U.S. STRUCTURE FIRES IN OFFICE PROPERTIES

Richard Campbell

August 2013

National Fire Protection Association
Fire Analysis and Research Division

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Abstract
During the five-year period of 2007-2011, NFPA estimates that U.S. fire departments responded to an average of 3,340 fires in office properties per year. These fires caused an annual average of four civilian deaths, 44 civilian fire injuries, and $112 million in direct property damage. Reported fires in this occupancy group fell 71% from 10,570 in 1980 to 3,050 in 2011. The vast majority of the fires in this category were in business offices. Less than one-third of the fires (31%) occurred between 7 p.m. and 7 a.m., but these fires accounted for 67% of the direct property damage. More than one in every four office property fires (29%) was caused by cooking equipment, but these fires accounted for just six percent of the direct property damage experienced by office properties. Fires that were intentionally set (10% of office property fires) caused the largest share of direct property damage (20%). These estimates are based on data from the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA) annual fire department experience survey.

Keywords: fire statistics, office fires, non-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

This report contains information about structure fires in office properties, which include general business offices, banks, veterinary or research offices, engineering, mailing firms and post offices. During the five-year period of 2007-2011, NFPA estimates that U.S. fire departments responded to an average of 3,340 fires in office properties per year. These fires caused an annual average of four civilian deaths, 44 civilian fire injuries, and $112 million in direct property damage. The vast majority of the fires in this category were in business offices. Reported fires in this occupancy group fell 71% from 10,570 in 1980 to 3,050 in 2011.

Fewer fires occur in this occupancy on the weekends since they are less likely to be fully populated. The peak times of day for these fires were between noon and 2:00 PM. Less than one-third of the fires (31%) occurred between 7 p.m. and 7 a.m., but these fires accounted for 67% of the direct property damage. Similarly, 19% of fires occurred on weekends, but these incidents caused 31% of the associated property loss. These findings highlight the need for automatic detection and extinguishing equipment to protect these properties when they aren't occupied.

More than one in every four office property fires (29%) was caused by cooking equipment, but these fires accounted for just 6% of the direct property damage experienced by office properties. Fires that were intentionally set caused the largest share of direct property damage (20%), while causing 10% of office property fires. Electrical distribution and lighting equipment was the second leading cause of office property fires (12%) of fires, while causing 15% of direct property damage

Just over one-fifth (22%) of the reported fires in office properties began in the *kitchen or cooking area*, causing one percent of the direct property damage. The highest share of direct property damage (24% of total) resulted from fires starting in an office, which were the cause of 12% of office property fires. Although just two percent of office fires began in the *attic, ceiling/roof assembly or concealed space*, they were responsible for 13% of the direct property damage. Four out of five office property fires were confined to the room of origin.

When present, wet pipe sprinklers operated 90% of the time in fires large enough to activate the equipment, and they were effective in 88% of these fires. Deaths per 1,000 fires were 62% lower in stores and offices equipped with wet pipe sprinklers compared to properties with no automatic extinguishing equipment.

Individuals interested in keeping offices safe from fire should consult NFPA 101*: Life Safety Code®* *or* NFPA 5000*: Building Construction and Safety Code®* for information about fire prevention in these properties.

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List of Tables and Figures

Data Sources, Definitions and Conventions Used in this Report

Unless otherwise specified, the statistics in this analysis are national estimates of fires reported to U.S. municipal fire departments, and they accordingly do not include fires reported only to federal or state agencies or industrial fire brigades. These estimates are projections based on the detailed information collected in Version 5.0 of the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS 5.0) and the annual fire department experience survey conducted by the National Fire Protection Association. Except for calculations involving property use and incident type, fires with unknown or unreported data were allocated proportionally in calculations of national estimates.

In general, any fire that occurs in or on a structure is considered a structure fire, even if the fire was limited to contents and the building itself was not damaged. Office properties were identified by NFIRS property use codes in the 592 to 599 range.
NFIRS 5.0 includes a category of structure fires collectively referred to as "confined fires," identified by incident type. These include confined cooking fires, confined chimney or flue fires, confined trash fires, confined fuel burner or boiler fires, confined commercial compactor fires, and confined incinerator fires (incident type 113-118). Losses are generally minimal in these fires, which, by definition, are assumed to have been limited to the object of origin. Although causal data is not required for these fires, it is sometimes available.

Confined and non-confined fires were analyzed separately and summed for Cause of Ignition, Heat Source, Factor Contributing to Ignition, Area of Origin, and Item First Ignited, as well as for the Detection and Automatic Suppression estimates. Non-confined fires were analyzed for Equipment Involved in Ignition. Other types of confined fires were not broken out further and were grouped by incident type with the non-confined fires.

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Property damage has not been adjusted for inflation. Fires are rounded to the nearest ten, civilian deaths and injuries to the nearest one, and direct property damage to the nearest million. Due to the small number of deaths, they have been omitted from trend and cause tables. Additional details on the methodology may be found in Appendix A and B.

NFPA Fire Analysis & Research

U.S. Office Property Structure Fires Fact Sheet

U. S. fire departments responded to an estimated average of **3,340** structure fires at office properties per year during 2007-2011. These fires caused annual averages of

- **4** civilian deaths
- **44** civilian fire injuries
- **$112** million in direct property damage

Fires in office properties fell 71% from 10,570 in 1980 to 3,050 in 2011.

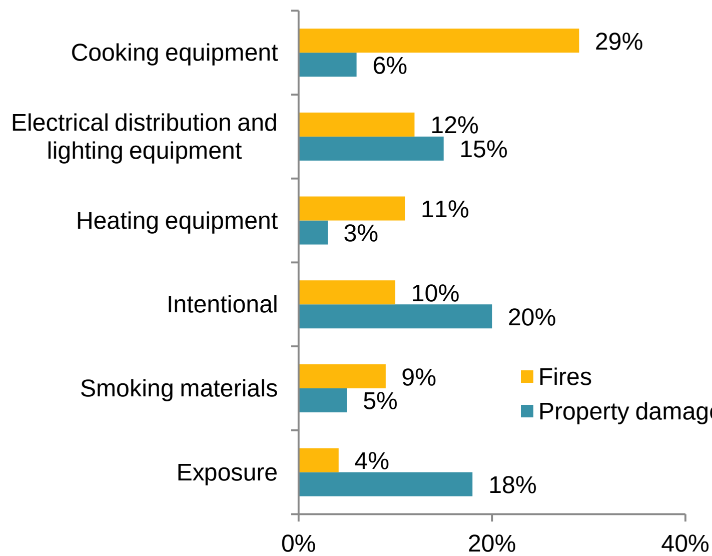
Leading Causes of Structure Fires in Office Properties, 2007-2011

One of every four fires in these offices was caused by cooking. Most of these fires were minor.

Electrical distribution and lighting equipment was the second leading major cause.

10% of these fires were intentional, but they accounted for 20% of the direct property damage.

Smoking materials were involved in 9% of the fires and 5% of the dollar loss. Exposures also caused 4% of these fires but 18% of the dollar loss.



Special Considerations in These Properties

- During 2007-2011, fewer than one-third (31%) of the fires occurred between 7:00 p.m. and 7:00 a.m., but these fires accounted for 67% of the direct property damage.
- The 12% of fires that started in an "office" area caused 24% of the property damage

For more information about fire and life safety,, please visit www.nfpa.org

From 2007 through 2011, there was an average of 3,340 structure fires in office properties per year. These fires caused an annual average of four civilian deaths, 44 civilian fire injuries, and $112 million in direct property damage. Table A below provides a breakdown of losses by occupancy. As indicated, the vast majority (86%) of the fires in this property category were in business office properties.

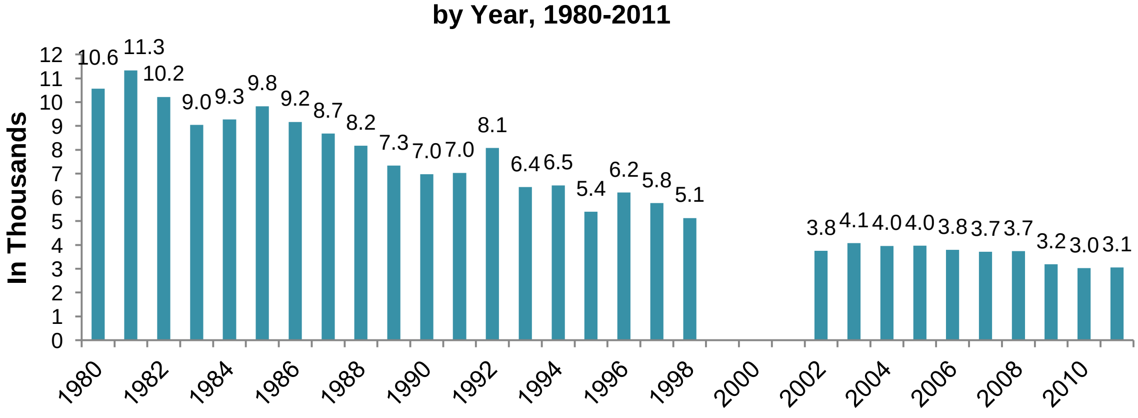
Table A. Structure Fires in Office Properties
2007-2011 Annual Averages

Occupancy	Civilian Fires		Civilian Deaths		Civilian Injuries		Property Damage (in Millions)	
Business office	2,890	(86%)	3	(92%)	38	(87%)	$98	(88%)
Bank	270	(8%)	0	(0%)	2	(3%)	$7	(6%)
Office, veterinary or research	90	(3%)	0	(7%)	4	(9%)	$6	(5%)
Post office or mailing firm	80	(3%)	0	(0%)	0	(0%)	$1	(1%)
Total	**3,340**	**(100%)**	**4**	**(100%)**	**44**	**(100%)**	**$112**	**(100%)**

Source: NFIRS 5.0 and NFPA survey.

Office property fires have fallen dramatically since 1980.
Office property fires have fallen 71% since 1980, from 10,570 per year in 1980 to 3,050 in 2011. A new version of NFIRS (NFIRS 5.0) was first introduced in 1999 and gradually adopted by fire departments. Estimates for the transition years of 1999-2001 are more volatile and should be viewed with caution. They are shown in Table 1 but not in Figure 1.

Figure 1. Reported Structure Fires in Office Properties
by Year, 1980-2011

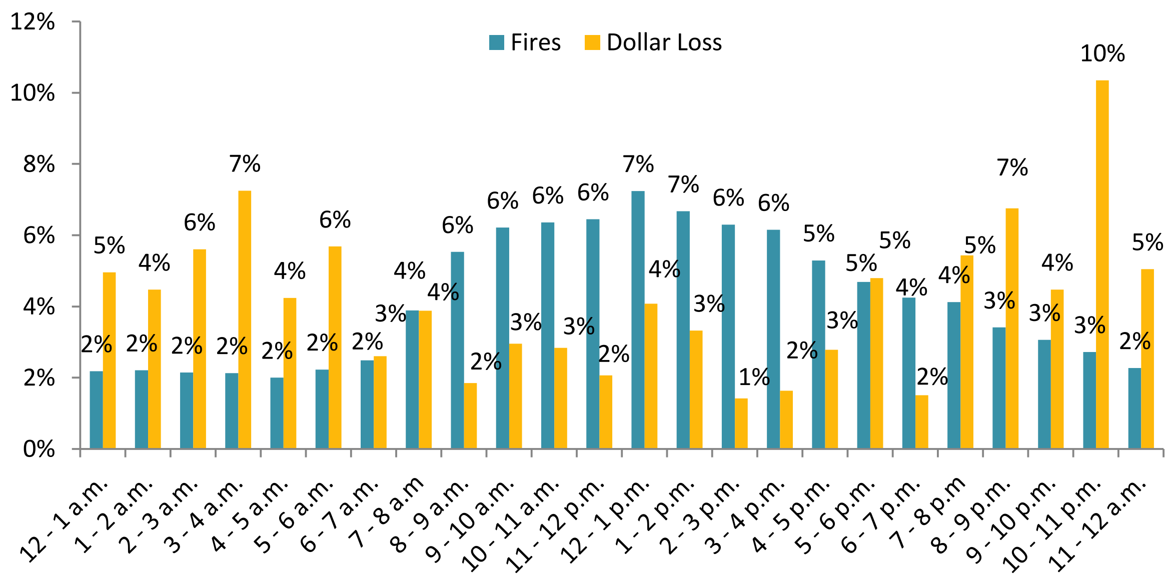


Source: NFIRS and NFPA survey. See note for Table 1

Fires in office properties accounted for less than one in every 100 (0.7%) reported structure fires from 2007 to 2011. During 2007-2011, there were an estimated 467,640 structure fires in the U.S., of which 3,340 (0.7%) were in office properties. The estimated four civilian fatalities in office fires represented 0.1% of 2,770 civilian fatalities estimated to have occurred in all structure fires, while the 44 civilian injuries represented 0.3% of the 15,010 civilian structure fire injuries, and the $112 million in direct property damage due to office fires represented 1.1% of an estimated $10 billion in direct property losses in all reported structure fires.

Fires in nighttime and early morning hours account for larger shares of property damage per fire than daytime fires. As shown in Figure 2 below, less than one-third (31%) of the fires occurred between 7 p.m. and 7 a.m., but these fires accounted for two-thirds (67%) of the direct property damage. Tables 2, 3, and 4 show reported structure fires in these properties by month, day of week and time of day, respectively. Fires in office properties were most likely to occur on days when occupancy is greatest, as is generally the case for property fires. Fires on weekends were less common than weekday fires. Fires were also less frequent during evening and overnight hours.

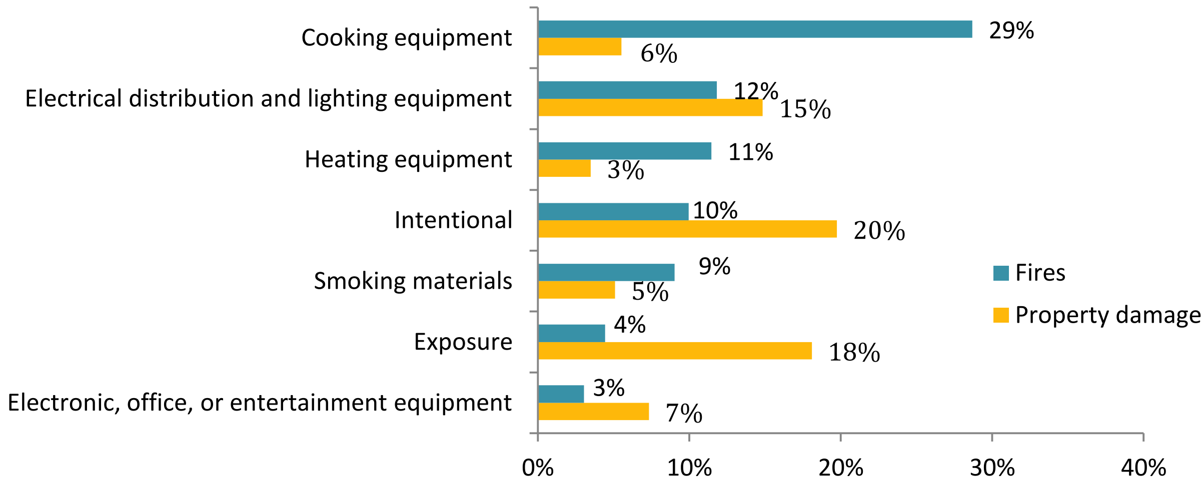
Figure 2. Reported Structure Fires in Office Properties by Alarm Time, 2007-2011



Source: NFIRS 5.0 and NFPA survey.

Cooking equipment was the leading cause of fires in office properties. Figure 3 below and Tables 5 to 9 show that more than one in every four office property fires (29%) was caused by cooking equipment, while accounting for just six percent of the direct property damage experienced by these properties. Fires that were intentionally set (10% of office property fires) caused the largest share of direct property damage (20%). Electrical distribution and lighting equipment was the second leading cause of office property fires (12%) of fires, while causing 15% of direct property damage. *Heating equipment* caused 11% of fires, but just 3% of direct property damage, while smoking materials caused 9% of office fires and 5% of the direct property damage.

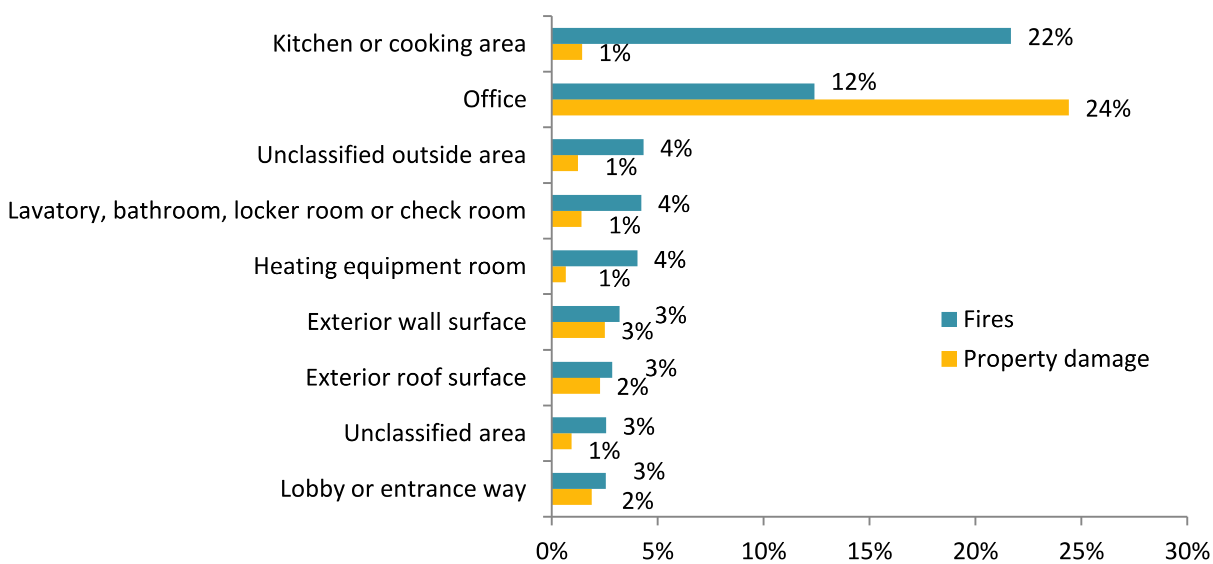
Figure 3. Leading Causes of Structure Fires in Office Properties, 2007-2011



Source: NFIRS 5.0 and NFPA survey.

More than one-fifth of these fires began in a kitchen area. Figure 4 and Table 10 show that 22% of the reported fires in office properties began in the *kitchen or cooking area*, while causing 1% of the direct property damage. The highest share of direct property damage (24% of total) resulted from fires starting in an office, which were the cause of 12% of office property fires. Although just 2% of office fires began in the *attic, ceiling/roof assembly or concealed space*, they were responsible for 13% of the direct property damage.

Figure 4. Leading Areas of Origin in Office Properties, 2007-2011



Source: NFIRS 5.0 and NFPA survey.

Four out of five fires in office properties (80%) were confined to the room of origin. Of these, 43% were identified as confined fires by *incident type* codes, while 21% were reported to be confined to the object of fire origin, and 16% were confined to the room of origin. Fires that spread beyond the room of origin included fires that were confined to the floor of origin (4% of all office property fires), fires that were confined to the building of origin (13%), and fires that spread beyond the building of origin (2%).

Sprinklers are a critical feature of warehouse fire protection. In his June, 2013 report, "U.S. Experience with Sprinklers," John Hall provides data on sprinkler operation in office properties. As indicated in Table B below, some type of sprinkler was reported to be present in 33% of structure fires in U.S. office properties from 2007 to 2011. The report indicates that sprinklers in most cases operated effectively. Sprinklers operated 90% of the time when properties were protected with wet pipe sprinklers and fires were large enough to activate the equipment. Wet pipe sprinklers operated effectively in 88% of the fires in which they were present. Deaths per thousand reported fires were 62% lower in stores and offices when wet pipe sprinklers were present.

Table B.
Sprinkler Systems in Office Structure Fires
2007-2011 Annual Averages*

Percent of structure fires in offices reporting some type of sprinkler present	33%
Percent of fires with wet pipe sprinklers in which sprinklers operated	90%
Percent of fires with wet pipe sprinklers present in which sprinklers operated effectively	88%
Reduction in average loss per fire when wet pipe sprinklers were present	46%

* Excludes properties under construction and fires where sprinklers were not present in the fire area.

Source: NFIRS 5.0 and NFPA survey.

The NFPA report, *High Rise Building Fires*, has found that the risk of fire and associated losses is actually lower in high-rise office buildings than in non-high-rise office buildings. The much greater use of fire protection systems and features, including sprinklers, in high-rise buildings is likely to be a critical factor in explaining why the high-rise office buildings are at lower risk, even though their potential hazard is greater. As an example, ten percent of the fires in high-rise office buildings from 2007 to 2011 entailed flame damage beyond the room of origin -- half the corresponding figure of 21% for non-high-rise office buildings. An NFPA report on high rise building fires, which includes analysis of fires in high rise office buildings, is available at: *High Rise Building Fires*.

Additional resources

Information on fire protection for office buildings is available from NFPA 101*: Life Safety Code®* and NFPA 5000*: Building Construction and Safety Code®*. In addition, NFPA members can download a number of investigation reports on office building fires, including the 1986 fire in Boston's Prudential Tower, the 1988 fire in the First Interstate Tower in Los Angeles, and the 1991 fire in Philadelphia's One Meridian Plaza. These reports are available at: http://www.nfpa.org/Research. Non-members may order these reports from the NFPA library.

Table 1. Structure Fires in Office Properties, by Year
1980-2011

Year	Fires	Civilian Injuries	Direct Property Damage (in Millions) As Reported	In 2011 Dollars
1980	10,570	103	$89	$243
1981	11,330	142	$141	$348
1982	10,220	176	$310	$721
1983	9,040	157	$121	$273
1984	9,270	140	$99	$214
1985	9,830	93	$150	$313
1986	9,170	195	$158	$324
1987	8,680	107	$109	$216
1988	8,170	128	$272	$517
1989	7,330	82	$114	$207
1990	6,970	68	$154	$265
1991	7,030	99	$134	$221
1992	8,070	148	$456	$731
1993	6,430	113	$127	$197
1994	6,500	93	$155	$235
1995	5,390	90	$83	$122
1996	6,200	86	$186	$267
1997	5,760	73	$106	$148
1998	5,130	59	$118	$163
1999	4,400	0	$126	$169
2000	3,250	32	$85	$111
2001*	3,680	28	$236	$300
2002	3,750	15	$79	$99
2003	4,080	41	$112	$136
2004	3,960	37	$76	$90
2005	3,960	34	$121	$139
2006	3,800	19	$101	$113
2007	3,710	47	$95	$103
2008	3,740	47	$148	$155
2009	3,180	36	$118	$124
2010	3,020	56	$108	$111
2011	3,050	33	$88	$88

*The events of September 11, 2001 are excluded from this table.
NFIRS 5.0 was first introduced in 1999, although participation was low. Estimates for 1999-2001 are considered particularly unstable and should be used with caution.
Note: Sums may not equal totals due to rounding errors. Due to the small number, annual estimates of civilian deaths are highly unstable and are therefore not shown.
Inflation adjustments were based on the consumer price index found in the U.S. Census Bureau's Purchasing Power of the Dollar.

Table 2. Structure Fires in Office Properties, by Month
2007-2011 Annual Averages

Month	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
January	320	(10%)	3	(6%)	$13	(12%)
February	280	(8%)	8	(17%)	$11	(10%)
March	310	(9%)	6	(15%)	$8	(7%)
April	290	(9%)	4	(10%)	$12	(11%)
May	290	(9%)	3	(6%)	$10	(9%)
June	260	(8%)	2	(6%)	$9	(8%)
July	250	(7%)	3	(7%)	$8	(8%)
August	250	(8%)	3	(7%)	$10	(9%)
September	250	(7%)	3	(7%)	$7	(6%)
October	290	(9%)	3	(7%)	$9	(8%)
November	250	(8%)	4	(9%)	$8	(7%)
December	290	(9%)	2	(4%)	$6	(5%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Monthly average	280	(8%)	4	(8%)	$9	(8%)

Table 3. Structure Fires in Office Properties, by Day of Week
2007-2011 Annual Averages

Day	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	300	(9%)	4	(8%)	$14	(13%)
Monday	530	(16%)	6	(14%)	$13	(12%)
Tuesday	550	(16%)	6	(13%)	$19	(17%)
Wednesday	540	(16%)	9	(20%)	$16	(15%)
Thursday	550	(17%)	7	(16%)	$16	(15%)
Friday	510	(15%)	10	(23%)	$12	(11%)
Saturday	350	(10%)	2	(6%)	$20	(18%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Average	480	(14%)	6	(14%)	$16	(14%)

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

Source: NFIRS 5.0 and NFPA survey.

Table 4. Structure Fires in Office Properties, by Alarm Time
2007-2011 Annual Averages

Alarm Time	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight-12:59 a.m.	70	(2%)	1	(2%)	$6	(5%)
1:00-1:59 a.m.	70	(2%)	0	(1%)	$5	(4%)
2:00-2:59 a.m.	70	(2%)	1	(2%)	$6	(6%)
3:00-3:59 a.m.	70	(2%)	0	(0%)	$8	(7%)
4:00-4:59 a.m.	70	(2%)	0	(1%)	$5	(4%)
5:00-5:59 a.m.	70	(2%)	0	(0%)	$6	(6%)
6:00-6:59 a.m.	80	(2%)	2	(4%)	$3	(3%)
7:00-7:59 a.m.	130	(4%)	1	(3%)	$4	(4%)
8:00-8:59 a.m.	180	(6%)	3	(8%)	$2	(2%)
9:00-9:59 a.m.	210	(6%)	7	(15%)	$3	(3%)
10:00-10:59 a.m.	210	(6%)	2	(5%)	$3	(3%)
11:00-11:59 a.m.	220	(6%)	1	(3%)	$2	(2%)
12:00-12:59 p.m.	240	(7%)	5	(12%)	$5	(4%)
1:00-1:59 p.m.	220	(7%)	1	(2%)	$4	(3%)
2:00-2:59 p.m.	210	(6%)	3	(7%)	$2	(1%)
3:00-3:59 p.m.	210	(6%)	3	(8%)	$2	(2%)
4:00-4:59 p.m.	180	(5%)	3	(7%)	$3	(3%)
5:00-5:59 p.m.	160	(5%)	1	(3%)	$5	(5%)
6:00-6:59 p.m.	140	(4%)	1	(2%)	$2	(2%)
7:00-7:59 p.m.	140	(4%)	1	(2%)	$6	(5%)
8:00-8:59 p.m.	110	(3%)	1	(3%)	$8	(7%)
9:00-9:59 p.m.	100	(3%)	1	(2%)	$5	(4%)
10:00-10:59 p.m.	90	(3%)	3	(6%)	$12	(10%)
11:00-11:59 p.m.	80	(2%)	1	(1%)	$6	(5%)
Total	3,340	(100%)	44	(100%)	$112	(100%)

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

Source: NFIRS 5.0 and NFPA survey.

Table 5. Leading Causes of Structure Fires in Office Properties
2007-2011 Annual Averages

Cause of Ignition	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	960	(29%)	4	(9%)	$6	(6%)
Electrical distribution and lighting equipment	390	(12%)	6	(13%)	$17	(15%)
Heating equipment	380	(11%)	8	(19%)	$4	(3%)
Intentional	330	(10%)	8	(18%)	$22	(20%)
Smoking materials	300	(9%)	1	(2%)	$6	(5%)
Exposure	150	(4%)	3	(6%)	$20	(18%)
Electronic, office or entertainment equipment	100	(3%)	3	(7%)	$8	(7%)
Shop tools and industrial equipment excluding torches, burners or soldering irons	70	(2%)	1	(3%)	$3	(3%)
Torch, burner, or soldering iron	60	(2%)	1	(3%)	$13	(12%)

Estimates of fires involving: electrical distribution or lighting equipment, electronic office, or entertainment equipment; and torches, burners, or soldering irons exclude confined fires.

Note: This table summarizes findings from multiple fields, meaning that the same fire may be listed under multiple causes. The methodology is used is described in Appendix B.

Source: NFIRS 5.0 and NFPA survey.

Table 6. Structure Fires in Office Properties, by Equipment Involved in Ignition
2007-2011 Annual Averages

Equipment Involved	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	960	(29%)	4	(9%)	$6	(6%)
No equipment involved	620	(18%)	5	(11%)	$47	(43%)
Electrical distribution and lighting equipment	390	(12%)	6	(13%)	$17	(15%)
Wiring and related equipment	180	(5%)	6	(13%)	$5	(5%)
Lamp, bulb or lighting	120	(4%)	0	(0%)	$2	(1%)
Transformers and power supplies	70	(2%)	0	(0%)	$4	(4%)
Cord or plug	30	(1%)	0	(0%)	$5	(5%)
Heating equipment	380	(11%)	8	(19%)	$4	(3%)
Central heat	240	(7%)	3	(7%)	$1	(1%)
Fixed or portable space heater	70	(2%)	5	(12%)	$0	(0%)
Water heater	30	(1%)	0	(0%)	$2	(1%)
Fireplace or chimney	30	(1%)	0	(0%)	$1	(1%)
Other known heating equipment	10	(0%)	0	(0%)	$0	(0%)
Contained trash or rubbish fire	340	(10%)	1	(2%)	$0	(0%)
Fan	160	(5%)	2	(6%)	$3	(3%)
Air conditioner	80	(2%)	0	(0%)	$4	(3%)
Torch, burner or soldering iron	60	(2%)	1	(3%)	$13	(12%)
Clothes dryer	40	(1%)	9	(20%)	$0	(0%)
Unclassified equipment	30	(1%)	1	(3%)	$1	(0%)
Heat pump	20	(1%)	0	(0%)	$0	(0%)
Computer	20	(1%)	0	(0%)	$2	(2%)
Other known equipment involved in ignition	250	(7%)	6	(13%)	$15	(13%)
Total	3,340	(100%)	44	(100%)	$112	(100%)

The estimates for equipment involved in ignition did not break out the confined fires further.

Note: Non-confined fires in which the equipment involved in ignition was unknown or not reported have been allocated proportionally among fires with known equipment involved. Fires in which the equipment involved in ignition was entered as none but the heat source indicated equipment involvement or the heat source was unknown were also treated as unknown and allocated proportionally among fires with known equipment involved. Non-confined fires in which the equipment was partially unclassified (i.e., unclassified kitchen or cooking equipment, unclassified heating, cooling or air condition equipment, etc.) were allocated proportionally among fires that grouping (kitchen or cooking equipment; heating, cooling or air conditioning equipment, etc.). Sums may not equal totals due to rounding errors.

Source: NFIRS 5.0 and NFPA survey.

Table 7. Structure Fires in Office Properties, by Cause of Ignition
2007-2011 Annual Averages

Cause of Ignition	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	1,990	(59%)	26	(59%)	$45	(40%)
Non-Confined	860	(26%)	22	(51%)	$45	(40%)
Confined	1,130	(34%)	3	(8%)	$0	(0%)
Failure of equipment or heat source	790	(24%)	8	(17%)	$22	(20%)
Non-Confined	610	(18%)	8	(17%)	$22	(20%)
Confined	180	(5%)	0	(0%)	$0	(0%)
Intentional	330	(10%)	8	(18%)	$22	(20%)
Non-Confined	230	(7%)	8	(18%)	$22	(20%)
Confined	110	(3%)	0	(0%)	$0	(0%)
Unclassified cause of ignition	180	(5%)	2	(6%)	$19	(17%)
Non-Confined	150	(4%)	2	(6%)	$19	(17%)
Confined	30	(1%)	0	(0%)	$0	(0%)
Other Known Cause	40	(1%)	0	(0%)	$4	(4%)
Non-Confined	40	(1%)	0	(0%)	$4	(4%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Non-Confined	1,890	(57%)	40	(92%)	$111	(100%)
Confined	1,450	(43%)	3	(8%)	$0	(0%)

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

Source: NFIRS 5.0 and NFPA survey.

Table 8. Structure Fires in Office Properties, by Factor Contributing to Ignition
2007-2011 Annual Averages

Factors Contributing to Ignition	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Electrical failure or malfunction	740	(22%)	14	(32%)	$30	(27%)
Non-Confined	650	(19%)	14	(32%)	$30	(27%)
Confined	90	(3%)	0	(0%)	$0	(0%)
Abandoned or discarded materials or products	430	(13%)	0	(0%)	$4	(4%)
Non-Confined	160	(5%)	0	(0%)	$4	(4%)
Confined	270	(8%)	0	(0%)	$0	(0%)
Equipment unattended	400	(12%)	0	(0%)	$1	(1%)
Non-Confined	30	(1%)	0	(0%)	$1	(1%)
Confined	370	(11%)	0	(0%)	$0	(0%)
Mechanical failure or malfunction	360	(11%)	4	(10%)	$8	(7%)
Non-Confined	250	(7%)	4	(10%)	$8	(7%)
Confined	110	(3%)	0	(0%)	$0	(0%)
Heat source too close to combustibles	290	(9%)	4	(10%)	$4	(4%)
Non-Confined	180	(5%)	4	(10%)	$4	(4%)
Confined	110	(3%)	0	(0%)	$0	(0%)
Misuse of material or product, other	220	(7%)	6	(14%)	$10	(9%)
Non-Confined	80	(3%)	6	(14%)	$10	(9%)
Confined	140	(4%)	0	(0%)	$0	(0%)
Other factor contributed to ignition	200	(6%)	5	(11%)	$10	(9%)
Non-Confined	130	(4%)	3	(8%)	$10	(9%)
Confined	80	(2%)	1	(3%)	$0	(0%)
Exposure fire	150	(4%)	3	(6%)	$20	(18%)
Non-Confined	150	(4%)	3	(6%)	$20	(18%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Equipment not being operated properly	90	(3%)	1	(3%)	$0	(0%)
Non-Confined	20	(0%)	1	(3%)	$0	(0%)
Confined	80	(2%)	0	(0%)	$0	(0%)
Failure to clean	80	(2%)	0	(0%)	$0	(0%)
Non-Confined	30	(1%)	0	(0%)	$0	(0%)
Confined	50	(2%)	0	(0%)	$0	(0%)
Improper container or storage	70	(2%)	1	(1%)	$1	(1%)
Non-Confined	20	(1%)	1	(1%)	$1	(1%)
Confined	40	(1%)	0	(0%)	$0	(0%)

Table 8. Structure Fires in Office Properties, by Factor Contributing to Ignition (Continued)
2007-2011 Annual Averages

Factors Contributing to Ignition	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Cutting, welding too close to combustible	70	(2%)	0	(0%)	$6	(6%)
Non-Confined	60	(2%)	0	(0%)	$6	(6%)
Confined	10	(0%)	0	(0%)	$0	(0%)
Accidentally turned on, not turned off	50	(2%)	1	(2%)	$1	(1%)
Non-Confined	20	(0%)	1	(2%)	$1	(1%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Operational deficiency, other	50	(2%)	1	(3%)	$1	(1%)
Non-Confined	20	(0%)	1	(3%)	$1	(1%)
Confined	30	(1%)	0	(0%)	$0	(0%)
Other known factor contributing to ignition	280	(8%)	5	(11%)	$19	(17%)
Non-Confined	180	(5%)	3	(6%)	$19	(17%)
Confined	90	(3%)	2	(5%)	$0	(0%)
Total Fires	3,340	(100%)	44	(100%)	$112	(100%)
Non-Confined	1,890	(57%)	40	(92%)	$111	(100%)
Confined	1,450	(43%)	3	(8%)	$0	(0%)
Total entries*	3,470	(104%)	45	(103%)	$117	(105%)
Non-Confined	1,970	(59%)	41	(95%)	$117	(105%)
Confined	1,510	(45%)	3	(8%)	$1	(0%)

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

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

Source: NFIRS 5.0 and NFPA survey.

Table 9. Structure Fires in Office Properties, by Heat Source
2007-2011 Annual Averages

Heat Source	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified heat from powered equipment	760	(23%)	9	(20%)	$11	(10%)
Non-confined	320	(10%)	7	(17%)	$11	(10%)
Confined	430	(13%)	1	(3%)	$0	(0%)
Radiated, conducted heat from operating equipment	530	(16%)	8	(18%)	$7	(6%)
Non-confined	190	(6%)	6	(13%)	$7	(6%)
Confined	340	(10%)	2	(5%)	$0	(0%)
Arcing	490	(15%)	8	(19%)	$23	(20%)
Non-confined	460	(14%)	8	(19%)	$23	(20%)
Confined	30	(1%)	0	(0%)	$0	(0%)
Smoking Materials	300	(9%)	1	(2%)	$6	(5%)
Non-confined	150	(4%)	1	(2%)	$6	(5%)
Confined	150	(5%)	0	(0%)	$0	(0%)
Unclassified heat source	220	(7%)	1	(1%)	$8	(7%)
Non-confined	100	(3%)	1	(1%)	$8	(7%)
Confined	120	(4%)	0	(0%)	$0	(0%)
Spark, ember or flame from operating equipment	220	(7%)	4	(9%)	$6	(5%)
Non-confined	110	(3%)	4	(9%)	$6	(5%)
Confined	100	(3%)	0	(0%)	$0	(0%)
Unclassified hot or smoldering object	190	(6%)	1	(2%)	$12	(11%)
Non-confined	100	(3%)	1	(2%)	$12	(10%)
Confined	80	(3%)	0	(0%)	$0	(0%)
Hot ember or ash	100	(3%)	0	(0%)	$7	(6%)
Non-confined	50	(2%)	0	(0%)	$7	(6%)
Confined	50	(1%)	0	(0%)	$0	(0%)
Heat from direct flame or convection currents	70	(2%)	2	(4%)	$4	(3%)
Non-confined	50	(1%)	2	(4%)	$4	(3%)
Confined	20	(1%)	0	(0%)	$0	(0%)
Cigarette lighter	70	(2%)	2	(5%)	$4	(3%)
Non-confined	50	(1%)	2	(5%)	$4	(3%)
Confined	20	(1%)	0	(0%)	$0	(0%)

Table 9. Structure Fires in Office Properties, by Heat Source (Continued)
2007-2011 Annual Averages

Heat Source	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Match	60	(2%)	1	(3%)	$2	(2%)
Non-confined	30	(1%)	1	(3%)	$2	(2%)
Confined	30	(1%)	0	(0%)	$0	(0%)
Other known heat source	320	(10%)	7	(17%)	$23	(20%)
Non-confined	270	(8%)	7	(17%)	$23	(20%)
Confined	60	(2%)	0	(0%)	$0	(0%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Non-confined	1,890	(57%)	40	(92%)	$111	(100%)
Confined	1,450	(43%)	3	(8%)	$0	(0%)

Note: Sums may not equal totals due to rounding errors. Confined structure fires (NFIRS incident type 113-118) were analyzed separately from non-confined structure fires (incident type 110-129, except 113-118). See Appendix A for details.
Source: NFIRS 5.0 and NFPA survey.

Table 10. Structure Fires in Office Properties, by Area of Origin
2007-2011 Annual Averages

Area of Origin	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Kitchen or cooking area	720	(22%)	3	(7%)	$2	(1%)
Non-Confined	70	(2%)	2	(4%)	$2	(1%)
Confined	650	(20%)	1	(3%)	$0	(0%)
Office	410	(12%)	8	(18%)	$27	(24%)
Non-Confined	320	(10%)	8	(18%)	$27	(24%)
Confined	90	(3%)	0	(0%)	$0	(0%)
Unclassified outside area	140	(4%)	0	(0%)	$2	(1%)
Non-Confined	50	(2%)	0	(0%)	$2	(1%)
Confined	90	(3%)	0	(0%)	$0	(0%)
Lavatory, bathroom, locker room or check room	130	(4%)	1	(2%)	$1	(1%)
Non-Confined	100	(3%)	1	(2%)	$1	(1%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Heating equipment room	120	(4%)	0	(1%)	$1	(1%)
Non-Confined	40	(1%)	0	(1%)	$1	(1%)
Confined	80	(2%)	0	(0%)	$0	(0%)
Exterior wall surface	110	(3%)	1	(2%)	$3	(3%)
Non-Confined	100	(3%)	1	(2%)	$3	(3%)
Confined	10	(0%)	0	(0%)	$0	(0%)
Exterior roof surface	100	(3%)	1	(3%)	$3	(2%)
Non-Confined	90	(3%)	1	(3%)	$3	(2%)
Confined	10	(0%)	0	(0%)	$0	(0%)
Unclassified area of origin	90	(3%)	0	(0%)	$1	(1%)
Non-Confined	50	(1%)	0	(0%)	$1	(1%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Lobby or entrance way	90	(3%)	0	(1%)	$2	(2%)
Non-Confined	50	(1%)	0	(1%)	$2	(2%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Trash or rubbish chute, area or container	80	(2%)	0	(0%)	$0	(0%)
Non-Confined	10	(0%)	0	(0%)	$0	(0%)
Confined	80	(2%)	0	(0%)	$0	(0%)
Attic or ceiling/roof assembly or concealed space	80	(2%)	0	(1%)	$14	(13%)
Non-Confined	80	(2%)	0	(1%)	$14	(13%)
Confined	0	(0%)	0	(0%)	$0	(0%)

Table 10. Structure Fires in Office Properties, by Area of Origin (Continued)
2007-2011 Annual Averages

Area of Origin	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified equipment or service area	70	(2%)	2	(4%)	$1	(1%)
Non-Confined	50	(1%)	2	(4%)	$1	(1%)
Confined	20	(1%)	0	(0%)	$0	(0%)
Duct for HVAC, cable, exhaust, heating, or AC	70	(2%)	0	(0%)	$0	(0%)
Non-Confined	50	(1%)	0	(0%)	$0	(0%)
Confined	20	(1%)	0	(0%)	$0	(0%)
Wall assembly or concealed space	60	(2%)	0	(1%)	$2	(1%)
Non-Confined	60	(2%)	0	(1%)	$2	(1%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Machinery room or area or elevator machinery room	60	(2%)	1	(1%)	$1	(1%)
Non-Confined	40	(1%)	1	(1%)	$1	(1%)
Confined	10	(0%)	0	(0%)	$0	(0%)
Unclassified storage area	50	(2%)	2	(5%)	$3	(3%)
Non-Confined	40	(1%)	2	(5%)	$3	(3%)
Confined	10	(0%)	0	(0%)	$0	(0%)
Ceiling/floor assembly or concealed space	50	(2%)	1	(3%)	$4	(4%)
Non-Confined	50	(1%)	1	(3%)	$4	(4%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Other known area of origin	910	(27%)	23	(52%)	$44	(39%)
Non-Confined	650	(19%)	21	(47%)	$44	(39%)
Confined	270	(8%)	2	(5%)	$0	(0%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Non-Confined	1,890	(57%)	40	(92%)	$111	(100%)
Confined	1,450	(43%)	3	(8%)	$0	(0%)

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

Source: NFIRS 5.0 and NFPA survey.

Table 11. Structure Fires in Office Properties, by Item First Ignited
2007-2011 Annual Averages

Item First Ignited	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking materials, including food	660	(20%)	2	(6%)	$0	(0%)
Non-Confined	30	(1%)	1	(2%)	$0	(0%)
Confined	640	(19%)	1	(3%)	$0	(0%)
Electrical wire or cable insulation	380	(12%)	7	(16%)	$15	(14%)
Non-Confined	340	(10%)	7	(16%)	$15	(13%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Rubbish, trash, or waste	300	(9%)	1	(3%)	$3	(2%)
Non-Confined	70	(2%)	1	(3%)	$3	(2%)
Confined	230	(7%)	0	(0%)	$0	(0%)
Item First Ignited, Other	250	(8%)	2	(5%)	$4	(4%)
Non-Confined	140	(4%)	2	(5%)	$4	(4%)
Confined	110	(3%)	0	(0%)	$0	(0%)
Magazine, newspaper, writing paper	180	(5%)	2	(4%)	$4	(3%)
Non-Confined	80	(2%)	2	(4%)	$4	(3%)
Confined	90	(3%)	0	(0%)	$0	(0%)
Structural member or framing	160	(5%)	1	(3%)	$18	(16%)
Non-Confined	160	(5%)	1	(3%)	$18	(16%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Flammable or combustible liquids or gases, piping or filter	160	(5%)	7	(15%)	$8	(8%)
Non-Confined	100	(3%)	7	(15%)	$8	(8%)
Confined	60	(2%)	0	(0%)	$0	(0%)
Exterior wall covering or finish	110	(3%)	3	(7%)	$5	(5%)
Non-Confined	110	(3%)	3	(7%)	$5	(5%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Appliance housing or casing	100	(3%)	2	(5%)	$3	(3%)
Non-Confined	70	(2%)	2	(5%)	$3	(3%)
Confined	30	(1%)	0	(0%)	$0	(0%)
Box, carton, bag, basket, barrel	80	(3%)	4	(10%)	$1	(1%)
Non-Confined	40	(1%)	2	(5%)	$1	(1%)
Confined	40	(1%)	2	(5%)	$0	(0%)
Exterior roof covering or finish	80	(2%)	0	(1%)	$8	(7%)
Non-Confined	80	(2%)	0	(1%)	$8	(7%)
Confined	0	(0%)	0	(0%)	$0	(0%)

Table 11. Structure Fires in Office Properties, by Item First Ignited
2007-2011 Annual Averages

Item First Ignited	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Insulation within structural area	70	(2%)	1	(1%)	$3	(3%)
Non-Confined	70	(2%)	1	(1%)	$3	(3%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Unclassified structural component or finish	70	(2%)	0	(0%)	$4	(3%)
Non-Confined	70	(2%)	0	(0%)	$4	(3%)
Confined	0	(0%)	0	(0%)	$0	(0%)
Multiple items first ignited	60	(2%)	2	(5%)	$9	(8%)
Non-Confined	40	(1%)	2	(5%)	$9	(8%)
Confined	20	(1%)	0	(0%)	$0	(0%)
Unclassified organic materials	60	(2%)	0	(0%)	$1	(1%)
Non-Confined	20	(1%)	0	(0%)	$1	(1%)
Confined	40	(1%)	0	(0%)	$0	(0%)
Other known item first ignited	600	(18%)	9	(21%)	$26	(24%)
Non-Confined	450	(13%)	9	(21%)	$26	(23%)
Confined	150	(5%)	0	(0%)	$0	(0%)
Total	3,340	(100%)	44	(100%)	$112	(100%)
Non-Confined	1,890	(57%)	40	(92%)	$111	(100%)
Confined	1,450	(43%)	3	(8%)	$0	(0%)

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

Source: NFIRS 5.0 and NFPA survey.

Table 12. Structure Fires in office Properties, by Extent of Flame Damage
2007-2011 Annual Averages

Extent of Flame Damage	Fires		Civilian Injuries		Direct Property Damage (in Millions)	
Confined or contained fire identified by incident type	1,450	(43%)	3	(8%)	$0	(0%)
Confined to object of origin	690	(21%)	8	(19%)	$9	(8%)
Confined to room of origin	540	(16%)	16	(38%)	$17	(15%)
Confined to floor of origin	150	(4%)	4	(8%)	$17	(15%)
Confined to building of origin	440	(13%)	11	(24%)	$60	(54%)
Beyond building of origin	70	(2%)	1	(3%)	$8	(7%)
Total	3,340	(100%)	44	(100%)	$112	(100%)

Note: Sums may not equal totals due to rounding errors

Source: NFIRS 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.

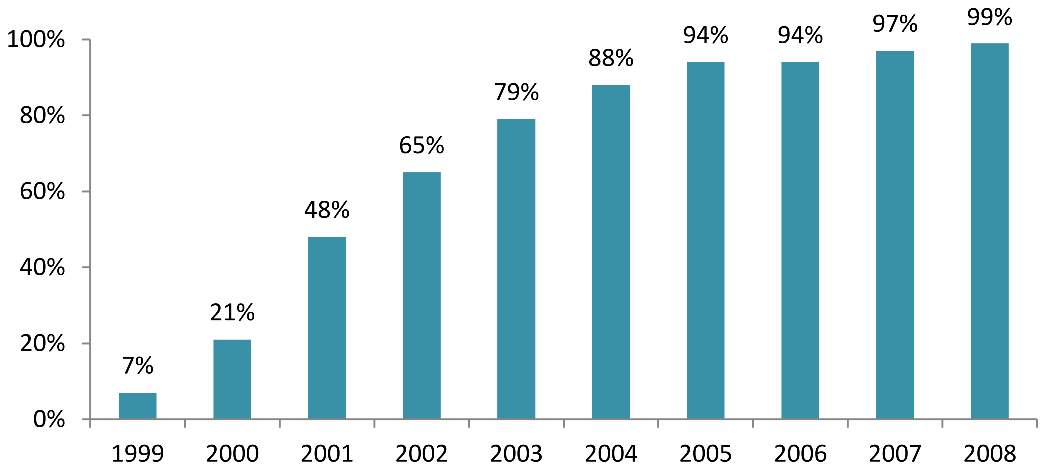
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific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

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

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

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

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



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

<u>NFPA survey projections</u>
NFIRS totals (Version 5.0)

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

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

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

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases. Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately. Table A.1 shows the breakdown of these fires. Figure A.1 shows the percentage of the different confined fires and of non-confined fires for all homes, one-and two-family homes (including manufactured homes), and apartments.

Table A.1. Confined and Non-Confined Reported Structure Fires in Office Properties
2004-2008 Annual Averages

Type of Fire	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
All Confined Fires	1,570	(41%)	0	(0%)	4	(11%)	$0	(0%)
Confined cooking fire	*880*	*(23%)*	*0*	*(0%)*	*2*	*(7%)*	*$0*	*(0%)*
Contained trash or rubbish fire	*410*	*(11%)*	*0*	*(0%)*	*1*	*(4%)*	*$0*	*(0%)*
Confined fuel burner or boiler fire	*220*	*(6%)*	*0*	*(0%)*	*0*	*(0%)*	*$0*	*(0%)*
Confined chimney or flue fire	*20*	*(1%)*	*0*	*(0%)*	*0*	*(0%)*	*$0*	*(0%)*
Confined incinerator overload or malfunction fire	*20*	*(0%)*	*0*	*(0%)*	*0*	*(0%)*	*$0*	*(0%)*
Confined commercial compactor fire	*20*	*(0%)*	*0*	*(0%)*	*0*	*(1%)*	*$0*	*(0%)*
Non-Confined Fires	2,260	(59%)	4	(100%)	33	(89%)	$108	(100%)
Total	**3,830**	**(100%)**	**4**	**(100%)**	**37**	**(100%)**	**$108**	**(100%)**

Source: NFIRS 5.0 and NFPA survey.

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

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

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

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

Cause of Ignition: This field is used chiefly to identify intentional fires. "Unintentional" in this field is a specific entry and does not include other fires that were not intentionally set: failure of equipment or heat source, act of nature, or "other" (unclassified)." The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown. For non-confined structure fires in office properties, the cause was known in 74% of the fires, 69% of the civilian injuries, and 53% of the direct property damage. For confined fires, the cause was known in 12% of the fires.

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

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

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

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

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

The factor contributing to ignition was coded as none, undetermined or left blank in 43% of the non-confined structure fires in office properties, 41% of the associated injuries, 61% of the associated direct property damage and 93% of the confined fires.

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.

In non-confined structure fires in office properties, code 60: "heat from open flame or smoking material, other" was entered for 3% of the fires and 1% of the direct property damage and civilian injuries. The heat source was undetermined in 29% of the non-confined office property structure fires, 19% of the civilian injuries, and 56% of the direct property damage. The heat source was known in 11% of the confined fires, including less than 1% with heat source code 60.

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

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

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

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

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

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

The equipment involved in ignition was undetermined, not reported, or coded as no equipment with a heat source code outside the range of 40-99 (non-equipment related heat sources) in 76% of the non-confined fires, 65% of the injuries, 78% of the direct property damage. Equipment was not analyzed separately for confined fires. Instead, each confined fire incident type was listed with the equipment or as other known equipment.

Item First Ignited. In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as "mattresses and bedding." In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as "clothing." In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together. The item first ignited was undetermined or unreported in 30% of the non-confined structure fires, 23% of the associated injuries, 52% of the direct property damage, and in 88% of the confined structure fires.

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply "bedroom." Chimney is no longer a valid area of origin code for non-confined fires. The area of origin was unknown or not reported in 8% of non-confined structure fires in Office properties, 6% of associated injuries, and 23% of the direct property damage. It was also unknown in 86% of confined fires excluding those confined to the chimney or flue which were all assumed to have begun in the chimney or flue.

Detection Equipment. Detection equipment presence was known in 75% of the non-confined fires and 3% of the non-confined fires.

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

In this analysis, when estimates were derived solely from the NFPA survey, fires were rounded to the nearest 500, civilian deaths were rounded to the nearest five, civilian injuries were rounded to the nearest 25, and direct property damage was rounded to the nearest million dollars. For estimates derived from NFIRS and the NFPA survey, fires were rounded to the nearest hundred, civilian deaths and injuries were rounded to the nearest ten, and direct property damage was rounded to the nearest million dollars.

Inflation. Property damage estimates are not adjusted for inflation unless so indicated. In this analysis, inflation adjusted damage estimates are provided in Table 1, 1A and 1B.

Appendix B.
Methodology and Definitions Used in "Leading Cause" Tables

The cause table reflects relevant causal factors that accounted for at least 2% of the fires in a given occupancy. Only those causes that seemed to describe a scenario are included. Because the causal factors are taken from different fields, some double counting is possible. Percentages are calculated against the total number of structure fires, including both confined and non-confined fires. Bear in mind that every fire has at least three "causes" in the sense that it could have been prevented by changing behavior, heat source, or ignitability of first fuel, the last an aspect not reflected in any of the major cause categories. For example, several of the cause categories in this system refer to types of equipment (cooking, heating, electrical distribution and lighting, clothes dryers and washers, torches). However, the problem may be not with the equipment but with the way it is used. The details in national estimates are derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS). This methodology is based on the coding system used in Version 5.0 of NFIRS. The *NFIRS 5.0 Reference Guide*, containing all of the codes, can be downloaded from http://www.nfirs.fema.gov/documentation/reference/.

Cooking equipment and heating equipment are calculated by summing fires identified by equipment involved in ignition and relevant confined fires. Confined fires will be shown if they account for at least 2% of the incidents. **Confined cooking fires** (cooking fires involving the contents of a cooking vessel without fire extension beyond the vessel) are identified by NFIRS incident type 113.

Confined heating equipment fires include **confined chimney or flue fires (**incident type 114) and **confined fuel burner or boiler** fires (incident type 116). The latter includes delayed ignitions and incidents where flames caused no damage outside the fire box. The two types of confined heating fires may be combined or listed separately, depending on the numbers involved.

Intentional fires are identified by fires with a "1" (intentional) in the field "cause." The estimate includes a proportional share of fires in which the cause was undetermined after investigation, under investigation, or not reported. All fires with intentional causes are included in this category regardless of the age of the person involved. Earlier versions of NFIRS included codes for incendiary and suspicious. Intentional fires were deliberately set; they may or may not be incendiary in a legal sense. No age restriction is applied.

Fires caused by **playing with heat source** (typically matches or lighters) are identified by code 19 in the field "factor contributing to ignition." Fires in which the factor contribution to ignition was undetermined (UU), entered as none (NN) or left blank are considered unknown and allocated proportionally. Because factor contributing to ignition is not required for intentional fires, the share unknown, by these definitions, is somewhat larger than it should be.

The heat source field is used to identify fires started by: **smoking materials** (cigarette, code 61; pipe or cigar, code 62; and heat from undetermined smoking material, code 63); **candles** (code 66), **lightning** (code 73); and **spontaneous combustion or chemical reaction** (code 72). Fires started by heat from unclassified open flame or smoking materials (code 60) are allocated proportionally among the "other open flame or smoking material" codes (codes 61-69) in an allocation of partial unknown data. This includes smoking materials and candles. This approach results in any true unclassified smoking or open flame heat sources such as incense being inappropriately allocated. However, in many fires, this code was used as an unknown.

The equipment involved in ignition field is used to find several cause categories. This category includes equipment that functioned properly and equipment that malfunctioned.

Cooking equipment in non-confined fire refers to equipment used to cook, heat or warm food (codes 620-649 and 654). Fire in which ranges, ovens or microwave ovens, food warming appliances, fixed or portable cooking appliances, deep fat fryers, open fired charcoal or gas grills, grease hoods or ducts, or other cooking appliances) were involved in the ignition are said to be caused by cooking equipment. Food preparation devices that do not involve heating, such as can openers or food processors, are not included here. As noted in Appendix A, a proportional share of unclassified kitchen and cooking equipment (code 600) is included here.

Heating equipment in non-confined fire (codes 120-199) includes central heat, portable and fixed heaters (including wood stoves), fireplaces, chimneys, hot water heaters, and heat transfer equipment such as hot air ducts or hot water pipes. Heat pumps are not included. As noted in Appendix A, a proportional share of unclassified heating, ventilation and air condition equipment (code 100) is included here.

Electrical distribution and lighting equipment (codes 200-299) include: fixed wiring; transformers; associated overcurrent or disconnect equipment such as fuses or circuit breakers; meters; meter boxes; power switch gear; switches, receptacles and outlets; light fixtures, lamps, bulbs or lighting; signs; cords and plugs; generators, transformers, inverters, batteries and battery charges.

Torch, burner or soldering iron (codes 331-334) includes welding torches, cutting torches, Bunsen burners, plumber furnaces, blowtorches, and soldering equipment. As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

Clothes dryer or washer (codes 811, 813 and 814) includes clothes dryers alone, washer and dryer combinations within one frame, and washing machines for clothes. As noted in Appendix A, a proportional share of unclassified personal and household equipment (code 800) is included here.

Electronic, office or entertainment equipment (codes 700-799) includes: computers and related equipment; calculators and adding machines; telephones or answering machines; copiers; fax machines; paper shredders; typewriters; postage meters; other office equipment; musical instruments; stereo systems and/or components; televisions and cable TV converter boxes,, cameras, excluding professional television studio cameras, video equipment and other electronic equipment. Older versions of NFIRS had a code for electronic equipment that included radar, X-rays, computers, telephones, and transmitter equipment.

Shop tools and industrial equipment excluding torches, burners or soldering irons (codes 300-330, 335-399) includes power tools; painting equipment; compressors; atomizing equipment; pumps; wet/dry vacuums; hoists, lifts or cranes; powered jacking equipment; water or gas drilling equipment; unclassified hydraulic equipment; heat-treating equipment; incinerators, industrial furnaces, ovens or kilns; pumps; compressors; internal combustion engines; conveyors; printing presses; casting, molding; or forging equipment; heat treating equipment; tar kettles; working or shaping machines; coating machines; chemical process equipment; waste recovery equipment; power transfer equipment; power takeoff; powered valves; bearings or brakes; picking, carding or weaving machines; testing equipment; gas regulators; separate motors; non-vehicular internal combustion engines; and unclassified shop tools and industrial equipment. . As noted in Appendix A, a proportional share of shop tools and industrial equipment (code 300) is included here.

Medical equipment (codes 410-419) includes: dental, medical or other powered bed, chair or wheelchair; dental equipment; dialysis equipment; medical monitoring and imaging equipment; oxygen administration equipment; radiological equipment; medical sterilizers, therapeutic equipment and unclassified medical equipment. As noted in Appendix A, a proportional share of commercial and medical equipment (code 400) is included here.

Mobile property (vehicle) describes fires in which some type of mobile property was involved in ignition, regardless of whether the mobile property itself burned (mobile property involved codes 2 and 3).

Exposures are fires that are caused by the spread of or from another fire. These were identified by factor contributing to ignition code 71. This code is automatically applied when the exposure number is greater than zero.

Appendix C
Selected Published Incidents

The following are selected published incidents involving office properties. Included are short articles from the "Firewatch" or "Bi-monthly" columns in *NFPA Journal* or it predecessor *Fire Journal* and incidents from either the large-loss fires report or catastrophic fires report. If available, investigation reports or NFPA Alert Bulletins are included and provide detailed information about the fires.

It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

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

Rags ignite spontaneously, New Hampshire
Urethane-soaked rags left on the floor when construction workers left for the day after a renovation project ignites spontaneously starting a fire in the basement of a multitenant office and retail building.

The three-story structure, which was 122 feet (37 meters) long and 127 feet (38 meters) wide, had exterior walls of brick and a flat, wood roof deck covered by a rubber membrane. Fire detection and suppression systems were installed throughout, and the fire alarm panel tripped a master box that notified the fire department.

Firefighters responded to the 6:22 a.m. alarm and arrived to find moderate smoke in the basement about 24 inches (61 centimeters) above the floor. There was little heat. The firefighters could hear sprinklers operating and eventually found them and the remains of the fire in a maintenance workroom.

Investigators determined that the fire started near sawhorses on which plywood coated with urethane gloss had been placed. Near the sawhorses, they found several cans of the gloss. Although the cans were clearly labeled with instructions to place soaked waste and sanding residue into water-filled metal containers to prevent a fire, the two workers said they were not aware that the urethane gloss was capable of spontaneous combustion.

The sprinklers extinguished the fire, which did and estimated $1,000 damage to the building and $3,000 damage to its contents. There were no injuries.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, May/June 31-32.

Fire damages office building, South Carolina
A passerby who heard glass breaking and saw flames in a second-floor window of a multitenant office building called 911 to report the blaze at 2:36 a.m.

The unsprinklered two-story building had brick veneer exterior walls on two sides, fiber cement on the other two sides, and a wood truss roof covered with a metal deck. There were two medical offices on the first floor and four professional offices on the second. Smoke detectors on each floor near the elevator provided recall, but the type of the fire alarm system was not reported. The detectors were not near the area of origin and operated only after the fire had spread.

Firefighters arrived four minutes after receiving the alarm to find a portion of the second floor involved in fire. The first-due engine company stretched a hose line into the building and made it to the second floor without encountering much smoke. As they tried to force the door to the office of origin open, however, conditions outside deteriorated, and the incident commander ordered all interior companies out of the building.

As other engines companies began to arrive, firefighters established a water supply and deployed several small- and large-diameter hose lines around the building. They fought the fire defensively in a collapse zone away from the building.

Although investigators could not determine the fire's cause, they established that it started in the office of a company that assembled drug carts used in the biotech and medical fields.

The top floor of the building sustained significant fire and smoke damage, the roof partially collapsed, and the first floor sustained smoke and water damage. Estimates of loss were not provided. There were no injuries.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, May/June 30-31.

Fire heavily damages office building, Washington
A two-story office building covering an area of approximately 16,000 square feet (1,486 square meters) was heavily damaged by a fire that began in a concealed roof void and spread undetected until it was discovered by a passerby.

The wood-frame building, which had a flat, wood truss roof covered with a built-up surface, had no fire alarms or sprinklers.

The passerby reported smoke coming from the building at 5:31 a.m., and firefighters arriving five minutes later found low-hanging smoke covering the roadway near the building. During his initial size-up, the officer reported smoke coming from the roof and visible through the glass on the second floor. Using a thermal imaging camera, he also noted significant heat build-up near the ceiling and roof.

Crews advanced a hose line up a stairwell in the atrium to the second floor, where they encountered heavy smoke and an orange glow near the floor. A quick blast of water knocked the fire down, but visibility dropped sharply as the smoke increased. When firefighters heard what sounded like a collapsing roof, they retreated and called for ventilation.

Using a positive-pressure fan to clear away the smoke, firefighters laid additional hose lines and pulled down the ceiling in an attempt to locate the seat of the fire. As they moved toward a corner of the building, they found fire at the ceiling. A glued, laminated ceiling beam had partially collapsed, and fire consumed an office. Firefighters' attempts to knock the office fire down were unsuccessful.

Crews had just changed their air cylinders and returned to the building with larger hose lines when the incident commander ordered everyone from the building. Once all personnel were accounted for, the commander ordered all hose lines to be positioned defensively. By the time the fire was finally brought under control several hours later, nearly the entire roof had burned off or collapsed into the second floor. Only a small section remained undamaged near the atrium. Portions of the second floor also collapsed into the first floor.

Investigators discovered that the fire began in the ceiling above an office, but they couldn't determine the cause of the fire due to the extent of damage.

The building, valued at $2 million, and its contents, valued at $750,000, were destroyed. One firefighter suffered a minor injury.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, March/April,18.

Sprinklers control arson fire, Vermont
A fire intentionally set in a two-story office building that was closed for the night damaged an office and some adjacent space until sprinklers operated and prevented it from spreading from the area of origin.

The office building, which was 150 feet (45 meters) long and 70 feet (21 meters) wide, was of ordinary construction. It had smoke detectors and a wet-pipe sprinkler system.

The fire department received the municipal fire alarm at 3:03 a.m. when the smoke detection system activated. When firefighters arrived, they could not see any smoke or fire coming from the building. Upon investigation, however, they noticed light smoke in the foyer.

When they entered the building, they smelled fuel and initially suspected a furnace problem. They then saw water coming down the stairs and heavier smoke. Eventually, fire crews found a small fire burning in an office cubicle. The incident commander ordered a full first alarm and later asked for a second alarm. After firefighters extinguished the blaze, they shut down the sprinkler system and began their investigation.

When the investigators found signs of forced entry at the back of the building and were told by the first-in officer that he had noticed a fuel-like smell, they brought in resources from other jurisdictions and an arson dog. They determined that the fire started in two separate areas, near which the dog detected hydrocarbons. A review of the security tape showed an individual carrying something in each hand near the point of origin. A flash occurred while the individual was outside of camera range, and the camera caught the person hastily moving toward the exit. Estimates of damage to the building, which was valued at $1.6 million, were not reported. There were no injuries.

Kenneth J. Tremblay, 2012," Firewatch", *NFPA Journal*, November/December, 18.

Dental Technician Burned by Alcohol-Fueled Fire, Texas
A 26-year-old dental technician was burned when vapors from a plastic bottle of denatured alcohol ignited as she tried to refuel a torch in a patient treatment room at a dental office. Two men, ages 40 and 53, were also burned when they put the fire out with a portable extinguisher.

The technician believed the flame of the torch was out when she poured the fuel into it, but the torch was still burning and ignited the alcohol vapors. The alcohol container also tipped over during the refilling process. As flames spread to her clothing, she left the treatment room and began rolling on the floor. Two co-workers helped her put out the flames, which caused second-degree burns to her abdomen and arm.

The fire department was called to the scene for medical aid at 11:31 a.m.

Kenneth J. Tremblay, 2010, "Firewatch", *NFPA Journal*, March/April 26.

Sprinkler Extinguishes Fire, Connecticut
A sprinkler quickly extinguished a fire in an office building, triggering the exterior waterflow alarm. However, the alarm was not tied into the fire alarm system and the building was closed for the evening, which is why the gong operated until a passerby heard the alarm and called 911 at 10:15 p.m.

The three-story, wood-frame office building, which had 1,200 square feet (111 square meters) per floor, was of ordinary construction with brick walls and an asphalt roof. A wet-pipe sprinkler system provided full coverage, and a fire alarm system provided detection in the common spaces.

Firefighters found the sprinkler valve on the lower floor and confirmed a waterflow, while others searched the first and second floors until they saw water seeping under the door to a second-floor doctor's office. Forcing the door, they discovered that the water was coming from a third-floor dentist's office, where they found the operating sprinkler and detected a slight odor of burning plastic. The odor let them to the remains of a fire that began when a ceiling-mounted utility fan overheated, causing the motor to ignite accumulated dust and the plastic fan cover. Dripping, burning plastic dropped into another plastic fan unit and a plastic pump shroud, and eventually there was enough heat to activate the sprinkler.

Damage to the structure was estimated at $5,000, while damage to its contents was estimated at $2,000. The smoke was confined to the closet and did not reach the common areas.

Kenneth J. Tremblay, 2009, “Firewatch”, *NFPA Journal*, May/June, 45."

Sprinkler Controls Air Handling Unit Fire, Illinois
A sprinkler extinguished a fire in the air handling unit of an office building. A water flow alarm alerted the building's owner, who was alone in the building at the time.

The two-story, wood-frame building, which was 60 feet (18 meters) long and 90 feet (27 meters) wide, had a wooden roof and exterior walls covered with wood shake shingles. It had a fire detection system, and a full-coverage wet-pipe system had been installed on all floors. A dry-pipe system had been installed in the attic.

Firefighters arrived shortly after 5:59 a.m. to find that heat-resistive coils in an electric air handling unit installed in a mechanical room had ignited a high-efficiency filter before activating the sprinkler.

The building, valued at $3.6 million, and its contents, valued at $2.75 million, sustained $75,000 and $75,000 in damage, respectively. It re-opened for business later that morning.

Ken Tremblay, 2009, "Firewatch", *NFPA Journal*, November/December, 27.

State: Indiana
Dollar Loss: $12,000,000
Month: February
Time: 2:44 am

Property Characteristics and Operating Status:
This fiberglass manufacturing plant was 12 feet (3.7 meters) to 40 feet (12 meters) in height and of heavy timber construction and covered 750,000 square feet (7,000 square meters). The plant was partially operating at the time of the fire; that is, the fire broke out in an area that was closed for the night but the adjacent manufacturing area was operating.

Fire Protection Systems:
There was no automatic detection equipment present. There was a partial-coverage, dry-pipe sprinkler system installed. The system operated, but its effectiveness was hindered by cold weather and a fire that was traveling horizontally above the heads. A firewall helped limit severe damage in the manufacturing area.
Fire Development:
This fire broke out in an office wall assembly when an overloaded relocateable power strip caused a malfunction in the wall outlet. The fire smoldered in the wall for a long time before it was discovered. Once smoke was detected, the employees attempted to locate the fire for 15 minutes before notifying the fire department. The fire spread vertically inside the wall assembly to the attic area and spread horizontally throughout the attic.

Contributing Factors and Other Details:
The fire-involved wall assembly had been layered over several times, with the original wall cover left in place. The walls were so layered that the thermal imaging camera could not detect heat in the walls. There were also three roofs in place due to construction add-ons that left the original roofs in place, with many void spaces making it difficult to fight this fire. One firefighter was injured in a flashover.

Stephen G. Badger, 2008, "Large-Loss Fires in the United States in 2007", NFPA Fire Analysis and Research, Quincy, MA

State: Texas
Dollar Loss: $5,000,000
Month: March
Time: 5:11 p.m.

Property Characteristics and Operating Status:
This six-story office building was of protected non-combustible construction. The ground floor area was not reported. The building was in operation at the time of the fire, with approximately 130 people present.

Fire Protection Systems:
There were smoke detectors located in each elevator lobby for the elevators' recall system. It was not reported if these operated or not. There was a sprinkler system installed in the atrium. The system operated and kept the fire from that area. There was a standpipe system supplied by a 750 gpm (2,840 liters per minute) fire pump and a 2,500-gallon (94,600-liter) tank.

Fire Development:
A fire was set in a storage area of the fifth story. Medical supplies, including oxygen, enhanced the fire's spread down to the fourth and third stories as well as up to the sixth-story.

Contributing Factors and Other Details:
Arriving firefighters were faced with a fire in an occupied office building, with smoke from the third and fourth stories and fire from the fifth and sixth story. Firefighters initiated an interior attack and rescues at the same time. In all, firefighters rescued eight people over aerial ladders. At the same time, approximately 120 occupants either self-evacuated or were assisted by firefighters. Three civilians died, and three civilians and three firefighters were injured.

Stephen G. Badger, 2008, "Large-Loss Fires in the United States in 2007", NFPA Fire Analysis and Research, Quincy, MA

Sprinklers Control Fire in Office, Connecticut
Three sprinklers controlled a fire that started in a plastic wastebasket in an office at a computer repair company, limiting loss and preventing further damage.

The office was in a two-story, wood-frame building that housed a business and manufacturing plant. The building, which was 200 feet (61 meters) long and 75 feet (22.9 meters) wide, had brick exterior walls and a wooden roof. It was protected by a wet-pipe sprinkler system but had no smoke or heat detectors.

Firefighters received the alarm from a second-floor occupant of the building at 12:51 a.m. When they arrived at the reported address, however, they found neither smoke nor fire. They checked the exterior of the structure, noting that everything appeared to in order, but a follow-up call again reported smoke in the building. At that point, the firefighters forced the door and checked the interior of the building, still finding no smoke, fire, or occupants. A command officer who smelled smoke coming from an adjacent property ordered the firefighters to force entry into that building, where they discovered sprinklers controlling a fire in the office.
Investigators could not discover the cause of the fire, which began in the wastebasket and spread to wooden cabinets.

The building, valued at just over $1 million, and its contents, valued at $500,000, sustained damages of $5,000 and $15,000, respectively. There were no injuries.

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

Florida, June 2004, 6:59 a.m., $10,020,000

The Building:
This two-story commercial property contained two offices and a tanning salon. It was of unprotected ordinary construction and covered a floor area of 16,500 square feet (1,532 square meters). The building was closed for the night.

Detection and Suppression Systems:
There was no fire detection or suppression equipment present.

The Fire:
An electrical short in ballast to a fluorescent light on the ceiling of a second-story storeroom started this fire, which spread through the void space between the ceiling and roof then down into the second story. An employee arriving for work discovered the fire.

Contributing Factors and Other Details:
Six firefighters were injured. The loss was $4,020,000 to the structure and $6,000,000 to the contents.

Stephen G. Badger, 2006, "Large-Loss Fires in the United States-2005", NFPA, Fire Analysis and Research, 25.

Use of Illegal Drugs Ignites Fire California
A security and alarm monitoring company employee was using a torch to heat illegal drugs in his second-floor office workstation when he inadvertently ignited combustibles on his desk.

The two-story building in which the fire occurred was constructed of wood and masonry materials. A sprinkler system provided complete coverage, but the building lacked a separate smoke detection system.

The fire began when flames from the small gas torch the 26-year-old employee using to heat the drugs ignited combustibles on the desk and the wall covering of his cubicle. As he tried to extinguish the flames with clothing, he tossed the still-operating torch off the desk onto a chair, where it ignited the upholstery fabric.

Unable to extinguish the blaze, the young man left the room to find a portable fire extinguisher, but he locked himself out when the door shut. By the time he called a coworker to let him back in, a single sprinkler had activated and extinguished the flames.

Firefighters responding to the waterflow alarm at 5:52 a.m. discovered that the fire was already out and began salvage operations, as investigators sorted through the scene. Based on the evidence and the two employees' statements, the investigators were able to determine the cause of the fire.

The employee who started the blaze was hospitalized with burns to his hands and face, and the second employee was treated for smoke inhalation at the scene. The building, valued at $2.25 million and its contents, valued at $960,000, sustained combined losses of $236,000.

Kenneth J. Tremblay, 2005, "Firewatch", *NFPA Journal*, November/December, 16.

State: Minnesota
Dollar Loss: $10,250,000
Month: November
Time: 6:03 AM

Property Characteristics and Operating Status:
This 1-story electronic equipment warehouse was of unprotected non-combustible construction and covered almost 10,000 square feet (929 square meters). The warehouse was closed for the weekend at the time of the fire.

Fire Protection Systems:
There was no automatic smoke detection system or suppression system present.

Fire Development:
A gas water heater in the mezzanine level above office space ignited paper records. The fire burned records and the office space. Fire officials estimated that the fire burned for up to hours unnoticed and created a tremendous amount of heat throughout the warehouse. A passerby discovered the fire and called 911.

Contributing Factors and Other Details:
The water heater was in poor operating condition and clearance was not maintained with the paper product. Loss was estimated at $250,000 to the structure and $10,000,000 to the contents which was electronic equipment.

Stephen G. Badger, 2005, "Large-Loss Fire for 2004," NFPA Journal, November/December, 47."

Minnesota, December 2005, 9:47 a.m., 3 deaths

Occupancy Type and Use, Number of Stories, Construction Type, Operating Status
One-story, bank office property of unprotected ordinary construction, four people were in the building.

Detection Systems and Suppression Systems
None

Fire Origin and Path
Natural gas from piping underground outside seeped into the building. The explosion resulted when an unknown source ignited the accumulated gas.

Contributing Factors and Victim Locations
The bodies of the three victims were recovered from the wreckage. A fourth person in the building survived.

Stephen G. Badger, 2005, "Catastrophic Fires of 2004 " NFPA Journal, September/October 60.""Firefighters forced to defensive attack due to fire spread, Georgia

Candle Ignites Office Fire, Minnesota
Cleaners making nightly rounds in a six-story office building detected smoke and called the fire department at 7:21 p.m. Firefighters arriving minutes later discovered smoke and flames coming from windows on the fifth floor, where a worker, trying to mask the odor of his cigarette, had lit a candle before leaving for the night.

The steel-framed building, which measured 200 feet (61 meters) by 50 feet (15 meters), had pre-cast concrete panel walls, a flat built-up roof, and interior walls of sheetrock that divided the multi-use building into irregularly shaped office suites. In addition to the fire detection system, the building was equipped with a wet standpipe system and a smoke detection system that provided coverage in the hallways. There were no sprinklers.

Kenneth J. Tremblay, 2004, "Firewatch", *NFPA Journal*, September/October, 19.

Minnesota, December, 2004, 9:47 a.m., 3 deaths:

The Building:
One-story, bank office property of unprotected ordinary construction, four people were in the building.

Detection and Suppression Systems:
None.

The Fire:
Natural gas from piping underground outside seeped into the building. The explosion resulted when an unknown source ignited the accumulated gas.

Contributing Factors and Other Details:
The bodies of the three victims were recovered from the wreckage. A fourth person in the building survived.

Stephen G. Badger, 2005, "Catastrophic Multiple-Death Fires in the United States-2004", NFPA, Fire Analysis and Research, 15.

California, January, 2004, 2:00 a.m., $5,000,000

The Building:
This one-story office property was of unprotected wood-frame construction. The area covered was not reported. The building was closed for the night.

Detection and Suppression Systems:
There was no automatic detection or suppression system present.

The Fire:
A fire broke out when two strip type circuit breakers (relocateable power taps) in tandem overheated and ignited carpeting in an office. The fire spread to the room and contents, then to the attic and throughout the structure.

Stephen G. Badger, 2004, "Large-Loss Fires in the United States-2005, NFPA, Fire Analysis and Research, 28.

Pennsylvania, June, 2003, 7:30 a.m., $23,000,000

The Building:
This three-story medical office building of heavy timber construction covered 30,000 square feet (2,787 square meters). This building was originally built as a shirt-making factory, but later renovated for offices. The building was opening for the day.

Detection and Suppression Systems:
No automatic detection or suppression systems were present.

The Fire:
A short circuit ignited wood structural members in the attic. Fire spread through a 4- to 6-foot (1.2-meter to 1.8-meter) void.

Contributing Factors and Other Details:
There was a delay in the fire's discovery due to it starting in a void space. Loss to the building was $20,000,000 and loss to the contents was $3,000,000.

Stephen G. Badger, 2004, "Large-Loss Fires in the United States-2003", NFPA, Fire Analysis and Research, 22.

Illinois, October, 2003, 5:03 p.m., 6 deaths

The Building:
A 27-story office building of protected noncombustible construction was closing for the night, but occupied.

Detection and Suppression Systems:
Not Reported. Sprinklers were on the ground floor only.

The Fire:
The fire started in a supply room on the 12th floor and extended into an adjacent office area. Fire department and county investigations have reported different ignition sources, but the fire involved boxes and paper products stored in the room.

Stephen G. Badger, 2004, "Large-Loss Fires in the United States-2003", NFPA, Fire Analysis and Research, 16.

Candle Ignites Office Fire, Minnesota
Cleaners making nightly rounds in a six-story office building detected smoke and called the fire department at 7:21 p.m. Firefighters arriving minutes later discovered smoke and flames coming from windows on the fifth floor, where a worker, trying to mask the odor of his cigarette, had lit a candle before leaving for the night.

The steel-framed building, which measured 200 feet (61 meters) by 50 feet (15 meters), had pre-cast concrete panel walls, a flat built-up roof, and interior walls of sheetrock that divided the multi-use building into irregularly shaped office suites. In addition to the fire detection system, the building was equipped with a wet standpipe system and a smoke detection system that provided coverage in the hallways. There were no sprinklers.
A police officer arrived on the scene first and reported flames showing, so a second alarm was requested. By the time firefighters arrived, the flames were showing from the fifth floor, and the incident commander requested a third alarm. With the first-arriving engine supporting the standpipe system, firefighters advanced hose lines to the fifth floor, where smoke filled the hallway, limiting visibility.

Investigators spoke with the occupants of the suite in which the fire began and determined that the last person left approximately 30 minutes before smoke was detected. He told the investigators that he'd been smoking in his office and lit a candle to mask the odor.

Investigators found the remains of the candle near the point of origin and believe that the man failed to extinguish it before he left. The candle fell over, igniting nearby combustibles, and the fire spread quickly throughout the office, shattering the triple-pane windows.

Flame damage was confined to the office of origin and an office next door. The fourth, fifth, and sixth floors sustained heavy water and smoke damage. The building, valued at $9.3 million, sustained losses of $700,000. Damage to the contents was estimated at $600,000. There were no injuries.

Kenneth J. Tremblay, 2004, "Firewatch," *NFPA Journal*, September/October, 19-20.

State: Illinois
Date: October 2003
Time of Alarm: 5:03 p.m.
Number of Deaths: 6

Number of Stories, Occupancy Type, Construction Type, Operating Status
A 27-story office building of protected noncombustible construction was closing for the night, but occupied.

Detection Systems and Suppression Systems
Not reported. Sprinklers were on the ground floor only.

Fire Origin and Path
The fire started in a supply room on the 12th floor fan extended into an adjacent office area. Fire department and county investigations have reported different ignition sources, but the fire involved boxes and paper products stored in the room.

Contributing Factors and Victim Locations
Not reported.

Stephen G. Badger, 2004, "Catastrophic Multi-Death Fires of 2003", *NFPA Journal*, September/October, 70.

Michigan, 2002
A 39-year-old man was killed in a cigarette fire in a church. The man was a member of the congregation and had been living temporarily in one of the offices. The fire began when a cigarette ignited rubbish in a trash can in a first floor coat room. A firefighter was also injured in the fire. The building and its contents, valued at $230,000, were lost in their entirety.

Source: NFPA's Fire Incident Data Organization (FIDO)

Overloaded Power Strips Ignite Combustibles in Warehouse, West Virginia
Two electrical power strips, overloaded with office equipment and a space heater, arced, starting a fire that destroyed a warehouse containing clothing and sporting goods. Merchandise stored near doorways prevented firefighters from rapidly entering the building, which had no sprinklers or fire detection equipment. The business was closed for the night when the fire broke out.

Built of steel and metal, the single-story warehouse was 80 feet (24 meters) long and 40 feet (12 meters) wide.

Police officers responded to the warehouse when the burglar alarm activated at 4:49 a.m. and called the fire department when they noticed smoke and an orange glow at the front of the building. Firefighters arrived at 5:06 a.m., 11 minutes after they received the fire alarm, to find heavy smoke billowing from the structure. They established a water supply and tried to enter through the main garage door but were blocked by goods stored inside the warehouse against the door. Interruptions to the water flow hampered firefighters' efforts.

Relocating the charged hose lines, firefighters managed to enter the building, but they'd only traveled 10 feet (3 meters) when they were forced to withdraw, as rack storage began to collapse around them. Roof crews also withdrew without venting, since the collapse of the roof was imminent. A back hoe was used to open up the building's walls to allow fire crews to extinguish the fire with master streams.

Investigators determined that the blaze began in a corner office, where a portable electric heater and other equipment had been connected to a multi-outlet electrical strip. This strip was plugged into another multi-outlet electrical strip with still more equipment. An arc from the overloaded outlet strip ignited nearby combustibles, and the fire spread to items in the warehouse. Investigators also discovered that the office's electrical equipment had tripped the main circuit breaker a week before the fire.

The building, valued at $112,000, and its contents, valued at $1 million, were a total loss.

Kenneth J. Tremblay, 2002, "Firewatch", *NFPA Journal*, January/February, 19.

Incendiary Fire Destroys Office Building, California
An unknown arsonist poured a liquid accelerant under a wooden walkway outside an office building and ignited it, sending flames along the building's wood exterior and into the building and a nearby structure.

The building of origin was completely destroyed, and 50 percent of the exposed building was damaged.

The three-story wood-frame structure, which covered 2,500 square feet (232 square meters), was faced with wood shake shingles and had a wood shake roof. There were wooden walkways and balconies on all four sides of the building, which had no smoke alarms or sprinklers. Most of the offices were closed for the night at the time of the fire, but some were still occupied.

The blaze was set on the ground level under one of the walkways, and flames spread to the combustible sidewall and along the walkways of the upper floors.

Radiant heat soon fractured the windows, allowing flames to spread to the interior. A second, similarly constructed building, 30 feet (9 meters) away began to burn, too, when a large oak tree next to it ignited.

Estimated total losses for both buildings were $1.5 million. There were no injuries.

Kenneth J. Tremblay, 2002, “Firewatch”, *NFPA Journal*, March/April, 22.

New York, September, 2001, 8:45 a.m., 2,666 deaths (plus victims on aircraft)

The Building:
Two 110-story office buildings, protective noncombustible construction; operating.

Detection and Suppression Systems:
The buildings were provided with interdependent fire protection features, including suppression, detection, notification and smoke management systems.

Each tower was equipped with automatic fire sprinkler protection. Standpipes were located in each of the tower’s three stairways and each building was provided with three electrical fire pumps that supplied additional pressure for the standpipes.

The Fire:
Two hijacked commercial airliners crashed into the World Trade Center twin towers, killing 157 passengers and crews on board. An additional 2666 people were killed, including 340 firefighters.

Contributing Factors and Other Details:

Airplanes, fueled for transcontinental flights, impacted the north and south towers at the upper levels. The structural steel supports were weakened by both the impact and ensuing fires, resulting in a pancake (floor to floor) collapse of both towers.

Stephen G. Badger, 2002, "Catastrophic Multiple-Death Fires in the United States-2001", NFPA, Fire Analysis and Research, 18.

Virginia, September, 2001, 9:40 a.m., 125 deaths (plus 64 victims on aircraft)

The Building:
Unique five-sided, five-story, office building of protective non-combustible construction; operating. It is synonymous with the department of defense.

Detection and Suppression Systems:
The building was equipped with smoke alarms and a partial wet pipe sprinkler system.

Wet pipe sprinkler system was overwhelmed by explosion and fire.
The Fire:
A hijacked commercial airliner struck the building and exploded on impact. Burning jet fuel penetrated the structure, igniting office furniture and materials involving 225,000 sq. ft. of floor space. The impact and fire caused a partial collapse of the structure.

Contributing Factors and Other Details:

The airliner was fueled for transcontinental flight when it impacted the structure. The explosion and ensuing fire overwhelmed the sprinkler system. The relatively minimal loss of lives can be attributed to the reduced occupancy in the area where the aircraft impacted. That portion of the building had undergone recent renovations.

Stephen G. Badger, 2002, "Catastrophic Multiple-Death Fires in the United States-2001", NFPA, Fire Analysis and Research, 18.

New York, September, 8:46 a.m., $33,400,000,000

The Building:
Two 110-story office buildings of protected noncombustible construction were in full operation at the time. The ground floor area of each building covered approximately 42,900 square feet (4,000 square meters).

Detection and Suppression Systems:
There was completed coverage smoke and heat detection equipment present. There was a complete coverage wet sprinkler system present. Both systems were damaged in the explosion and fire.

The Fire:
At 8:46 a.m., a hijacked aircraft with 92 people onboard crashed into the north face of the north tower of the World Trade Center. The plane crashed into the tower between the 94th and 98th floors. Upon impact the jet fuel ignited in a fireball. Some of this fuel was burned off instantly but a large amount was burning as it flowed down elevator shafts and across the floors. This structure collapsed at 10:29 a.m.

At 9:03 a.m., a second hijacked aircraft with 65 people onboard crashed into the south face of the south tower of the World Trade Center. The plane crashed into the tower between the 78th and 84th floors. Upon impact the jet fuel ignited in a fireball. Some of this fuel was burned off instantly but a large amount was burning as it flowed down elevator shafts and across the floors. This structure collapsed at 9:50 a.m.

Contributing Factors and Other Details:

As of this writing the official death toll stands at 2,792 persons, including 403 emergency workers. Of the 403 emergency workers, 340 were New York City firefighters. At the time of the attacks it is estimated 58,000 people were at work in this office complex. The complex covers an estimated 16 acres (7 hectares), including office buildings, and subway system. During the attack and massive collapse, a total of 10 buildings collapsed in full or partially. Loss to the structures is $12 billion and $12 billion to the contents. An addition $9.4 billion loss was suffered in the infrastructure, utilities and subway system.

Stephen G. Badger, 2002, “Large-Loss Fires in the United States-2001”, NFPA, Fire Analysis and Research, 28.

State: Kentucky
Dollar Loss: $15,000,000
Month: May, 2001
Time: 3:58 pm

Property Characteristics and Operating Status
Three-story university administration office building of protected ordinary construction covering 8,910 square feet (828 square meters) was in full operation at the time the fire broke out.

Fire Protection Systems
There was an automatic detection system present. The type and extent of coverage were not reported. The system did operate. There was no automatic suppression equipment present.

Fire Development
A worker soldering copper with a propane torch spotted smoke coming from the roof area about 15 minutes after working at the soffit at the roof line. The worker used an extinguisher in an unsuccessful attempt to extinguish the fire. The fire spread through the attic and throughout the structure. As fire conditions deteriorated, firefighters withdrew from the structure and went to a defensive attack.

Contributing Factors and Other Details
One worker was injured when he attempted to extinguish the fire. Strong winds allowed for a rapid fire spread.

Stephen G. Badger, "Large-Loss Fires in the United States – 2001", November 2002, p. 29.

Cutting Torch Heats Metal Bolts, Igniting Wooden Structure, Georgia
A fire damaged an unoccupied university office building under renovation when a worker using a cutting torch to remove metal stairs unintentionally started a chain of events that led to a concealed fire in a wall space. The fire burned undetected, spreading to the third floor and attic.

Built in 1901, the three-story structure was constructed of heavy timber with a brick veneer measuring 9,000 feet (836 meters) per floor. It had been used for office space until the renovation project began. All the fire detection and suppression systems had been disabled or removed during construction, and only temporary, power remained in part of the building.

The fire department received a 911 call at 6:28 p.m. from a passerby reporting the fire using their cell phone. Firefighters responded to find heavy smoke and flames coming from the third floor and attic of the building. As firefighters from two departments began a defensive attack, a second alarm was sounded. It took eight engines, two truck companies, two squads, and numerous support staff to extinguish the blaze.
The fire started in a wall void as a result of a worker's removal of metal bolts from a third-floor stairwell by use of a cutting torch. A small fire occurred during his work, but he said that he had extinguished it with a bucket of water, then left for the day about an hour later. There was no evidence of fire or smoke when he left.

Investigators determined that the cutting torch had heated the metal bolts, which then conducted heat to wooden structural members inside the wall space. The resulting fire then smoldered for a while. Oxygen supplied primarily through the roof vents, appears to have helped the flames spread from the concealed spaces to the attic.

The building, which was valued at more than $1 million, was a total loss. Contents losses and injuries weren't reported

Kenneth J. Tremblay, 2001, "Firewatch", *NFPA Journal*, May/June, 26.