark from operating equipment	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Washing part or painting with flammable liquid	20	(1%)	0	(0%)	4	(5%)	$0	(0%)
Storm	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Abandoned or discarded material or product	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Unintentionally turned on or not turned off	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Improper startup	10	(1%)	4	(19%)	5	(6%)	$0	(1%)

Table 3.2. Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Gas-Fueled Central Heating (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known factor	60	(5%)	0	(0%)	2	(3%)	$2	(4%)
Total fires excluding confined fires	1,350	(100%)	21	(100%)	75	(100%)	$41	(100%)
Total factor entries	1,450	(108%)	21	(100%)	77	(103%)	$45	(109%)

C. Electric-Powered Central Heating

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	270	(26%)	0	(0%)	0	(0%)	$5	(33%)
Unclassified electrical failure or malfunction	160	(16%)	0	(0%)	0	(0%)	$2	(12%)
Unspecified short circuit arc	130	(13%)	3	(100%)	2	(9%)	$1	(5%)
Worn out	70	(7%)	0	(0%)	0	(0%)	$1	(8%)
Heat source too close to combustibles	60	(6%)	0	(0%)	2	(10%)	$2	(11%)
Failure to clean	60	(5%)	0	(0%)	0	(0%)	$0	(0%)
Automatic control failure	40	(4%)	0	(0%)	2	(10%)	$1	(8%)
Arc or spark from operating equipment	40	(4%)	0	(0%)	4	(20%)	$2	(10%)
Short circuit arc from defective or worn insulation	40	(4%)	0	(0%)	2	(10%)	$0	(1%)
Installation deficiency	30	(3%)	0	(0%)	0	(0%)	$0	(1%)
Short circuit arc from mechanical damage	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Arc from faulty contact or broken conductor	20	(2%)	0	(0%)	0	(0%)	$0	(2%)
Unclassified operational deficiency	20	(2%)	0	(0%)	0	(0%)	$1	(5%)
Leak or break	20	(2%)	0	(0%)	2	(10%)	$0	(0%)
Unclassified factor	20	(2%)	0	(0%)	2	(9%)	$1	(6%)
Equipment overloaded	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Water caused short circuit arc	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified design, manufacturing or installation deficiency	10	(1%)	0	(0%)	0	(0%)	$1	(4%)
Construction deficiency	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Improper startup	10	(1%)	0	(0%)	4	(20%)	$1	(8%)
Storm	10	(1%)	0	(0%)	0	(0%)	$0	(0%)

Table 3.2. Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

C. Electric-Powered Central Heating (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified misuse of material or product	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Equipment not being operated properly	10	(1%)	0	(0%)	5	(21%)	$0	(0%)
Manual control failure	10	(1%)	0	(0%)	0	(0%)	$1	(8%)
Backfire	10	(1%)	0	(0%)	0	(0%0	$1	(5%)
Other known factor	20	(2%)	0	(0%)	0	(0%)	$0	(2%)
Total fires excluding confined fires	1,010	(100%)	3	(100%)	22	(100%)	$16	(100%)
Total factor entries	1,110	(110%)	3	(100%)	26	(120%)	$21	(131%)

D. Liquid-Fueled Central Heating

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified mechanical failure or malfunction	130	(40%)	0	(NA)	0	(0%)	$3	(29%)
Heat source too close to combustibles	50	(15%)	0	(NA)	4	(40%)	$0	(4%)
Backfire	30	(9%)	0	(NA)	0	(0%)	$0	(1%)
Leak or break	30	(8%)	0	(NA)	0	(0%)	$1	(10%)
Installation deficiency	20	(7%)	0	(NA)	3	(30%)	$0	(2%)
Failure to clean	10	(4%)	0	(NA)	3	(30%)	$4	(43%)
Automatic control failure	10	(4%)	0	(NA)	0	(0%)	$1	(7%)
Worn out	10	(4%)	0	(NA)	0	(0%)	$0	(0%)
Equipment not being operated properly	10	(3%)	0	(NA)	0	(0%)	$0	(1%)
Unspecified short circuit arc	10	(3%)	0	(NA)	0	(0%)	$0	(0%)
Unclassified operational deficiency	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Unclassified electrical failure or malfunction	10	(2%)	0	(NA)	0	(0%)	$0	(2%)
Other known factor	30	(10%)	0	(NA)	0	(0%)	$0	(0%)

Table 3.2. Home Central Heating Unit Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

D. Liquid-Fueled Central Heating (Continued)

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Total fires excluding confined fires	320	(100%)	0	(NA)	10	(100%)	$10	(100%)
Total factor entries	360	(111%)	0	(NA)	10	(100%)	$10	(103%)

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 ten, 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.

Table 3.3. Home Central Heating Unit Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Central Heating

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	500	(18%)	3	(6%)	5	(5%)	$3	(4%)
Structural member or framing	440	(16%)	22	(50%)	4	(4%)	$22	(29%)
Flammable or combustible gas or liquid	360	(13%)	10	(23%)	35	(31%)	$8	(11%)
Unclassified item	220	(8%)	7	(16%)	8	(7%)	$5	(7%)
Dust, fiber, or lint	120	(4%)	0	(0%)	0	(0%)	$1	(1%)
Insulation within structural area	110	(4%)	0	(0%)	3	(3%)	$1	(1%)
Clothing	110	(4%)	3	(6%)	13	(12%)	$4	(5%)
Interior wall covering	100	(4%)	0	(0%)	2	(2%)	$3	(4%)
Unclassified structural component or finish	90	(3%)	0	(0%)	2	(2%)	$4	(5%)
Floor covering	90	(3%)	0	(0%)	2	(2%)	$2	(3%)
Pipe, duct, conduit, hose, or hose covering	70	(3%)	0	(0%)	6	(5%)	$1	(1%)
Interior ceiling covering	50	(2%)	0	(0%)	4	(4%)	$6	(8%)
Appliance housing or casing	50	(2%)	0	(0%)	2	(2%)	$1	(1%)
Box or bag	50	(2%)	0	(0%)	6	(5%)	$1	(2%)
Multiple items first ignited	50	(2%)	0	(0%)	4	(4%)	$4	(5%)
Filter including evaporative cooler pad	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified soft goods or clothing	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified liquid, piping, or filter	30	(1%)	0	(0%)	3	(3%)	$4	(5%)
Papers	20	(1%)	0	(0%)	3	(3%)	$0	(1%)
Exterior wall covering	20	(1%)	0	(0%)	2	(1%)	$1	(1%)
Trash or waste	20	(1%)	0	(0%)	2	(2%)	$0	(0%)
Mattress or bedding	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Linen other than bedding	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified furniture or utensil	10	(1%)	0	(0%)	2	(2%)	$0	(0%)
Fabric not made up	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified storage supplies	10	(1%0	0	(0%)	2	(2%)	$0	(1%)
Other known items	90	(3%)	0	(0%)	0	(0%)	$1	(1%)
Total fires excluding confined fires	2,730	(100%)	44	(100%)	111	(100%)	$73	(100%)

Table 3.3. Home Central Heating Unit Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Gas-Fueled Central Heating

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	260	(19%)	0	(0%)	2	(3%)	$11	(27%)
Flammable or combustible gas or liquid	180	(14%)	11	(51%)	23	(30%)	$4	(11%)
Wire or cable insulation	130	(9%)	0	(0%)	2	(2%)	$0	(1%)
Clothing	100	(7%)	3	(14%)	12	(16%)	$4	(10%)
Unclassified item	90	(7%)	8	(35%)	4	(5%)	$3	(8%)
Floor covering	60	(4%)	0	(0%)	0	(0%)	$2	(5%)
Interior wall covering	60	(4%)	0	(0%)	0	(0%)	$3	(7%)
Insulation within structural area	50	(4%)	0	(0%)	4	(5%)	$0	(1%)
Unclassified structural component or finish	50	(3%)	0	(0%)	2	(3%)	$1	(3%)
Dust, fiber or lint	40	(3%)	0	(0%)	0	(0%)	$1	(1%)
Box or bag	40	(3%)	0	(0%)	6	(8%)	$1	(3%)
Multiple items first ignited	30	(2%)	0	(0%)	2	(2%)	$4	(10%)
Unclassified soft goods or clothing	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Appliance housing or casing	20	(2%)	0	(0%)	2	(3%)	$1	(2%)
Pipe, duct, conduit or hose	20	(2%)	0	(0%)	4	(6%)	$0	(1%)
Papers	20	(1%)	0	(0%)	2	(2%)	$0	(1%)
Linen other than bedding	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Interior ceiling covering	20	(1%)	0	(0%)	2	(3%)	$0	(1%)
Exterior wall covering	20	(1%)	0	(0%)	2	(2%)	$0	(1%)
Trash or waste	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Pipe, duct, conduit or hose covering	10	(1%)	0	(0%)	0	(0%)	$1	(1%)
Filter including evaporative cooler pad	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Fabrics not made up	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified storage supplies	10	(1%)	0	(0%)	2	(3%)	$0	(1%)
Mattress or bedding	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified liquid, piping, or filter	10	(1%)	0	(0%)	2	(2%)	$1	(2%)
Unclassified furniture or utensil	10	(1%)	0	(0%)	2	(3%)	$0	(0%)
Other known item	50	(3%)	0	(0%)	0	(0%)	$1	(2%)
Total fires excluding confined fires	1,350	(100%)	21	(100%)	75	(100%)	$41	(100%)

Table 3.3. Home Central Heating Unit Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

C. Electric-Powered Central Heating

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	360	(36%)	3	(100%)	3	(14%)	$2	(10%)
Structural member or framing	120	(12%)	0	(0%)	1	(7%)	$4	(28%)
Unclassified item	100	(9%)	0	(0%)	2	(8%)	$2	(10%)
Dust, fiber, or lint	70	(7%)	0	(0%)	0	(0%)	$0	(3%)
Flammable or combustible gas or liquid	70	(7%)	0	(0%)	10	(47%)	$1	(5%)
Insulation within structural area	50	(5%)	0	(0%)	0	(0%)	$0	(3%)
Interior wall covering	30	(3%)	0	(0%)	0	(0%)	$0	(1%)
Appliance housing or casing	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Pipe, duct, conduit or hose	20	(2%)	0	(0%)	0	(0%)	$0	(2%)
Filter including evaporative cooler pads	20	(2%)	0	(0%)	0	(0%)	$0	(0%)
Floor covering	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Interior ceiling covering	20	(2%)	0	(0%)	0	(0%)	$4	(24%)
Pipe, duct, conduit, or hose covering	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified structural component or finish	10	(1%)	0	(0%)	0	(0%)	$0	(2%)
Multiple items first ignited	10	(1%)	0	(0%)	2	(10%)	$0	(1%)
Papers	10	(1%)	0	(0%)	2	(8%)	$0	(1%)
Unclassified furniture or utensil	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Drive belt	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	50	(5%)	0	(0%)	2	(8%)	$1	(7%)
Total fires excluding confined fires	1,010	(100%)	3	(100%)	22	(100%)	$16	(100%)

D. Liquid-Fueled Central Heating

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	130	(40%)	0	(NA)	3	(27%)	$4	(36%)
Structural member or framing	40	(13%)	0	(NA)	0	(0%)	$1	(10%)
Unclassified structural component or finish	30	(10%)	0	(NA)	0	(0%)	$1	(10%)
Unclassified item	30	(9%)	0	(NA)	0	(0%)	$0	(3%)
Unclassified liquid, piping, or filter	10	(4%)	0	(NA)	0	(0%)	$3	(31%)
Floor covering	10	(4%)	0	(NA)	3	(29%)	$0	(0%)

Table 3.3. Home Central Heating Unit Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

D. Liquid-Fueled Central Heating (Continued)

Insulation within structural area	10	(4%)	0	(NA)	0	(0%)	$0	(0%)
Interior ceiling covering	10	(3%)	0	(NA)	0	(0%)	$0	(4%)
Wire or cable insulation	10	(2%)	0	(NA)	0	(0%)	$0	(2%)
Interior wall covering	10	(2%)	0	(NA)	0	(0%)	$0	(3%)
Clothing	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Other known item	20	(7%)	0	(NA)	4	(44%)	$0	(0%)
Total fires excluding confined fires	320	(100%)	0	(NA)	10	(100%)	$10	(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 ten, 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 3.4. Home Central Heating Unit Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Central Heating

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	1,320	(48%)	15	(35%)	64	(58%)	$32	(44%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	340	(12%)	3	(7%)	11	(9%)	$5	(7%)
Crawl space or substructure space	220	(8%)	0	(0%)	5	(5%)	$7	(9%)
Attic or other space above top story	140	(5%)	0	(0%)	0	(0%)	$5	(6%)
Laundry room or area	100	(4%)	3	(7%)	7	(7%)	$3	(4%)
Unclassified function area	70	(3%)	0	(0%)	7	(6%)	$3	(4%)
Unclassified equipment or service area	70	(2%)	0	(0%)	2	(2%)	$4	(5%)
Ceiling/floor assembly or space between stories	60	(2%)	0	(0%)	0	(0%)	$2	(3%)
Closet	50	(2%)	0	(0%)	0	(0%)	$1	(1%)
Garage*	40	(2%)	0	(0%)	1	(1%)	$3	(4%)
Living room, family room, or den	40	(2%)	5	(11%)	1	(1%)	$2	(3%)
Wall assembly or concealed space	30	(1%)	4	(10%)	0	(0%)	$0	(1%)
Unclassified storage area	30	(1%)	0	(0%)	2	(2%)	$0	(1%)
Unclassified structural area	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Other known area of origin	190	(7%)	13	(30%)**	10	(9%)	$6	(8%)
Total fires excluding confined fires	2,730	(100%)	44	(100%)	111	(100%)	$73	(100%)

* Excludes dwelling garages coded as separate property.

** Leading areas for fire deaths not shown above are hallway or corridor (21% of deaths) and bedroom (9%).

B. Gas-Fueled Central Heating

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	650	(48%)	12	(54%)	36	(48%)	$15	(36%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	150	(11%)	3	(14%)	11	(15%)	$3	(8%)
Crawl space or substructure space	120	(9%)	0	(0%)	6	(7%)	$6	(13%)

Table 3.4. Home Central Heating Unit Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Gas-Fueled Central Heating (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Laundry room or area	70	(5%)	3	(14%)	6	(8%)	$2	(4%)
Attic or other space above top story	70	(5%)	0	(0%)	0	(0%)	$2	(6%)
Unclassified function area	40	(3%)	0	(0%)	5	(7%)	$2	(6%)
Garage*	30	(2%)	0	(0%)	0	(0%)	$3	(6%)
Living room, family room, or den	30	(2%)	0	(0%)	0	(0%)	$2	(4%)
Unclassified equipment or service area	20	(2%)	0	(0%)	2	(3%)	$1	(4%)
Ceiling/floor assembly or space between stories	20	(2%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified storage area	20	(1%)	0	(0%)	2	(3%)	$0	(1%)
Closet	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known area of origin	110	(8%)	4	(18%)**	7	(9%)	$4	(11%)
Total fires excluding confined fires	1,350	(100%)	21	(100%)	75	(100%)	$41	(100%)

*Leading area for fire deaths not shown above is bedroom (21% of deaths).

** Leading area in fire deaths not shown above is bedroom (18% of deaths).

C. Electric-Powered Central Heating

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	480	(47%)	3	(100%)	20	(93%)	$8	(49%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	170	(17%)	0	(0%)	0	(0%)	$2	(10%)
Attic or other space above top story	70	(7%)	0	(0%)	0	(0%)	$2	(13%)
Crawl space or substructure space	60	(6%)	0	(0%)	0	(0%)	$1	(6%)
Closet	30	(3%)	0	(0%)	0	(0%)	$1	(4%)
Unclassified equipment or service area	30	(3%)	0	(0%)	0	(0%)	$0	(1%)
Ceiling/floor assembly or space between stories	30	(2%)	0	(0%)	0	(0%)	$0	(3%)
Unclassified function area	20	(2%)	0	(0%)	0	(0%)	$1	(4%)
Laundry room or area	20	(2%)	0	(0%)	0	(0%)	$1	(6%)

Table 3.4. Home Central Heating Unit Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

C. Electric-Powered Central Heating (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known area of origin	110	(11%)	0	(0%)	1	(7%)	$1	(6%)
Total fires excluding confined fires	1,010	(100%)	3	(100%)	22	(100%)	$16	(100%)

D. Liquid-Fueled Central Heating

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	180	(54%)	0	(NA)	7	(71%)	$5	(55%)
Crawl space or substructure space	40	(12%)	0	(NA)	0	(0%)	$0	(2%)
Duct for HVAC, exhaust, heating, or air conditioning	20	(7%)	0	(NA)	0	(0%)	$0	(2%)
Other known area of origin	90	(27%)	0	(NA)	3	(29%)	$4	(41%)
Total fires excluding confined fires	320	(100%)	0	(NA)	10	(100%)	$10	(100%)

NA – Not applicable because total is zero.

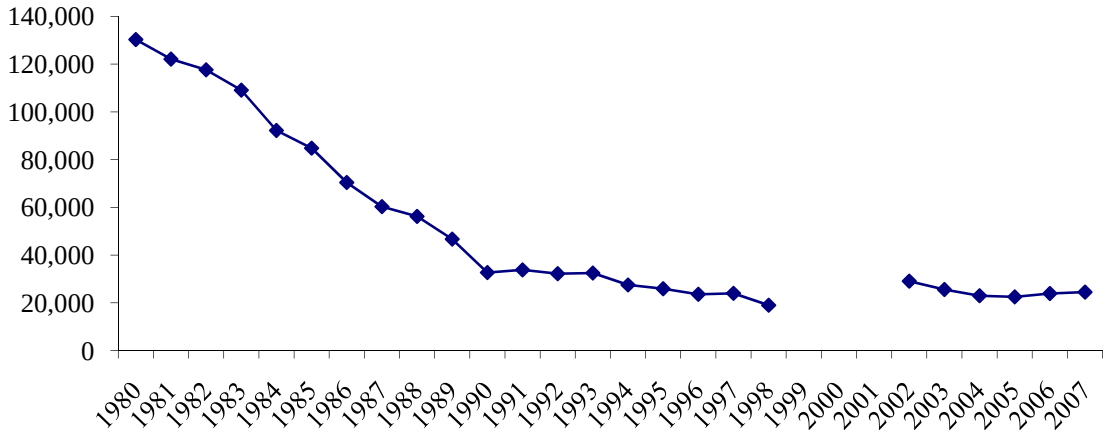
Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, 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.

Section 4. Fireplaces, Chimneys and Chimney Connectors

In 2007, an estimated 10,900 reported home structure fires involving fireplaces, chimneys and chimney connectors resulted in 50 civilian deaths, 130 civilian fire injuries and $146 million in direct property damage.
Estimated fires declined sharply from the early 1980s to the late 1990s, but there has been no clear trend up or down over the last four years. (See Figure 4.1 and Table 4.1.)

Figure 4.1. Home Fires Involving Fireplaces, Chimneys, and Chimney Connectors, 1980-2007, 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 (1999-2007) and from NFPA survey.

In 2003-2007, including fires reported as confined fires, 94% of fireplace, chimney or chimney connector fires were reported to be in solid-fueled equipment (nearly all wood-burning rather than coal-burning), 4% were reported in gas-fueled equipment (about 5-to-1 natural gas over LP-gas), and 1% each were reported in electric-powered and liquid-fueled fireplaces.

Fireplaces, chimneys and chimney connectors accounted for 16,380 injuries reported to hospital emergency rooms in 2008.
For specific devices, unspecified fireplaces accounted for 11,220 injuries, built-in fireplaces 3,260 injuries, unspecified chimneys 670 injuries, metal chimneys 470 injuries, factory-built gas-fueled fireplaces 420 injuries, factory-built wood-fueled fireplaces 230 injuries, brick or masonry chimneys 90 injuries, and factory-built electric-powered fireplaces 20 injuries.[18]

[18] Based on National Electronic Injury Surveillance System, at www.cpsc.gov.

Half (51%) of home fireplace, chimney and chimney connector fires involve failure to clean as a factor contributing to ignition. Table 4.B shows other leading factors could also include problems with creosote build-up including unclassified factor contributed to ignition (9%) and unclassified operational deficiency (6%).

Heat source too close to combustibles is the leading factor contributing to ignition for *non-confined* home fireplace, chimney or chimney connector fires, with one-fifth (20%) of fires. One-fourth of non-confined home fireplace, chimney or chimney connector fires involve an installation deficiency (15%) or a construction deficiency (13%). (See Table 4.2, which includes breakdowns for all fireplaces, chimneys, and chimney connectors and for gas-fueled and solid-fueled equipment.)

Most fire deaths were attributed to leak or break (52%) or heat source too close to combustibles (38%).

Most home fireplace, chimney, and chimney connector fires begin with ignition of something that could be creosote. Table 4.C shows 13% of fires begin with ignition of film or residue, but another 21% begin with unclassified organic material, 37% begin with unclassified item first ignited, and 5% begin with trash or waste. Any or all of these could be creosote or other forms of unburned fuel deposits associated with a dirty chimney.

Half of *non-confined* home fireplace, chimney or chimney connector fires (50%) began with ignition of structural member or framing. (See Table 4.3, which includes breakdowns for all fireplaces, chimneys, and chimney connectors and for gas-fueled and solid-fueled equipment.)

Creosote and Chimney Fires

Creosote is a sticky, oily combustible substance created when wood does not burn completely. It rises into the chimney as a liquid and deposits on the chimney wall. A fire starting in creosote can appropriately be reported as a fire with failure to clean as Factor Contributing to Ignition and film or residue as Item First Ignited. The former appears to be used more consistently in fire incident reports.

A conservative best estimate of creosote fires would combine failure-to-clean confined chimney or flue fires with failure-to-clean fires involving solid-fueled space heaters, fireplaces, chimneys and chimney connectors. **This produces estimates of 14,720 reported creosote fires (22% of the total) per year with associated losses of four civilian deaths, 24 civilian injuries, and $33 million in direct property damage per year.**

Some analysts prefer the simplicity of estimating creosote fires by total confined chimney or flue fires – 23,380 fires, no deaths, 40 civilian injuries, and $11 million in direct property damage per year. Combining the two approaches (without double-counting the overlaps) gives a high estimate of 24,010 fires, four civilian deaths, 53 civilian injuries, and $39 million in direct property damage per year.

Table 4.A. Home Fireplace, Chimney, or Chimney Connector Fires, by Type of Fuel or Power
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Department
(Including Fires Reported as Confined Fires)

Fuel or Power	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Solid-fueled	22,490	(94%)	33	(100%)	101	(83%)	$174	(83%)
Gas-fueled	840	(4%)	0	(0%)	8	(7%)	$29	(14%)
Electric-powered	290	(1%)	0	(0%)	0	(0%)	$3	(2%)
Liquid-fueled	230	(1%)	0	(0%)	13	(10%)	$2	(1%)
Total	23,870	(100%)	33	(100%)	122	(100%)	$209	(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 the equipment and type of fuel or power unknown have also been allocated proportionally.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 4.B. Leading Factors Contributing to Ignition for Home Fireplace, Chimney, and Chimney Connector Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Failure to clean	12,250	(51%)	4	(13%)	16	(13%)	$26	(12%)
Unclassified factor	2,170	(9%)	0	(0%)	10	(8%)	$10	(5%)
Heat source too close to combustibles	1,340	(6%)	12	(38%)	30	(25%)	$50	(24%)
Unclassified operational deficiency	1,330	(6%)	0	(0%)	4	(4%)	$15	(7%)
Installation deficiency	1,120	(5%)	0	(0%)	6	(5%)	$20	(10%)
Total	23,870		33		122		$209	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined or confined to chimney or flue.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 4.C. Leading Items First Ignited for Home Fireplace, Chimney, and Chimney Connector Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified item	8,780	(37%)	0	(0%)	13	(11%)	$13	(6%)
Unclassified organic material	5,070	(21%)	0	(0%)	3	(3%)	$2	(1%)
Film or residue (including creosote)	3,160	(13%)	4	(11%)	2	(1%)	$2	(1%)
Structural member or framing	2,540	(11%)	7	(22%)	35	(29%)	$109	(52%)
Trash or waste	1,160	(5%)	0	(0%)	3	(2%)	$1	(0%)
Total	23,870		33		122		$209	

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 ten 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. Statistics are calculated separately for fires reported as non-confined or confined to chimney or flue.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 4.D. Leading Areas of Origin for Home Fireplace, Chimney, and Chimney Connector Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Chimney or flue (confined)	19,810	(83%)	0	(0%)	23	(19%)	$8	(4%)
Wall assembly or concealed space	970	(4%)	0	(0%)	18	(15%)	$42	(20%)
Living room, den, or family room	730	(3%)	7	(20%)	36	(30%)	$37	(18%)
Attic or other space above top story	560	(2%)	0	(0%)	11	(9%)	$35	(17%)
Ceiling/floor assembly or space between stories	250	(1%)	5	(14%)	3	(2%)	$11	(5%)
Total	23,870		33		122		$209	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined or confined to chimney or flue.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Most home fire place, chimney, and chimney connector fires begin in the chimney. Table 4.D shows 83% of these fires are reported as confined to chimney or flue, but the true share could be much higher, because NFIRS Version 5.0 has no code for chimney as an area of origin. Any of the other leading areas of origin could be describing the room or space containing or adjacent to the chimney. *Non-confined* home fireplace, chimney and chimney connector fires are shown by area of origin (without chimney as an option) in Table 4.4, which includes breakdowns for all fireplaces, chimneys, and chimney connectors, and for gas-fueled and solid-fueled equipment.

Safe Heating Behaviors

Messages from NFPA Educational Messaging Advisory Committee

General heating-related messages

- Have a three-foot kid-free zone around open fires.
- 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.
- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at least 3 feet away from heating equipment.
- Make sure all fuel-burning equipment is vented to the outside to avoid carbon monoxide poisoning. CO is created when fuels burn incompletely. CO poisoning can cause illness and even death. Make sure the venting for exhaust is kept clear and unobstructed. This includes removal of snow around the outlet to the outside.
- Install and maintain carbon monoxide alarms to avoid risk of carbon monoxide poisoning.
- Maintain heating equipment and chimneys by having them cleaned and inspected annually by a qualified professional.

Fireplaces

- Allow ashes to cool before disposing. Dispose of ashes in a tightly covered metal container and keep the ash container at least 10 feet away from the home and any other nearby buildings. Douse and saturate with water. Chimneys and vents need to be cleaned and inspected at least once a year.
- Have a sturdy screen on a fireplace.
- Burn only dry, seasoned wood.
- Use artificial logs according to manufacturer's recommendations.
- Use only newspaper and kindling wood or fire starters to start a fire. Never use flammable liquids, such as lighter fluid, kerosene or gasoline to start a fire.
- Chimneys and vents need to be cleaned and inspected at least once a year.

Additional safe behaviors for fireplaces

- Make sure your choice of heating equipment is permitted by law in your community. For example, chimineas and firepits are not allowed in all communities.
- Check for product recalls at www.cpsc.gov.
- For wood-burning fireplaces, burn only 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. 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.
- 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 wood-burning fireplaces, the annual inspection needs to address potential build-up of creosote in heating equipment and associated chimneys and chimney connectors.

Table 4.1. Home Fires Involving Fireplaces, 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 2007 Dollars	
1980	130,300		280		850		$289		$728	
1981	122,100		300		460		$256		$583	
1982	117,600		220		540		$279		$600	
1983	109,100		150		490		$261		$544	
1984	92,200		120		450		$251		$501	
1985	84,800		140		400		$291		$561	
1986	70,400		90		440		$213		$404	
1987	60,300		100		310		$207		$379	
1988	56,200		80		680		$243		$427	
1989	46,700		60		310		$250		$418	
1990	32,700		110		320		$200		$317	
1991	33,800		60		290		$289*		$441*	
1992	32,200		110		370		$186		$276	
1993	32,500		30		240		$195		$280	
1994	27,500		30		200		$182		$255	
1995	25,900		30		220		$225		$307	
1996	23,600		130		250		$214		$283	
1997	22,400		40		210		$193		$250	
1998	19,000		40		140		$170		$217	
1999	35,100	(12,300)	0	(0)	90	(90)	$338	($286)	$421	($356)
2000	30,400	(8,700)	160	(160)	310	(310)	$292	($278)	$352	($335)
2001	28,800	(6,500)	90	(90)	60	(60)	$223	($210)	$261	($246)
2002	29,100	(6,200)	20	(20)	80	(50)	$193	($181)	$223	($209)
2003	25,600	(4,600)	90	(90)	120	(110)	$255	($242)	$288	($273)
2004	23,000	(3,800)	0	(0)	120	(100)	$241	($235)	$264	($257)
2005	22,500	(3,600)	20	(20)	120	(90)	$217	($202)	$230	($215)
2006	23,900	(3,900)	10	(10)	120	(80)	$227	($223)	$233	($230)
2007	24,500	(4,400)	50	(50)	150	(120)	$148	($144)	$148	($144)

*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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey.

Table 4.2. Home Fireplace, Chimney and Chimney Connector Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Fireplaces, Chimneys and Chimney Connectors

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	820	(20%)	12	(38%)	30	(30%)	$50	(25%)
Installation deficiency	610	(15%)	0	(0%)	6	(6%)	$19	(10%)
Construction deficiency	530	(13%)	0	(0%)	5	(5%)	$18	(9%)
Failure to clean	460	(11%)	4	(13%)	12	(12%)	$23	(12%)
Leak or break	390	(10%)	17	(52%)	19	(19%)	$19	(9%)
Unclassified operational deficiency	240	(6%)	0	(0%)	0	(0%)	$14	(7%)
Unclassified mechanical failure or malfunction	240	(6%)	0	(0%)	2	(2%)	$15	(8%)
Worn out	220	(5%)	0	(0%)	0	(0%)	$12	(6%)
Unclassified design, manufacturing, or installation deficiency	220	(5%)	0	(0%)	5	(5%)	$13	(7%)
Unclassified factor	210	(5%)	0	(0%)	8	(8%)	$9	(5%)
Design deficiency	150	(4%)	0	(0%)	0	(0%)	$7	(4%)
Equipment unattended	100	(3%)	3	(8%)	2	(2%)	$9	(5%)
Unclassified fire spread or control	80	(2%)	0	(0%)	0	(0%)	$6	(3%)
Unclassified misuse of material or product	60	(2%)	5	(17%)	6	(6%)	$3	(1%)
Equipment not being operated properly	50	(1%)	0	(0%)	0	(0%)	$1	(1%)
Equipment used for not intended purpose	40	(1%)	0	(0%)	0	(0%)	$2	(1%)
Animal	40	(1%)	0	(0%)	2	(2%)	$1	(0%)
Abandoned or discarded material or product	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
High wind	20	(1%)	0	(0%)	0	(0%)	$2	(1%)
Equipment overloaded	20	(1%)	0	(0%)	2	(2%)	$2	(1%)
Arc or spark from operating equipment	20	(1%)	0	(0%)	0	(0%)	$1	(0%)
Other known factor	190	(5%)	3	(10%)*	25	(25%)	$12	(6%)
Total fires excluding confined fires	4,060	(100%)	33	(100%)	99	(100%)	$201	(100%)
Total factor entries	4,740	(117%)	45	(138%)	123	(125%)	$238	(119%)

* Leading factor for fire deaths not shown above is improper fueling technique (10% of deaths).

Table 4.2. Home Fireplace, Chimney and Chimney Connector Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Gas-Fueled Fireplaces, Chimneys and Chimney Connectors

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	80	(25%)	0	(NA)	0	(0%)	$13	(44%)
Leak or break	50	(16%)	0	(NA)	2	(100%)	$2	(8%)
Installation deficiency	50	(16%)	0	(NA)	0	(0%)	$2	(7%)
Construction deficiency	30	(9%)	0	(NA)	0	(0%)	$1	(2%)
Unclassified design, manufacturing, or installation deficiency	30	(8%)	0	(NA)	0	(0%)	$2	(7%)
Unclassified operational deficiency	20	(5%)	0	(NA)	0	(0%)	$2	(6%)
Unclassified mechanical failure or malfunction	10	(4%)	0	(NA)	0	(0%)	$2	(6%)
Unclassified fire spread or control	10	(4%)	0	(NA)	0	(0%)	$1	(4%)
Worn out	10	(3%)	0	(NA)	0	(0%)	$0	(2%)
Unclassified factor	10	(3%)	0	(NA)	0	(0%)	$0	(1%)
Unclassified misuse of material or product	10	(3%)	0	(NA)	0	(0%)	$0	(1%)
Storm	10	(3%)	0	(NA)	0	(0%)	$0	(0%)
Equipment unattended	10	(2%)	0	(NA)	0	(0%)	$1	(4%)
Equipment used for not intended purpose	10	(2%)	0	(NA)	0	(0%)	$0	(1%)
Washing part or painting with flammable liquid	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Improper startup	10	(2%)	0	(NA)	0	(0%)	$5	(19%)
Other known factor	30	(9%)	0	(NA)	2	(100%)	$1	(3%)
Total fires excluding confined fires	320	(100%)	0	(NA)	2	(100%)	$29	(100%)
Total factor entries	370	(116%)	0	(NA)	3	(200%)	$33	(115%)

C. Solid-Fueled Fireplaces, Chimneys and Chimney Connectors

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	710	(20%)	12	(38%)	23	(26%)	$33	(20%)
Installation deficiency	570	(16%)	0	(0%)	7	(8%)	$18	(11%)
Construction deficiency	490	(14%)	0	(0%)	3	(3%)	$17	(10%)
Failure to clean	440	(12%)	4	(13%)	14	(15%)	$23	(14%)
Leak or break	330	(9%)	17	(52%)	17	(19%)	$16	(10%)
Unclassified operational deficiency	240	(7%)	0	(0%)	0	(0%)	$13	(8%)
Worn out	200	(5%)	0	(0%)	0	(0%)	$11	(7%)

Table 4.2. Home Fireplace, Chimney and Chimney Connector Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Solid-Fueled Fireplaces, Chimneys and Chimney Connectors (Continued)

Unclassified factor	190	(5%)	0	(0%)	7	(8%)	$9	(5%)
Unclassified mechanical failure or malfunction	190	(5%)	0	(0%)	3	(3%)	$12	(7%)
Unclassified design, manufacturing, or installation deficiency	180	(5%)	0	(0%)	6	(7%)	$10	(6%)
Design deficiency	140	(4%)	0	(0%)	0	(0%)	$6	(3%)
Equipment unattended	90	(3%)	3	(8%)	2	(2%)	$8	(5%)
Unclassified misuse of material of product	50	(1%)	5	(17%)	3	(3%)	$3	(2%)
Equipment not being operated properly	50	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified fire spread or control	50	(1%)	0	(0%)	0	(0%)	$4	(3%)
Animal	30	(1%)	0	(0%)	2	(2%)	$1	(0%)
Equipment used for not intended purpose	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Abandoned or discarded material or product	30	(1%)	0	(0%)	0	(0%)	$1	(0%)
High wind	20	(1%)	0	(0%)	0	(0%)	$2	(1%)
Equipment overloaded	20	(1%)	0	(0%)	2	(2%)	$2	(1%)
Arc or spark from operating equipment	20	(1%)	0	(0%)	0	(0%)	$1	(0%)
Other known factor	120	(3%)	3	(10%)*	18	(20%)	$5	(3%)
Total fires excluding confined fires	3,590	(100%)	33	(100%)	89	(100%)	$165	(100%)
Total factor entries	4,190	(117%)	45	(138%)	106	(120%)	$195	(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 ten, 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.

Table 4.3. Home Fireplace, Chimney and Chimney Connector Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Fireplaces, Chimneys and Chimney Connectors

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	2,020	(50%)	7	(22%)	35	(36%)	$109	(54%)
Unclassified structural component or finish	350	(9%)	7	(22%)	4	(4%)	$25	(12%)
Exterior wall covering	230	(6%)	0	(0%)	0	(0%)	$5	(2%)
Insulation within structural area	220	(6%)	0	(0%)	2	(2%)	$7	(3%)
Interior wall covering	210	(5%)	0	(0%)	3	(3%)	$6	(3%)
Unclassified item	170	(4%)	0	(0%)	2	(2%)	$9	(5%)
Interior ceiling covering	130	(3%)	9	(29%)	2	(2%)	$7	(3%)
Exterior roof covering	120	(3%)	0	(0%)	2	(2%)	$9	(4%)
Unclassified organic material	110	(3%)	0	(0%)	3	(3%)	$2	(1%)
Floor covering	60	(2%)	0	(0%)	8	(8%)	$4	(2%)
Film or residue including creosote	60	(2%)	4	(11%)	2	(2%)	$2	(1%)
Flammable or combustible gas or liquid	40	(1%)	3	(9%)	9	(9%)	$1	(0%)
Multiple items first ignited	40	(1%)	0	(0%)	5	(5%)	$3	(2%)
Upholstered furniture	30	(1%)	0	(0%)	7	(7%)	$3	(2%)
Light vegetation including grass	30	(1%)	0	(0%)	5	(5%)	$2	(1%)
Trash or waste	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	210	(5%)	2	(7%)	10	(10%)	$8	(4%)
Total fires excluding confined fires	4,060	(100%)	33	(100%)	99	(100%)	$201	(100%)

B. Gas-Fueled Fireplaces, Chimneys and Chimney Connectors

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	180	(56%)	0	(NA)	0	(0%)	$14	(49%)
Insulation within structural area	20	(6%)	0	(NA)	0	(0%)	$1	(2%)
Flammable or combustible gas or liquid	20	(6%)	0	(NA)	2	(100%)	$0	(1%)
Unclassified structural component or finish	20	(5%)	0	(NA)	0	(0%)	$9	(31%)
Interior wall covering	10	(5%)	0	(NA)	0	(0%)	$1	(2%)
Exterior wall covering	10	(4%)	0	(NA)	0	(0%)	$0	(1%)
Upholstered furniture or vehicle seat	10	(2%)	0	(NA)	0	(0%)	$0	(1%)

Table 4.3. Home Fireplace, Chimney and Chimney Connector Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Gas-Fueled Fireplaces, Chimneys and Chimney Connectors (Continued)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified item	10	(2%)	0	(NA)	0	(0%)	$2	(9%)
Unclassified furniture or utensil	10	(2%)	0	(NA)	0	(0%)	$0	(1%)
Exterior roof covering or finish	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Other known items	30	(10%)	0	(NA)	0	(0%)	$1	(3%)
Total excluding confined fires	320	(100%)	0	(NA)	2	(100%)	$29	(100%)

NA – Not applicable because total is zero.

C. Solid-Fueled Fireplaces, Chimneys and Chimney Connectors

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Structural member or framing	1,790	(50%)	7	(22%)	33	(37%)	$91	(55%)
Unclassified structural component or finish	310	(9%)	7	(22%)	4	(4%)	$14	(9%)
Exterior wall covering	210	(6%)	0	(0%)	0	(0%)	$4	(2%)
Insulation within structural area	200	(6%)	0	(0%)	2	(2%)	$6	(4%)
Interior wall covering	180	(5%)	0	(0%)	3	(4%)	$5	(3%)
Unclassified item	140	(4%)	0	(0%)	2	(3%)	$6	(4%)
Interior ceiling covering	140	(4%)	9	(29%)	2	(2%)	$7	(4%)
Exterior roof covering	110	(3%)	0	(0%)	2	(3%)	$9	(5%)
Unclassified organic material	90	(2%)	0	(0%)	2	(2%)	$1	(1%)
Floor covering	70	(2%)	0	(0%)	9	(10%)	$5	(3%)
Film or residue including creosote	60	(2%)	4	(11%)	2	(2%)	$2	(1%)
Multiple items first ignited	30	(1%)	0	(0%)	2	(2%)	$2	(1%)
Light vegetation including grass	30	(1%)	0	(0%)	6	(6%)	$2	(1%)
Upholstered furniture	30	(1%)	0	(0%)	7	(8%)	$3	(2%)
Trash or waste	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Flammable or combustible gas or liquid	20	(1%)	3	(9%)	9	(10%)	$1	(0%)
Other known item	160	(4%)	2	(7%)*	4	(4%)	$7	(4%)
Total fires excluding confine fires	3,590	(100%)	33	(100%)	89	(100%)	$165	(100%)

* Leading item for fire deaths not shown above is papers (7% of deaths).

Table 4.3. Home Fireplace, Chimney and Chimney Connector Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

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 ten 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 4.4. Home Fireplace, Chimney and Chimney Connector Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Fireplaces, Chimneys and Chimney Connectors

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wall assembly or concealed space	970	(24%)	0	(0%)	18	(18%)	$42	(21%)
Living room, den, or family room	730	(18%)	7	(20%)	36	(37%)	$37	(19%)
Attic or other space above top story	560	(14%)	0	(0%)	11	(12%)	$35	(18%)
Ceiling/floor assembly or space between stories	250	(6%)	5	(14%)	3	(3%)	$11	(6%)
Unclassified structural area	220	(5%)	0	(0%)	0	(0%)	$11	(6%)
Unclassified function area	180	(5%)	15	(45%)	4	(4%)	$8	(4%)
Exterior wall surface	170	(4%)	0	(0%)	0	(0%)	$5	(3%)
Crawl space or substructure space	130	(3%)	5	(14%)	3	(3%)	$14	(7%)
Exterior roof surface	120	(3%)	0	(0%)	5	(5%)	$9	(5%)
Duct for HVAC, exhaust, heating, or air conditioning	110	(3%)	0	(0%)	4	(4%)	$3	(2%)
Heating equipment room or area	100	(2%)	0	(0%)	5	(5%)	$3	(1%)
Unclassified area of origin	70	(2%)	2	(7%)	1	(2%)	$2	(1%)
Kitchen	50	(1%)	0	(0%)	0	(0%)	$1	(0%)
Bedroom	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Garage	40	(1%)	0	(0%)	1	(1%)	$2	(1%)
Conduit, pipe, utility, or ventilation shaft	30	(1%)	0	(0%)	0	(0%)	$2	(1%)
Exterior balcony or unenclosed porch	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified service facility	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified storage area	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Other known area of origin	200	(5%)	0	(0%)	6	(7%)	$9	(4%)
Total fires excluding confined fires	4,060	(100%)	33	(100%)	99	(100%)	$201	(100%)

B. Gas-Fueled Fireplaces, Chimneys and Chimney Connectors

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wall assembly or concealed space	110	(33%)	0	(NA)	0	(0%)	$9	(32%)
Living room, family room, or den	70	(23%)	0	(NA)	0	(0%)	$5	(18%)
Ceiling/floor assembly or space between stories	20	(6%)	0	(NA)	0	(0%)	$1	(5%)

Table 4.4. Home Fireplace, Chimney and Chimney Connector Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires) (Continued)

B. Gas-Fueled Fireplaces, Chimneys and Chimney Connectors

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Attic or other space above top story	20	(5%)	0	(NA)	0	(0%)	$1	(3%)
Exterior wall surface	20	(5%)	0	(NA)	0	(0%)	$0	(1%)
Other known area of origin	90	(28%)	0	(NA)	2	(100%)	$12	(42%)
Total fires excluding confined fires	320	(100%)	0	(NA)	2	(100%)	$29	(100%)

NA – Not applicable because total is zero.

C. Solid-Fueled Fireplaces, Chimneys and Chimney Connectors

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wall assembly or concealed space	860	(24%)	0	(0%)	15	(17%)	$33	(20%)
Living room, den, or family room	610	(17%)	7	(20%)	33	(37%)	$30	(18%)
Attic or other space above top story	540	(15%)	0	(0%)	10	(12%)	$31	(19%)
Ceiling/floor assembly or space between stories	230	(6%)	5	(14%)	4	(4%)	$10	(6%)
Unclassified structural area	190	(5%)	0	(0%)	0	(0%)	$11	(7%)
Unclassified function area	170	(5%)	15	(45%)	4	(5%)	$8	(5%)
Exterior wall surface	150	(4%)	0	(0%)	0	(0%)	$5	(3%)
Crawl space or substructure space	110	(3%)	5	(14%)	0	(0%)	$5	(3%)
Exterior roof surface	110	(3%)	0	(0%)	5	(6%)	$9	(5%)
Duct for HVAC, exhaust, heating, or air conditioning	90	(2%)	0	(0%)	4	(4%)	$2	(1%)
Heating equipment room	80	(2%)	0	(0%)	5	(6%)	$3	(2%)
Unclassified area of origin	60	(2%)	2	(7%)	2	(2%)	$2	(1%)
Kitchen	40	(1%)	0	(0%)	0	(0%)	$1	(0%)
Bedroom	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Exterior balcony or unenclosed porch	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Garage	30	(1%)	0	(0%)	2	(2%)	$2	(1%)
Other known area of origin	250	(7%)	0	(0%)	4	(4%)	$11	(7%)
Total fires excluding confined fires	3,590	(100%)	33	(100%)	89	(100%)	$165	(100%)

Table 4.4. Home Fireplace, Chimney and Chimney Connector Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

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 ten, 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.

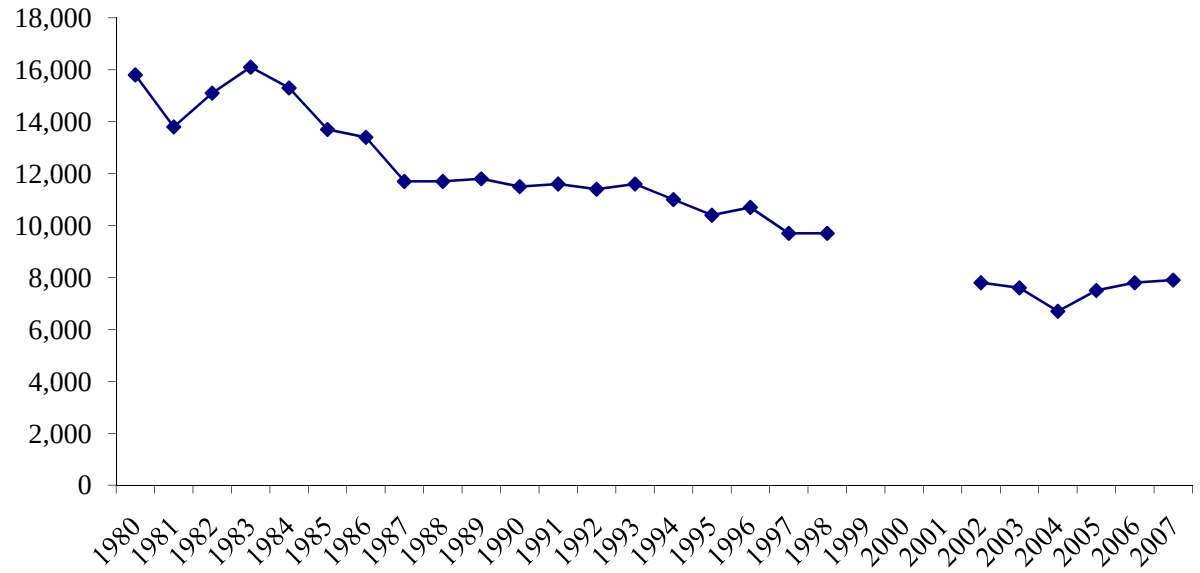
Source: Data from NFIRS Version 5.0 and NFPA survey.

Section 5. Water Heaters

In 2007, an estimated 7,900 reported home structure fires involving water heaters resulted in 30 civilian deaths, 340 civilian injuries, and $75 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. (See Figure 5.1 and Table 5.1.)

Figure 5.1. Home Fires Involving Water Heaters, 1980-2007, 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 (1999-2007) and from NFPA survey.

Three out of five (62%) home water heater fires in 2003-2007, including fires reported as confined fires, involved gas-fueled equipment.

Another 36% involved electric-powered water heaters, and 2% involved liquid-fueled water heaters. For gas-fueled equipment, natural gas outnumbered LP-gas by nearly 5-to-1.

Table 5.A. Home Water Heater Fires, by Type of Fuel or Power
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Department
(Including Fires Reported as Confined Fires)

Fuel or Power	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Gas-fueled	4,620	(62%)	41	(93%)	276	(86%)	$103	(86%)
Electric-powered	2,720	(36%)	3	(7%)	45	(14%)	$17	(14%)
Liquid-fueled	140	(2%)	0	(0%)	0	(0%)	$0	(0%)
Solid-fueled	10	(0%)	0	(0%)	3	(1%)	$0	(0%)
Total	7,480	(100%)	44	(100%)	322	(100%)	$121	(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 ten, 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.

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 2005, the last year with published detailed usage statistics, gas-fueled water heaters had 36% more users than electric-powered water heaters (58.7 million households vs. 43.1 million households). By contrast, gas-fueled water heaters had 2½ times as many confined and non-confined 2003-2007 reported home fires, six times as much direct property damage, 13 times as many civilian fire deaths, and six times as many civilian fire injuries.

Water heaters accounted for 4,250 injuries reported to hospital emergency rooms in 2008.[19]
For specific equipment, water heaters with unknown-type power or fuel accounted for 2,920 injuries, gas-fueled equipment 860 injuries, faucet water heaters 240 injuries, electric immersion heaters 90 injuries, and other electric water heaters 150 injuries.

In 1998, 2000, 2001, and 2003, there were 2.5 electrocution deaths per year involving electric water heaters.[20]
These are the only years with separate statistics for water heaters and furnaces. In 1995-1997, statistics were provided for furnaces and water heaters together, and the combined average in those years was higher (5.0) than the combined average (4.3) in the four years cited.

[19] All statistics from CPSC's National Electronic Injury Surveillance System, at www.cpsc.gov.
[20] Risana T. Chowdbury, "2003 Electrocutions Associated with Consumer Products," December 2006, Table 2, www.cpsc.gov, and previous reports in the series.

One-quarter (23%) of home water heater fires had heat source too close to combustibles as a factor contributing to ignition.

Heat source too close to combustibles accounted for 31% of associated civilian deaths and 44% of associated civilian injuries. (See Table 5.B.) Heat source too close to combustibles had a much larger share of *non-confined* home water heater fires for gas-fueled equipment (39%) than for electric-powered equipment (9%). (See Table 5.2, which includes breakdowns for all water heaters and for gas-fueled and electric-powered water heaters.)

Table 5.B. Leading Factors Contributing to Ignition for Home Water Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,740	(23%)	14	(31%)	142	(44%)	$40	(33%)
Unclassified mechanical failure	1,360	(18%)	3	(7%)	33	(10%)	$19	(16%)
Unclassified electrical failure or malfunction	690	(9%)	0	(0%)	3	(1%)	$4	(4%)
Unspecified short circuit arc	590	(8%)	0	(0%)	2	(1%)	$2	(1%)
Leak or break	560	(7%)	13	(29%)	32	(10%)	$14	(12%)
Total	7,480		44		322		$121	

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 ten, 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. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with water heater as equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

One-fifth (19%) of home water heater fires began with ignition of flammable or combustible gas or liquid.

This may often be the gas or liquid that fuels the equipment, because roughly a third of these fires are reported as confined to the equipment. (Compare Table 5.C to Table 5.3.)

The second leading item first ignited was wire or cable insulation (15%). For gas-fueled equipment, flammable or combustible liquid or gas accounted for 26% of *non-confined* fires and 54% of associated civilian fire deaths, but they accounted for less than 1% of fires for the electric-powered equipment (not enough to be shown on Table 5.3). Wire or cable insulation accounted for 53% of the fires for electric-powered equipment but only 1% of the fires for gas-fueled equipment. (Table 5.3 includes breakdowns for all water heaters and for gas-fueled and electric-powered water heaters.)

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.

Table 5.C. Leading Items First Ignited for Home Water Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	1,430	(19%)	5	(10%)	49	(33%)	$13	(17%)
Wire or cable insulation	1,120	(15%)	8	(17%)	5	(4%)	$9	(12%)
Appliance housing	570	(8%)	0	(0%)	0	(0%)	$2	(2%)
Unclassified item first ignited	540	(7%)	0	(0%)	2	(1%)	$4	(5%)
Clothing	530	(7%)	0	(0%)	8	(5%)	$2	(3%)
Total	7,480		44		322		$121	

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 ten, 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 listed as unknown have also been allocated proportionally. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with water heater as equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Two out of five (40%) of home water heater fires began in a designated heating equipment room or area.
The other leading areas of origin were all popular locations for water heaters, including laundry rooms or areas (15%), closets (10%), and garages (6%). (See Tables 5.D and 5.4, which covers only *non-confined* fires and includes breakdowns for all water heaters and for gas-fueled and electric-powered units.)

Safe Heating Behaviors

Messages from NFPA Educational Messaging Advisory Committee

General heating-related messages

- All heaters need space. Keep things that can burn, such as paper, bedding or furniture, at heat 3 feet away from heating equipment.
- Use heating equipment that has the label of a recognized testing laboratory.
- Install water heaters according to the local codes and manufacturer's instructions. Have a qualified professional install the equipment.

Additional safe behaviors for water heaters

- 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.

Table 5.D. Leading Areas of Origin for Home Water Heater Fires
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room	2,970	(40%)	13	(29%)	107	(33%)	$39	(32%)
Laundry room or area	1,100	(15%)	5	(12%)	68	(21%)	$19	(16%)
Closet	750	(10%)	0	(0%)	17	(5%)	$9	(7%)
Garage*	450	(6%)	0	(0%)	25	(8%)	$20	(17%)
Crawl space or substructure space	350	(5%)	5	(12%)	16	(5%)	$6	(5%)
Total	7,480		44		322		$121	

* Excludes garages designated as separate properties

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 ten, 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 area of origin unknown have also been allocated proportionally. Statistics are calculated separately for fires reported as non-confined fires and for fires reported as confined to fuel burner or boiler and with water heater as equipment involved in ignition.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Table 5.1. Home Fires Involving Water 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 2007 Dollars
1980	15,800	140	990	$86	$218
1981	13,800	50	800	$77	$174
1982	15,100	190	930	$88	$189
1983	16,100	70	1,010	$113	$235
1984	15,300	80	790	$103	$206
1985	13,700	80	820	$101	$194
1986	13,400	50	680	$95	$180
1987	11,700	30	890	$81	$149
1988	11,700	40	700	$101	$178
1989	11,800	30	550	$90	$151
1990	11,500	60	620	$135	$215
1991	11,600	70	770	$170*	$258*
1992	11,400	60	550	$81	$120
1993	11,600	50	670	$97	$139
1994	11,000	40	620	$102	$143
1995	10,400	30	510	$97	$132
1996	10,700	70	450	$129	$170
1997	9,700	60	300	$118	$153
1998	9,700	90	510	$107	$136
1999	6,100 (5,600)	0 (0)	170 (170)	$67 ($66)	$83 ($83)
2000	7,700 (7,300)	120 (120)	310 (310)	$95 ($95)	$114 ($114)
2001	8,800 (7,800)	20 (20)	240 (240)	$106 ($104)	$124 ($122)
2002	7,800 (7,100)	50 (50)	220 (220)	$116 ($116)	$134 ($134)
2003	7,600 (6,100)	40 (40)	360 (340)	$121 ($120)	$136 ($136)
2004	6,700 (5,800)	30 (30)	270 (270)	$118 ($118)	$129 ($129)
2005	7,500 (5,900)	80 (80)	320 (300)	$149 ($149)	$159 ($158)
2006	7,800 (5,800)	50 (50)	300 (300)	$167 ($166)	$171 ($171)
2007	7,900 (6,000)	30 (30)	340 (340)	$75 ($75)	$75 ($75)

* 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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey.

Table 5.2. Home Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Water Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,680	(28%)	14	(31%)	142	(46%)	$40	(33%)
Unclassified mechanical failure or malfunction	870	(15%)	3	(7%)	33	(11%)	$19	(16%)
Unclassified electrical failure or malfunction	460	(8%)	0	(0%)	3	(1%)	$4	(4%)
Leak or break	430	(7%)	13	(29%)	32	(10%)	$14	(12%)
Unspecified short circuit arc	410	(7%)	0	(0%)	2	(1%)	$2	(1%)
Unclassified misuse of material or product	220	(4%)	0	(0%)	22	(7%)	$7	(6%)
Improper container or storage	220	(4%)	0	(0%)	13	(4%)	$3	(3%)
Worn out	210	(4%)	0	(0%)	0	(0%)	$1	(1%)
Flammable liquid or gas spilled	200	(3%)	7	(17%)	24	(8%)	$16	(13%)
Installation deficiency	200	(3%)	6	(13%)	7	(2%)	$4	(3%)
Water caused short circuit arc	200	(3%)	0	(0%)	2	(1%)	$0	(0%)
Unclassified factor	170	(3%)	4	(9%)	2	(1%)	$5	(4%)
Automatic control failure	130	(2%)	6	(14%)	0	(0%)	$4	(3%)
Unclassified operational deficiency	130	(2%)	0	(0%)	0	(0%)	$1	(1%)
Short circuit arc from defective or worn insulation	120	(2%)	0	(0%)	0	(0%)	$1	(1%)
Arc or spark from operating equipment	100	(2%)	0	(0%)	0	(0%)	$1	(1%)
Failure to clean	80	(1%)	0	(0%)	4	(1%)	$1	(0%)
Arc from faulty contact or broken conductor	70	(1%)	0	(0%)	0	(0%)	$0	(0%)
Equipment not being operated properly	60	(1%)	0	(0%)	5	(2%)	$1	(0%)
Abandoned or discarded material of product	50	(1%)	0	(0%)	9	(3%)	$1	(1%)
Washing part or painting with flammable liquid	50	(1%)	0	(0%)	11	(4%)	$1	(1%)
Short circuit arc from mechanical damage	40	(1%)	0	(0%)	0	(0%)	$1	(1%)
Storm	30	(1%)	0	(0%)	2	(1%)	$0	(0%)
Collision, knockdown or overturn	30	(1%)	0	(0%)	4	(1%)	$0	(0%)
Other known factor	300	(5%)	0	(0%)	24	(8%)	$7	(6%)
Total fires excluding confined fires	5,900	(100%)	44	(100%)	311	(100%)	$121	(100%)
Total factor entries	6,480	(110%)	53	(120%)	341	(110%)	$136	(112%)

Table 5.2. Home Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Gas-Fueled Water Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heat source too close to combustibles	1,470	(39%)	10	(24%)	118	(44%)	$36	(35%)
Unclassified mechanical failure or malfunction	590	(15%)	3	(8%)	30	(11%)	$16	(16%)
Leak or break	330	(9%)	13	(32%)	28	(10%)	$13	(13%)
Unclassified misuse of material or product	200	(5%)	0	(0%)	22	(8%)	$7	(7%)
Flammable liquid or gas spilled	190	(5%)	8	(19%)	24	(9%)	$15	(15%)
Improper container or storage	190	(5%)	0	(0%)	13	(5%)	$3	(3%)
Installation deficiency	160	(4%)	6	(15%)	7	(2%)	$3	(3%)
Worn out	160	(4%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified factor	140	(4%)	4	(10%)	2	(1%)	$5	(5%)
Unclassified operational deficiency	100	(3%)	0	(0%)	0	(0%)	$1	(1%)
Automatic control failure	90	(2%)	6	(15%)	0	(0%)	$3	(3%)
Failure to clean	80	(2%)	0	(0%)	4	(1%)	$1	(1%)
Equipment not being operated properly	50	(1%)	0	(0%)	3	(1%)	$1	(1%)
Washing part or painting with flammable liquid	50	(1%)	0	(0%)	11	(4%)	$1	(1%)
Abandoned or discarded material or product	30	(1%)	0	(0%)	7	(3%)	$1	(1%)
Collision, knockdown or overturn	30	(1%)	0	(0%)	4	(1%)	$0	(0%)
Improper fueling technique	30	(1%)	0	(0%)	0	(0%)	$2	(2%)
Unclassified electrical failure or malfunction	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified design, manufacturing or installation deficiency	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Improper startup	20	(1%)	0	(0%)	6	(2%)	$0	(0%)
Other known factor	220	(6%)	0	(0%)	16	(6%)	$5	(5%)
Total fires excluding confined fires	3,800	(100%)	41	(100%)	271	(100%)	$103	(100%)
Total factor entries	4,190	(110%)	50	(123%)	295	(109%)	$115	(112%)

Table 5.2. Home Water Heater Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Electric-Powered Water Heaters

Factor	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified electrical failure or malfunction	450	(22%)	0	(0%)	4	(11%)	$4	(26%)
Unspecified short circuit arc	420	(20%)	0	(0%)	2	(5%)	$2	(11%)
Unclassified mechanical failure or malfunction	250	(12%)	0	(0%)	4	(11%)	$3	(16%)
Water caused short circuit arc	200	(10%)	0	(0%)	2	(6%)	$0	(2%)
Heat source too close to combustibles	180	(9%)	3	(100%)	23	(60%)	$3	(19%)
Short circuit arc from defective or worn insulation	120	(6%)	0	(0%)	0	(0%)	$1	(4%)
Leak or break	100	(5%)	0	(0%)	0	(0%)	$1	(6%)
Arc or spark from operating equipment	90	(4%)	0	(0%)	0	(0%)	$1	(6%)
Arc from faulty contact or broken conductor	60	(3%)	0	(0%)	0	(0%)	$1	(3%)
Worn out	50	(2%)	0	(0%)	0	(0%)	$0	(1%)
Short circuit arc from mechanical damage	40	(2%)	0	(0%)	0	(0%)	$1	(4%)
Automatic control failure	40	(2%)	0	(0%)	0	(0%)	$1	(4%)
Installation deficiency	30	(2%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified operational deficiency	30	(1%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified factor contributed to ignition	30	(1%)	0	(0%)	0	(0%)	$0	(1%)
Improper container or storage	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Storm	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified misuse of material or product	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Abandoned or discarded material or product	20	(1%)	0	(0%)	2	(6%)	$0	(0%)
Equipment not being operated properly	10	(1%)	0	(0%)	2	(6%)	$0	(0%)
Other known factor	50	(2%)	0	(0%)	0	(0%)	$1	(6%)
Total fires excluding confined fires	2,050	(100%)	3	(100%)	37	(100%)	$17	(100%)
Total factor entries	2,220	(108%)	3	(100%)	40	(106%)	$20	(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 ten, 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.

Table 5.3. Home Water Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Water Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	1,120	(19%)	0	(0%)	8	(3%)	$2	(2%)
Flammable or combustible gas or liquid	1,030	(17%)	22	(50%)	126	(40%)	$42	(35%)
Clothing	500	(8%)	5	(10%)	49	(16%)	$13	(11%)
Structural member or framing	460	(8%)	8	(18%)	5	(2%)	$9	(7%)
Unclassified item	340	(6%)	0	(0%)	2	(1%)	$4	(3%)
Appliance housing or casing	320	(5%)	0	(0%)	3	(1%)	$3	(2%)
Interior wall covering	290	(5%)	0	(0%)	23	(7%)	$10	(8%)
Floor covering	270	(5%)	7	(17%)	13	(4%)	$2	(2%)
Unclassified soft goods or clothing	170	(3%)	0	(0%)	7	(2%)	$5	(4%)
Insulation within structural area	160	(3%)	0	(0%)	5	(2%)	$1	(1%)
Multiple items first ignited	150	(3%)	0	(0%)	16	(5%)	$7	(5%)
Box or bag	130	(2%)	0	(0%)	10	(3%)	$6	(5%)
Unclassified structural component or finish	120	(2%)	2	(5%)	1	(0%)	$2	(1%)
Exterior wall covering	90	(2%)	0	(0%)	0	(0%)	$2	(1%)
Unclassified storage supplies	70	(1%)	0	(0%)	0	(0%)	$2	(2%)
Dust, fiber, or lint	70	(1%)	0	(0%)	0	(0%)	$0	(0%)
Trash or waste	60	(1%)	0	(0%)	4	(1%)	$0	(0%)
Papers	60	(1%)	0	(0%)	0	(0%)	$2	(1%)
Cabinetry	60	(1%)	0	(0%)	3	(1%)	$1	(0%)
Linen other than bedding	50	(1%)	0	(0%)	5	(1%)	$1	(1%)
Household utensil	50	(1%)	0	(0%)	0	(0%)	$0	(0%)
Mattress or bedding	50	(1%)	0	(0%)	2	(1%)	$1	(1%)
Interior ceiling covering	40	(1%)	0	(0%)	0	(0%)	$4	(3%)
Other known item	200	(4%)	0	(0%)	31	(10%)	$3	(2%)
Total fires excluding confined fires	5,900	(100%)	44	(100%)	311	(100%)	$121	(100%)

B. Gas-Fueled Water Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible gas or liquid	1,010	(26%)	22	(54%)	125	(46%)	$42	(41%)
Clothing	410	(11%)	5	(11%)	43	(16%)	$11	(11%)
Structural member or framing	380	(10%)	5	(11%)	4	(2%)	$8	(7%)
Floor covering	240	(6%)	7	(18%)	13	(5%)	$2	(2%)
Interior wall covering	230	(6%)	0	(0%)	21	(8%)	$8	(8%)
Unclassified item	220	(6%)	0	(0%)	0	(0%)	$3	(3%)

Table 5.3. Home Water Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Gas-Fueled Water Heaters (Continued)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified soft goods or clothing	130	(4%)	0	(0%)	7	(2%)	$4	(4%)
Box or bag	110	(3%)	0	(0%)	10	(4%)	$5	(5%)
Unclassified structural component or finish	100	(3%)	2	(6%)	2	(1%)	$1	(1%)
Appliance housing or casing	100	(3%)	0	(0%)	2	(1%)	$1	(1%)
Multiple items first ignited	100	(3%)	0	(0%)	7	(3%)	$4	(4%)
Insulation within structural area	80	(2%)	0	(0%)	0	(0%)	$1	(1%)
Exterior wall covering	70	(2%)	0	(0%)	0	(0%)	$1	(1%)
Dust, fiber, or lint	60	(2%)	0	(0%)	0	(0%)	$0	(0%)
Waste or trash	50	(1%)	0	(0%)	5	(2%)	$0	(0%)
Unclassified storage supplies	50	(1%)	0	(0%)	0	(0%)	$1	(1%)
Papers	50	(1%)	0	(0%)	0	(0%)	$2	(1%)
Linen other than bedding	50	(1%)	0	(0%)	5	(2%)	$1	(1%)
Household utensil	50	(1%)	0	(0%)	0	(0%)	$0	(0%)
Interior ceiling covering	40	(1%)	0	(0%)	0	(0%)	$4	(4%)
Cabinetry	30	(1%)	0	(0%)	3	(1%)	$0	(0%)
Wire or cable insulation	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Mattress or bedding	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Pipe, duct, conduit or hose	20	(1%)	0	(0%)	3	(1%)	$0	(0%)
Other known item	170	(4%)	0	(0%)	23	(9%)	$2	(2%)
Total fires excluding confined fires	3,800	(100%)	41	(100%)	271	(100%)	$103	(100%)

C. Electric-Powered Water Heaters

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Wire or cable insulation	1,090	(53%)	0	(0%)	8	(20%)	$2	(13%)
Appliance housing or casing	210	(10%)	0	(0%)	1	(4%)	$1	(8%)
Unclassified item	120	(6%)	0	(0%)	2	(5%)	$1	(5%)
Clothing	80	(4%)	0	(0%)	5	(13%)	$1	(8%)
Insulation within structural area	80	(4%)	0	(0%)	5	(13%)	$0	(2%)
Structural member or framing	70	(3%)	3	(100%)	1	(4%)	$1	(7%)
Interior wall covering	60	(3%)	0	(0%)	1	(4%)	$2	(10%)
Multiple items first ignited	50	(2%)	0	(0%)	7	(19%)	$2	(11%)
Unclassified storage supplies	30	(1%)	0	(0%)	0	(0%)	$1	(5%)
Unclassified soft goods or clothing	30	(1%)	0	(0%)	0	(0%)	$1	(6%)
Mattress or bedding	30	(1%)	0	(0%)	2	(4%)	$0	(1%)
Box or bag	20	(1%)	0	(0%)	0	(0%)	$1	(6%)

Table 5.3. Home Water Heater Fires, by Item First Ignited
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Electric-Powered Water Heaters (Continued)

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cabinetry	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified structural component or finish	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Floor covering	20	(1%)	0	(0%)	0	(0%)	$0	(1%)
Exterior wall covering	20	(1%)	0	(0%)	0	(0%)	$1	(5%)
Dust, fiber or lint	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	100	(5%)	0	(0%)	5	(14%)	$2	(10%)
Total fires excluding confined fires	2,050	(100%)	3	(100%)	37	(100%)	$17	(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 ten, 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 5.4. Home Water Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

A. All Water Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	2,190	(37%)	13	(29%)	107	(35%)	$39	(32%)
Laundry room or area	970	(16%)	5	(12%)	68	(22%)	$19	(16%)
Closet	660	(11%)	0	(0%)	17	(6%)	$9	(7%)
Garage*	320	(5%)	0	(0%)	25	(8%)	$20	(17%)
Crawl space or substructure space	270	(5%)	5	(12%)	13	(4%)	$6	(5%)
Kitchen	230	(4%)	5	(10%)	24	(8%)	$5	(4%)
Bathroom	170	(3%)	0	(0%)	8	(3%)	$2	(2%)
Storage room	140	(2%)	2	(5%)	3	(1%)	$3	(2%)
Unclassified function area	140	(2%)	0	(0%)	8	(3%)	$3	(3%)
Unclassified storage area	140	(2%)	0	(0%)	6	(2%)	$4	(3%)
Unclassified equipment or service area	80	(1%)	0	(0%)	2	(0%)	$0	(0%)
Attic or other space above top story	70	(1%)	0	(0%)	2	(1%)	$1	(0%)
Bedroom	70	(1%)	0	(0%)	7	(2%)	$1	(0%)
Unclassified structural area	70	(1%)	0	(0%)	2	(0%)	$2	(1%)
Storage of supplies or tools	60	(1%)	2	(5%)	2	(0%)	$2	(2%)
Wall assembly or concealed space	50	(1%)	0	(0%)	1	(0%)	$2	(1%)
Unclassified area of origin	50	(1%)	0	(0%)	2	(1%)	$0	(0%)
Duct for HVAC, exhaust, heating, or air conditioning	30	(1%)	0	(0%)	0	(0%)	$0	(0%)
Exterior wall surface	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Other known area of origin	160	(3%)	11	(26%)**	15	(5%)	$3	(2%)
Total fires excluding confined fires	5,900	(100%)	44	(100%)	311	(100%)	$121	(100%)

* Excludes dwelling garages coded as separate property.

** Leading areas for fire deaths not shown above are interior stairway (13% of deaths), lobby or entrance way (7%), and courtyard, terrace or patio (7%).

B. Gas-Fueled Water Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	1,450	(38%)	13	(31%)	97	(36%)	$33	(32%)
Laundry room or area	730	(19%)	2	(6%)	58	(21%)	$18	(17%)
Closet	260	(7%)	0	(0%)	12	(5%)	$5	(5%)
Garage*	240	(6%)	0	(0%)	23	(8%)	$19	(19%)

Table 5.4. Home Water Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

B. Gas-Fueled Water Heaters (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Crawl space or substructure space	210	(5%)	5	(13%)	13	(5%)	$6	(5%)
Kitchen	140	(4%)	5	(11%)	23	(8%)	$4	(4%)
Unclassified storage area	110	(3%)	0	(0%)	6	(2%)	$4	(3%)
Bathroom	100	(3%)	0	(0%)	5	(2%)	$1	(1%)
Storage room or area	100	(3%)	2	(6%)	3	(1%)	$2	(2%)
Unclassified function area	90	(2%)	0	(0%)	8	(3%)	$3	(3%)
Attic or other space above top story	40	(1%)	0	(0%)	2	(1%)	$0	(0%)
Supply or tool storage	40	(1%)	2	(6%)	0	(0%)	$2	(2%)
Unclassified equipment or service area	40	(1%)	0	(0%)	2	(1%)	$0	(0%)
Unclassified structural area	40	(1%)	0	(0%)	2	(1%)	$1	(1%)
Wall assembly or concealed space	30	(1%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified area of origin	30	(1%)	0	(0%)	2	(1%)	$0	(0%)
Other known area of origin	150	(4%)	11	(28%)**	15	(6%)	$3	(3%)
Total fires excluding confined fires	3,800	(100%)	41	(100%)	271	(100%)	$103	(100%)

* Excludes dwelling garages coded as separate property.

** Leading areas for fire deaths not shown above are interior stairway (14% of deaths), lobby or entrance way (7%), and courtyard, terrace, or patio (7%).

C. Electric-Powered Water Heaters

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Heating equipment room or area	720	(35%)	0	(0%)	10	(27%)	$6	(32%)
Closet	410	(20%)	0	(0%)	5	(13%)	$4	(24%)
Laundry room or area	240	(12%)	3	(100%)	6	(17%)	$2	(9%)
Kitchen	100	(5%)	0	(0%)	1	(4%)	$1	(5%)
Garage*	70	(4%)	0	(0%)	2	(5%)	$1	(5%)
Crawl space or substructure space	60	(3%)	0	(0%)	0	(0%)	$0	(1%)
Bathroom	60	(3%)	0	(0%)	3	(8%)	$0	(3%)
Bedroom	50	(3%)	0	(0%)	7	(18%)	$0	(2%)
Unclassified function area	50	(2%)	0	(0%)	0	(0%)	$0	(1%)
Storage room or area	40	(2%)	0	(0%)	0	(0%)	$1	(5%)
Unclassified storage area	30	(2%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified equipment or service area	30	(2%)	0	(0%)	0	(0%)	$0	(1%)

Table 5.4. Home Water Heater Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Departments
(Excluding Fires Reported as Confined Fires)

C. Electric-Powered Water Heaters (Continued)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Attic or other space above top story	30	(1%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified structural area	30	(1%)	0	(0%)	0	(0%)	$0	(3%)
Duct for HVAC, exhaust, heating, or air conditioning	20	(1%)	0	(0%)	0	(0%)	$0	(0%)
Wall assembly or concealed space	20	(1%)	0	(0%)	1	(4%)	$0	(3%)
Supply or tool storage	20	(1%)	0	(0%)	1	(4%)	$0	(2%)
Exterior wall surface	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified area of origin	10	(1%)	0	(0%)	0	(0%)	$0	(1%)
Other known area of origin	50	(2%)	0	(0%)	0	(0%)	$0	(1%)
Total fires excluding confined fires	2,050	(100%)	3	(100%)	37	(100%)	$17	(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 ten, 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.

Section 6. Heat Tape and Heat Lamps

A. Heat Tape

In 2007, an estimated 300 reported home structure fires involving heat tape resulted in seven civilian injuries and $7 million in direct property damage.
There were no civilian deaths reported. In all or nearly all years, there were no heat lamp fires reported as confined to fuel burner, boiler, chimney or flue. The same was true of fires confined to trash although those fires were not allocated in this report. Heat tape was added as a coding choice in 1999. (See Table 6.A.)

Table 6.A. Home Fires Involving Heat Tape, by Year

	Fires		Civilian Injuries		Direct Property Damage (in Millions of Current Dollars)		Direct Property Damage (in Millions of 2007 Dollars)	
1999	1,000	(1,000)	0	(0)	$1	($1)	$2	($2)
2000	700	(700)	88	(88)	$24	($24)	$29	($29)
2001	700	(700)	0	(0)	$16	($16)	$19	($19)
2002	700	(700)	12	(12)	$9	($9)	$10	($10)
2003	400	(400)	20	(20)	$8	($8)	$9	($9)
2004	500	(500)	0	(0)	$13	($13)	$14	($14)
2005	300	(300)	8	(8)	$5	($5)	$5	($5)
2006	300	(300)	0	(0)	$2	($2)	$2	($2)
2007	300	(300)	7	(7)	$7	($7)	$7	($7)

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. There are too few civilian deaths reported to support meaningful estimates by individual year. Fires are rounded to the nearest hundred, civilian deaths and civilian injuries are expressed to the nearest one 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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

Heat tapes accounted for 60 injuries reported to hospital emergency rooms in 2008.[21]

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

Half of home heat tape fires begin with ignition of insulation, either wire or cable insulation (36%) or thermal, acoustic, or other insulation in a structural area (12%). (See Table 6.2.)

[21] Statistics from National Electronic Injury Surveillance System at www.cpsc.gov.

Half (50%) of home heat tape fires begin in a crawl space or substructure space. (See Table 6.3.)

B. Heat Lamps

In 2007, an estimated 500 reported home structure fires involving heat lamps resulted in 30 reported civilian injuries and $11 million in direct property damage.
Heat lamp was added as a coding choice in 1999. In 2003-2007, there were an estimated 6 civilian deaths per year. In most years, there were no heat lamp fires reported as confined to fuel burner, boiler, chimney, or flue. The same was true of fires confined to trash although those fires were not allocated in this report.

Heat lamps accounted for 100 injuries reported to hospital emergency rooms in 2008.[22]

The leading factor contributing to ignition for home heat lamp fires was heat source too close to combustibles (64%). (See Table 6.A.) The leading item first ignited was mattress or bedding (13%), and the leading area of origin was bedroom (23%). (See Tables 6.5 and 6.6.)

Table 6.B. Home Fires Involving Heat Lamp, by Year

	Fires		Civilian Injuries		Direct Property Damage (in Millions of Current Dollars)		Direct Property Damage (in Millions of 2007 Dollars)	
1999	400	(400)	0	(0)	$20	($20)	$25	($25)
2000	200	(200)	0	(0)	$10	($10)	$12	($12)
2001	300	(300)	0	(0)	$10	($10)	$12	($12)
2002	300	(300)	12	(12)	$7	($7)	$9	($9)
2003	600	(500)	30	(30)	$26	($26)	$29	($29)
2004	500	(400)	0	(0)	$10	($10)	$11	($11)
2005	300	(300)	24	(24)	$10	($10)	$10	($10)
2006	600	(600)	21	(21)	$14	($14)	$14	($14)
2007	500	(500)	30	(30)	$11	($11)	$11	($11)

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. There are too few civilian deaths reported to support meaningful estimates by individual year. Fires are rounded to the nearest hundred, civilian injuries are expressed to the nearest one 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 2007 dollars is done using the consumer price index.

Source: Data from NFIRS Version 5.0 and NFPA survey.

[22] Statistics from National Electronic Injury Surveillance System at www.cpsc.gov.

Safe Use of Electrical Appliances, Including Heat Tape and Heat Lamps[23]

- 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, loose connections, or broken plugs, and replace any damaged equipment before use.

[23] Not taken from messages from the Educational Messaging Advisory Committee.

Table 6.1. Home Heat Tape Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 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	100	(27%)	0	(NA)	3	(36%)	$1	(14%)
Unspecified short circuit arc	70	(19%)	0	(NA)	0	(0%)	$2	(25%)
Short circuit arc from defective or worn insulation	50	(13%)	0	(NA)	5	(64%)	$1	(13%)
Heat source too close to combustibles	40	(12%)	0	(NA)	0	(0%)	$1	(15%)
Unclassified mechanical failure or malfunction	30	(9%)	0	(NA)	0	(0%)	$1	(11%)
Worn out	20	(4%)	0	(NA)	0	(0%)	$0	(7%)
Unclassified misuse of material or product	10	(4%)	0	(NA)	0	(0%)	$0	(1%)
Installation deficiency	10	(3%)	0	(NA)	0	(0%)	$0	(4%)
Arc or spark from operating equipment	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Unintentionally turned on or not turned off	10	(2%)	0	(NA)	0	(0%)	$0	(5%)
Arc from faulty contact or broken conductor	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Automatic control failure	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Unclassified operational deficiency	10	(2%)	0	(NA)	0	(0%)	$0	(3%)
Equipment not being operated properly	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Short circuit arc from mechanical damage	10	(2%)	0	(NA)	0	(0%)	$0	(2%)
Other known factor	20	(5%)	0	(NA)	0	(0%)	$1	(8%)
Total fires excluding confined fires	370	(100%)	0	(NA)	7	(100%)	$7	(100%)
Total factor entries	410	(109%)	0	(NA)	7	(100%)	$7	(109%)

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 ten, 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.

Table 6.2. Home Heat Tape Fires, by Item First Ignited
Annual Average of 2003-2007 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	140	(36%)	0	(NA)	2	(28%)	$3	(38%)
Structural member or framing	60	(17%)	0	(NA)	4	(51%)	$1	(17%)
Insulation within structural area	50	(12%)	0	(NA)	0	(0%)	$1	(11%)
Pipe, duct, conduit, or hose covering	20	(6%)	0	(NA)	0	(0%)	$0	(0%)
Pipe, duct, conduit or hose	20	(5%)	0	(NA)	0	(0%)	$0	(2%)
Unclassified item first ignited	20	(4%)	0	(NA)	0	(0%)	$1	(8%)
Floor covering	10	(3%)	0	(NA)	1	(21%)	$0	(1%)
Exterior wall covering	10	(3%)	0	(NA)	0	(0%)	$0	(1%)
Unclassified structural component or finish	10	(3%)	0	(NA)	0	(0%)	$0	(7%)
Exterior roof covering	10	(2%)	0	(NA)	0	(0%)	$0	(4%)
Other known item	30	(8%)	0	(NA)	0	(0%)	$1	(10%)
Total fires excluding confined fires	370	(100%)	0	(NA)	7	(100%)	$7	(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 ten, 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 6.3. Home Heat Tape Fires, by Area of Origin
Annual Average of 2003-2007 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)	
Crawl space or substructure space	190	(50%)	0	(NA)	6	(79%)	$2	(32%)
Ceiling/floor assembly or space between stories	20	(5%)	0	(NA)	0	(0%)	$0	(4%)
Bedroom	20	(5%)	0	(NA)	0	(0%)	$0	(1%)
Attic or other space above top story	10	(4%)	0	(NA)	0	(0%)	$0	(6%)
Exterior roof surface	10	(4%)	0	(NA)	0	(0%)	$1	(11%)
Bathroom	10	(3%)	0	(NA)	0	(0%)	$0	(7%)
Unclassified area of origin	10	(3%)	0	(NA)	0	(0%)	$0	(3%)
Unclassified structural area	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Heating equipment room	10	(2%)	0	(NA)	0	(0%)	$0	(2%)
Conduit, pipe, utility, or ventilation shaft	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Unclassified equipment or service area	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Kitchen	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Wall assembly or concealed space	10	(2%)	0	(NA)	0	(0%)	$0	(0%)
Laundry room	10	(2%)	0	(NA)	0	(0%)	$0	(2%)
Exterior wall surface	10	(2%)	0	(NA)	0	(0%)	$0	(1%)
Storage room or area	10	(2%)	0	(NA)	0	(0%)	$0	(5%)
Other known area of origin	30	(8%)	0	(NA)	1	(21%)	$2	(24%)
Total fires excluding confined fires	370	(100%)	0	(NA)	7	(100%)	$7	(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 ten, 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 6.4. Home Heat Lamp Fires, by Factor Contributing to Ignition
Annual Average of 2003-2007 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	290	(64%)	5	(67%)	17	(82%)	$10	(72%)
Unclassified electrical failure or malfunction	30	(7%)	0	(0%)	0	(0%)	$2	(12%)
Equipment unattended	20	(5%)	0	(0%)	0	(0%)	$0	(2%)
Animal	20	(5%)	0	(0%)	0	(0%)	$0	(1%)
Unspecified short circuit arc	20	(4%)	2	(33%)	2	(10%)	$1	(8%)
Collision, knockdown or overturn	20	(3%)	0	(0%)	2	(8%)	$0	(2%)
Unclassified mechanical failure or malfunction	10	(2%)	0	(0%)	0	(0%)	$0	(2%)
Unintentionally turned on or not turned off	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Installation deficiency	10	(2%)	0	(0%)	0	(0%)	$0	(4%)
Unclassified factor	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Equipment used for not intended purpose	10	(2%)	0	(0%)	0	(0%)	$1	(7%)
Design deficiency	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Arc or spark from operating equipment	10	(1%)	0	(0%)	0	(0%)	$0	(0%)
Other known factor	30	(7%)	0	(0%)	0	(0%)	$0	(2%)
Total fires excluding confined fires	450	100%)	7	(100%)	21	(100%)	$14	(100%)
Total factor entries	500	110%)	7	(100%)	21	(100%)	$15	(112%)

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 ten, 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.

Table 6.5. Home Heat Lamp Fires, by Item First Ignited
Annual Average of 2003-2007 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)	
Mattress or bedding	60	(13%)	3	(50%)	2	(9%)	$3	(19%)
Floor covering	40	(9%)	0	(0%)	0	(0%)	$1	(8%)
Structural member or framing	40	(9%)	0	(0%)	0	(0%)	$0	(3%)
Wire or cable insulation	40	(8%)	0	(0%)	0	(0%)	$1	(7%)
Box or bag	20	(5%)	0	(0%)	0	(0%)	$0	(2%)
Upholstered furniture	20	(4%)	0	(0%)	2	(9%)	$1	(4%)
Unclassified organic material	20	(4%)	0	(0%)	0	(0%)	$0	(3%)
Unclassified item	20	(4%)	0	(0%)	0	(0%)	$0	(3%)
Unclassified structural component or finish	20	(4%)	0	(0%)	0	(0%)	$0	(1%)
Insulation within structural area	20	(4%)	0	(0%)	6	(29%)	$0	(3%)
Chips	20	(3%)	0	(0%)	0	(0%)	$0	(2%)
Interior wall covering	10	(3%)	0	(0%)	0	(0%)	$0	(3%)
Papers	10	(3%)	0	(0%)	0	(0%)	$0	(3%)
Unclassified soft goods or clothing	10	(3%)	0	(0%)	0	(0%)	$0	(3%)
Exterior wall covering	10	(3%)	0	(0%)	0	(0%)	$0	(2%)
Interior ceiling covering	10	(3%)	0	(0%)	2	(9%)	$1	(7%)
Clothing	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Exterior trim including doors	10	(2%)	0	(0%)	0	(0%)	$0	(2%)
Agricultural crop	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified furniture or utensil	10	(2%)	0	(0%)	2	(9%)	$1	(6%)
Light vegetation including grass	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Other known item	40	(8%)	3	(50%)*	8	(36%)	$2	(18%)
Total fires excluding confined fires	450	(100%)	7	(100%)	21	(100%)	$14	(100%)

* Leading item for fire deaths not shown above is curtain or drape (50% of deaths).

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 ten, 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 6.6. Home Heat Lamp Fires, by Area of Origin
Annual Average of 2003-2007 Structure Fires Reported to U.S. Fire Department
(Excluding Fires Reported as Confined Fires)

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Bedroom	110	(23%)	5	(67%)	6	(28%)	$3	(19%)
Garage	50	(10%)	0	(0%)	4	(19%)	$2	(17%)
Bathroom	40	(9%)	0	(0%)	7	(32%)	$1	(7%)
Living room, family room, or den	40	(8%)	0	(0%)	1	(7%)	$1	(6%)
Exterior balcony or unenclosed porch	20	(5%)	0	(0%)	1	(7%)	$1	(9%)
Attic or other space above top story	20	(4%)	0	(0%)	0	(0%)	$0	(2%)
Exterior wall surface	20	(4%)	0	(0%)	0	(0%)	$1	(6%)
Unclassified structural area	20	(4%)	0	(0%)	1	(7%)	$1	(7%)
Courtyard, terrace or patio	20	(3%)	0	(0%)	0	(0%)	$1	(10%)
Unclassified outside area	10	(3%)	0	(0%)	0	(0%)	$0	(0%)
Kitchen	10	(3%)	2	(33%)	0	(0%)	$0	(3%)
Crawl space or substructure space	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Unclassified area of origin	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Ceiling/floor assembly or space between stories	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Lawn, field or open area	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified storage area	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Unclassified function area	10	(2%)	0	(0%)	0	(0%)	$0	(0%)
Storage room or area	10	(2%)	0	(0%)	0	(0%)	$0	(1%)
Other known area of origin	40	(10%)	0	(0%)	0	(0%)	$1	(9%)
Total fires excluding confined fires	450	(90%)	7	(100%)	21	(100%)	$14	(91%)

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 ten, 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.

Appendix A.
How National Estimates Statistics Are Calculated

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

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

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

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

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

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be

surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

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

Projecting NFIRS to National Estimates

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

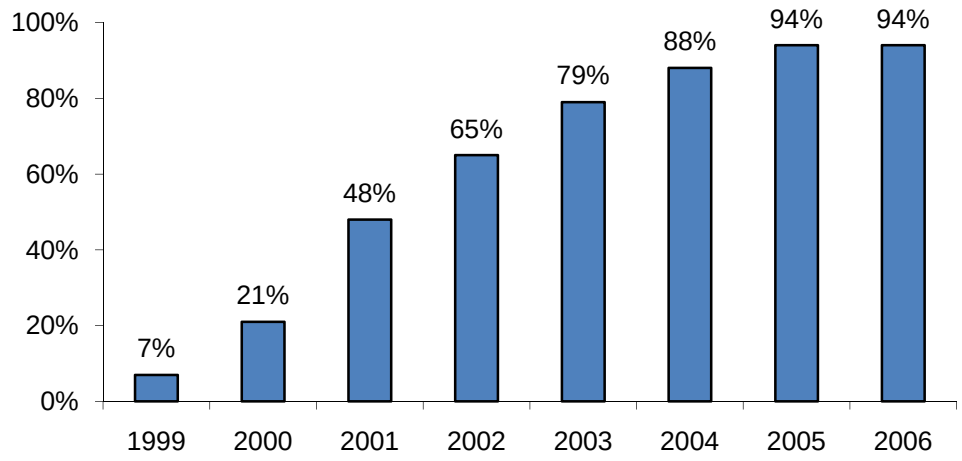
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific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

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

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

Figure 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.

Figure 1. Fires Originally Collected in NFIRS 5.0 by Year



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

NFPA survey projections
NFIRS totals (Version 5.0)

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

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

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

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases (typically 10-20%). Some analyses, particularly

those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

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

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

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

In the formulas that follow, the term "all fires" refers to all fires in NFIRS on the dimension studied.

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

In some analyses, all entries in the category of electrical failure or malfunction (factor contributing to ignition 30-39) are combined and shown as "electrical failure or malfunction." This category includes:

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

36. Arc or spark from operating equipment, switch, or electric fence;
37. Fluorescent light ballast; and
30. Electrical failure or malfunction, other.

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:

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

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, fuse;
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

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

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

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

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to "the piece of

equipment that provided the principal heat source to cause ignition." However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

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

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

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

In some analyses, various types of equipment are grouped together. (Confined fire incident types are not discussed here)

Code Grouping	**EII Co**	**NFIRS definitions**
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Wiring, switch or outlet	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	214	Wiring from meter box to circuit

		breaker
	216	Electrical branch circuit
	217	Outlet, receptacle
	218	Wall switch
Power switch gear or overcurrent protection device	215	Panel board, switch board, circuit breaker board
	219	Ground fault interrupter
	222	Overcurrent, disconnect equipment
	227	Surge protector
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipm	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top

	broiler
638	Waffle iron, griddle
639	Wok, frying pan, skillet
641	Breadmaking machine

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

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply "bedroom."

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

Inflation. Property damage estimates are not adjusted for inflation unless so indicated.