

**HOME FIRES INVOLVING HEATING EQUIPMENT
FIREPLACES, CHIMNEY AND CHIMNEY CONNECTORS**

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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.

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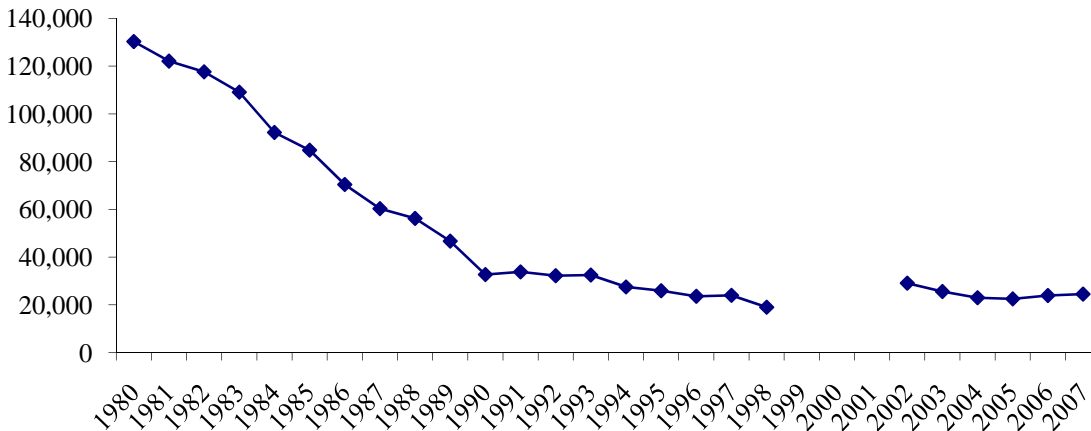
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Section 4. Fireplaces, Chimneys and Chimney Connectors

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		Direct Property Damage (in Millions)	
		Deaths	Injuries	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)	
	Fires	(%)	Deaths	(%)	Injuries	(%)	Damage	(%)
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)	
	Fires	(%)	Deaths	(%)	Injuries	(%)	Damage	(%)
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.

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.

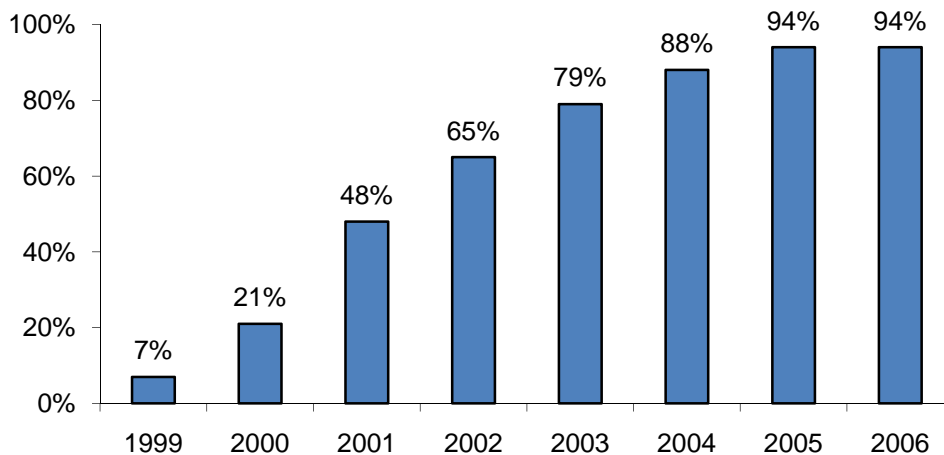
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific 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:

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

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

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

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

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases (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 all structure fires. This approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of possibly overstating the percentage of factors that are seldom seen in the confined fire incident types.

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

All fires

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

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

In some analyses, various types of equipment are grouped together. (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 equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top

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

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.