STRUCTURE FIRES IN EDUCATIONAL PROPERTIES

Jennifer D. Flynn

August 2009

National Fire Protection Association
Fire Analysis and Research Division

STRUCTURE FIRES IN EDUCATIONAL PROPERTIES

Jennifer D. Flynn

August 2009

National Fire Protection Association
Fire Analysis and Research Division

Abstract

In 2003-2006, U.S. fire departments responded to an estimated average of 6,650 structure fires in educational properties, annually. These fires caused an annual average of 88 civilian fire injuries and $90 million in direct property damage. There were no civilian fire deaths due to structure fires reported in these properties during this time period. Educational properties include day-care centers, public, private or parochial boarding schools, trade or business schools, and colleges or universities, excluding dormitories, fraternity or sororities houses. Fires in educational properties accounted for 1.2% of all reported structure fires in 2003-2006. 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, school, educational properties, day-care centers

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 call617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7443.

Copies of this analysis are available from:

National Fire Protection Association
One-Stop Data Shop
1 Batterymarch Park
Quincy, MA 02169-7471
www.nfpa.org
e-mail: osds@nfpa.org
phone: 617-984-7443

NPFA No. PKG14

Contents

List of Tables and Figures

List of Tables and Figures
(continued)

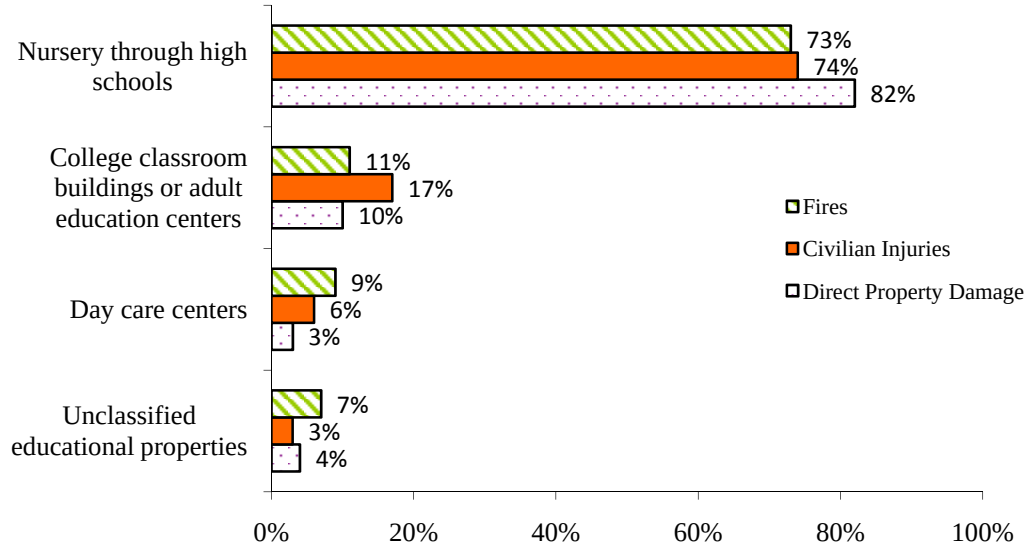
One-Stop Data Shop
Fire Analysis and Research Division
One Batterymarch Park, Quincy, MA 02169
Email: osds@nfpa.org
www.nfpa.org

Structure Fires in Educational Properties

U.S. fire departments responded to an estimated average of **6,650** structure fires in educational properties in 2003-2006, annually. These fires caused annual averages of **88** civilian fire injuries and **$90 million** in direct property damage.

These estimates are derived from the U.S. Fire Administration National Fire Incident Reporting System (NFIRS) Version 5.0 and NFPA's annual fire department experience survey. Educational property includes Preschool through high schools, adult education centers, and day-care centers.

Structure Fires in Educational Properties, by Occupancy Type
2003-2006 Annual Averages

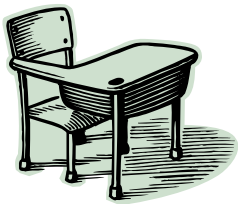


In 2006, 34% of structure fires in educational properties occurred in structures with automatic suppression systems present.

- During 2003-2006, where automatic suppression equipment was present and known, 88% of AES systems in structure fires in these properties were sprinklers.

- Of these fires, 93% of systems operated when the fire was large enough to activate them. When the automatic suppression system failed and the fire was large enough to activate it,
  - 48% of failures were due to the system being shut off
  - 33% were due to manual intervention which defeated the system

One-Stop Data Shop
Fire Analysis and Research Division
One Batterymarch Park, Quincy, MA 02169
Email: osds@nfpa.org
www.nfpa.org



Educational Property Structure Fires by Facility Type

The following estimates are annual averages for 2003-2006

Day Care Centers

- **600** structure fires
- **5** civilian injuries
- **$3.1** million in direct property damage

- **Leading Causes**
  - Cooking equipment
  - Heating equipment
  - Electrical distribution and lighting equipment
- **Area of Origin**
  - Kitchen or cooking area
  - Bathroom
  - Bathroom
- **Item 1st Ignited**
  - Cooking materials including food
- **8%** of fires in these properties extended beyond room of origin
- **Peak Times**
  - During week
  - 9 a.m.-Noon

Preschools through Grades 12

- **4,870** structure fires
- **65** civilian injuries
- **$74.2** million in direct property damage

- **Leading Causes**
  - Contained trash or rubbish fire
  - Intentional
  - Cooking equipment
- **Area of Origin**
  - Contained trash or rubbish fire
  - Kitchen or cooking area
  - Bathroom
- **Item 1st Ignited**
  - Trash or rubbish
- **6%** of fires in these properties extended beyond room of origin
- **Peak Times**
  - Weekdays
  - 11 a.m.- 2 p.m.

College Classroom Buildings and Adult Ed. Centers

- **750** structure fires
- **15** civilian injuries
- **$9.4** million in direct property damage

- **Leading Causes**
  - Cooking equipment
  - Contained trash and rubbish
  - Intentional
- **Area of Origin**
  - Kitchen or cooking area
  - Contained trash or rubbish fire
  - Laboratory
- **Item 1st ignited**
  - Cooking materials, including food
- **5%** of fires in these properties extended beyond the room of origin
- **Peak Times**
  - During the week
  - 11 a.m.-8 p.m.

Structure Fires in Educational Properties

Educational properties include: public, private and parochial schools from nursery school through high school where students attend during the day only; public, private or parochial boarding schools; trade or business schools; and colleges or universities. Beginning with 1999, day-care centers and vocational rehabilitation centers with directed attendance are also included. Prior to Version 5.0 of NFIRS, they were considered institutional property. Only fires reported to municipal fire departments are included in these statistics. The report is broken into three subsections, (1) Day-Care Centers, (2) Nursery, Elementary, Middle, Junior, and High Schools, and (3) College Classroom Buildings and Adult Education Centers.

An estimated 6,650 structure fires were reported per year in 2003-2006.
During the four-year period of 2003-2006, an estimated average of 6,650 structure fires in educational properties was reported per year. These fires caused an annual average of 88 civilian fire injuries and $90 million in direct property damage. There were no civilian deaths reported in these properties during this time period. Table A provides a more detailed breakdown of losses by occupancy. Forty-two percent of these fires occurred in middle or high schools; 21% occurred in elementary schools, including kindergartens.

Table A. Structure Fires in Educational Properties 2003-2006 Annual Averages

	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Nursery school through high school	4,870	(73%)	0	(N/A)	65	(74%)	$74.2	(82%)
Preschool	*240*	*(4%)*	*0*	*(N/A)*	*2*	*(2%)*	*$0.9*	*(1%)*
Elementary school, including kindergarten	*1,390*	*(21%)*	*0*	*(N/A)*	*7*	*(8%)*	*$35.8*	*(40%)*
High school, junior high school, middle school	*2,820*	*(42%)*	*0*	*(N/A)*	*54*	*(61%)*	*$34.6*	*(38%)*
Unclassified non-adult school	*420*	*(6%)*	*0*	*(N/A)*	*2*	*(3%)*	*$2.9*	*(3%)*
Adult education center or college classroom	750	(11%)	0	(N/A)	15	(17%)	$9.4	(10%)
Day-care centers	600	(9%)	0	(N/A)	5	(6%)	$3.1	(3%)
Unclassified educational properties	430	(7%)	0	(N/A)	3	(3%)	$3.2	(4%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

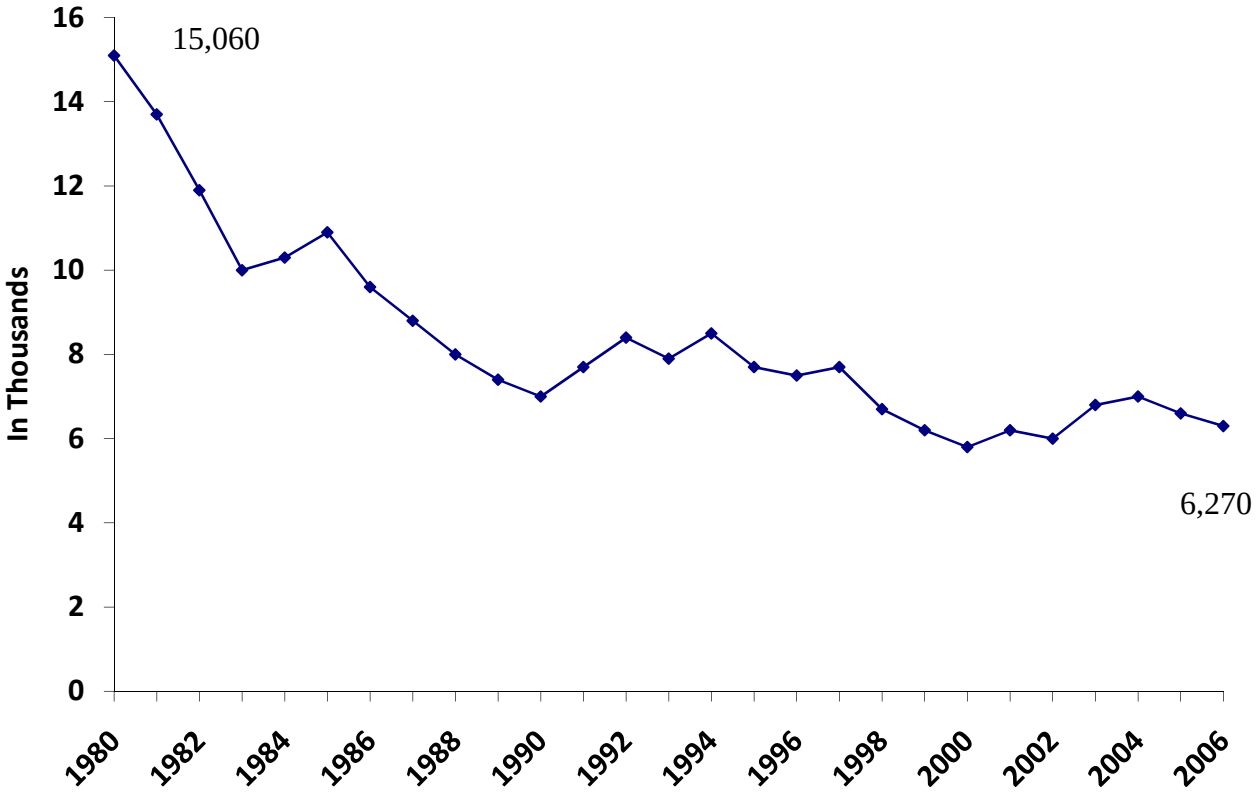
In 2006, 34% of structure fires in these properties occurred in structures with automatic suppression systems present. During 2003-2006, where automatic suppression equipment was present and known, 88% of AES systems in structure fires in these properties were sprinklers. Of these fires, 93% of systems operated when the fire was large enough to activate them. When the automatic suppression system failed and the fire was large enough to activate it, 48% of failures were due to the

system being shut off and 33% were due to manual intervention which defeated the system.[1] See NFPA's report, *U.S. Sprinklers and Other Automatic Fire Extinguishing Equipment* for more information.

Since 1980, these structure fires fell 58%.
As shown in Table 1 and Figure 1, structure fires in educational properties fell 58% from 15,060 in 1980 to 6,270 in 2006. In comparison, structure fires of all types declined 51% from 1980 to 2006.

At least some of the variation in fires since 1998 may be related to changes in reporting, including the change to NFIRS Version 5.0 which made it easier to document certain types of confined fires, such as cooking and rubbish fires.

Figure 1. Structure Fires in Educational Properties, 1980-2006



Source: NFIRS and NFPA Survey

Historic fires are reminders to practice fire safety in schools.
Today, most school children practice escaping from the classroom building in scheduled fire drills and it is almost unheard of for a child to die in a school fire.

[1] John R. Hall, Jr., *U.S. Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment*, Division of Fire Analysis and Research, January 2009.

Three devastating fires in the last century demonstrate the importance of maintaining fire safety in these buildings. A 1937 gas explosion in the New London, Texas gas explosion killed 294 people. The 1908 Lakeview Grammar School fire in Collinwood, Ohio, claimed 175 lives and the 1958 fire in Our Lady of Angels Grade School in Chicago, Illinois, killed 95 people.

Additional information sources.

An NFPA fire investigation report was done on a 1997 school fire in Pangnirtung, Canada. This report can be ordered through the NFPA library. Section 20, chapter 12 "Educational Occupancies," by Alex L. Szachnowicz and chapter 13, "Day-Care Occupancies" by Catherine Stashak, in the 20th edition of the NFPA *Fire Protection Handbook*, describes some of the special fire safety concerns for these properties. The Fire Analysis and Research Division offers a report on fires in dormitories and fraternity and sorority houses. This report is free to members and can be downloaded from http://nfpa.org/research.

Table 1. Structure Fires in Educational Properties by Year: 1980-2006

Year	Fires	Civilian Deaths	Civilian Injuries	Direct Property Damage (in Millions) As Reported	Direct Property Damage (in Millions) In 2006 Dollars
1980	15,060	4	173	$104	$255
1981	13,720	0	362	$139	$308
1982	11,930	5	287	$87	$182
1983	10,000	0	170	$61	$123
1984	10,280	0	171	$97	$188
1985	10,920	0	168	$112	$210
1986	9,570	7	333	$82	$151
1987	8,810	11	149	$109	$193
1988	7,970	0	85	$118	$201
1989	7,410	2	226	$93	$151
1990	7,010	2	138	$98	$151
1991	7,690	0	200	$78	$115
1992	8,440	0	153	$79	$114
1993	7,940	0	192	$110	$153
1994	8,490	0	188	$102	$139
1995	7,720	2	187	$109	$144
1996	7,510	1	209	$84	$108
1997	7,700	3	174	$48	$60
1998	6,680	0	122	$70	$87
1999	6,240	0	169	$39	$47
2000	5,790	0	111	$112	$131
2001	6,180	0	68	$76	$87
2002	5,990	0	107	$161	$180
2003	6,770	0	121	$60	$66
2004	6,990	0	67	$79	$84
2005	6,570	0	85	$99	$102
2006	6,270	0	77	$119	$119

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. NFIRS 5.0, first introduced in 1999, instituted major changes in the coding rules and definitions. The 1999-2006 single-year estimates are based on NFIRS Version 5.0 data only. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars.

Source: NFIRS and NFPA survey. Inflation adjustments were based on the consumer price index found in the U.S. Census Bureau's *Statistical Abstract of the United States: 2006*, "Table 705, Purchasing Power of the Dollar."

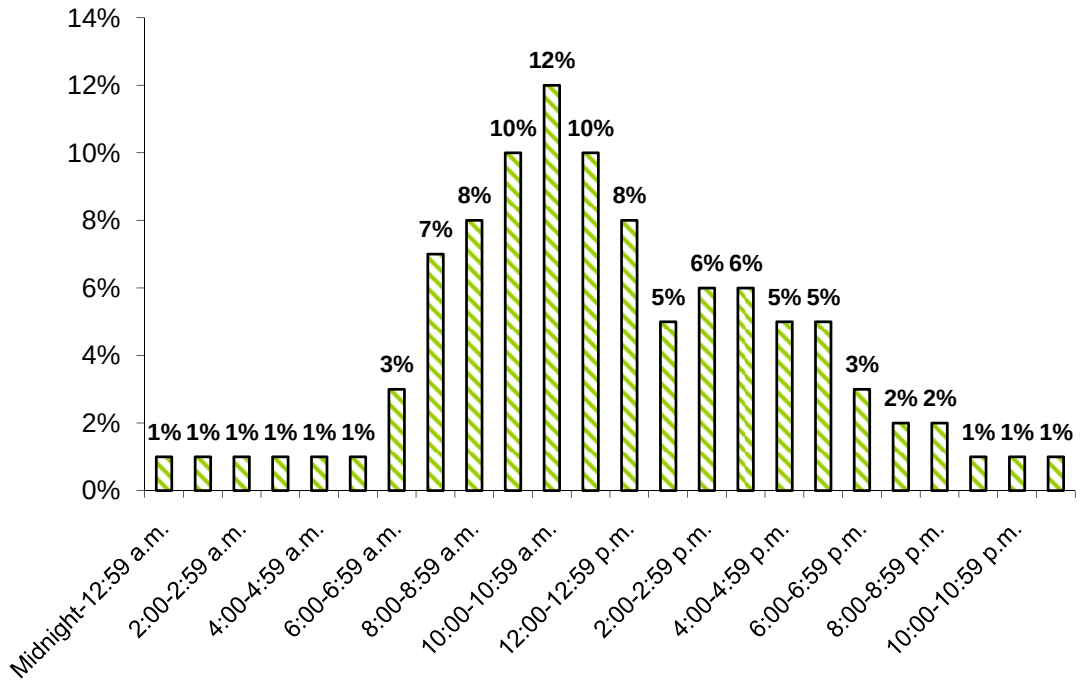
Structure Fires in Day-Care Centers

This analysis examines reported structure fires in day-care centers, classified as property use codes 250-256 in the National Fire Incident Response System, Version 5.0.

An estimated 600 structure fires involving day-care centers were reported per year in 2003-2006.
During the four-year period of 2003-2006, an estimated average of 600 structure fires day-care centers were reported per year. These fires caused an annual average of 5 civilian fire injuries and $3.1 million in direct property damage. There were no civilian deaths reported in these properties during this time period.

0.1% of all reported structure fires occurred in college day-care centers.
During 2003-2006, the 600 fires in day-care centers accounted for 0.1% of the 520,100 structure fires, none of the 3,130 civilian structure fire deaths, 0.03% of the 15,200 civilian structure fire injuries, and 0.03% of the $9 billion in direct property loss.

Figure 1A. Structure Fires in Day-Care Centers by Time of Day 2003-2006 Annual Averages



Source: NFIRS and NFPA Survey

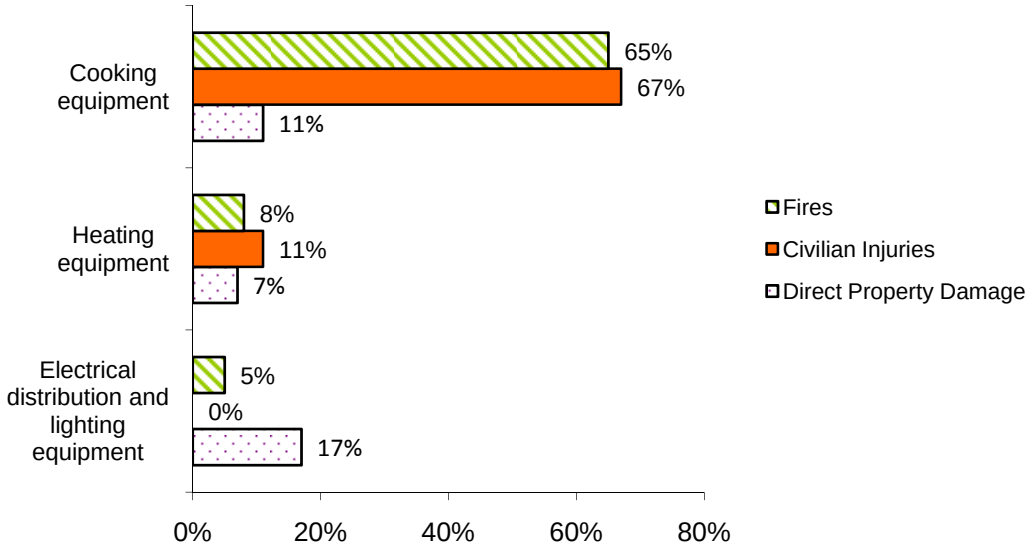
More than half of fires in these properties occur between the hours of 7 a.m. and 1 p.m., peaking between 9 a.m. and Noon.
Tables 1A-3A show reported structure fires in these properties by month, day of week and alarm time, respectively. October is the peak month for fires in day-care centers. Structure fires in

these properties were much more common on weekdays than weekends. Figure 1A shows that 71% of fires in day-care centers occurred between 7 a.m. and 4 p.m.

Cooking equipment was the leading cause of structure fires in day-care centers.
Figure 2A and Table 4A show the leading causes of fires in these properties with data summarized from several NFIRS fields. In some cases, the equipment involved in ignition is most relevant; heat source, the field "cause," and factor contributing to ignition also provide relevant information. The causes shown in this table are not mutually exclusive when they have been pulled from different fields. More detailed information on equipment involved in ignition may be found in Table 5A; more information on heat source is in Table 6A.

Almost two of every three (65%) structure fires in day-care centers were cooking equipment fires, including 59% which were reported as confined to cooking equipment. Another 8% of these fires were heating equipment fires, including 5% which were reported as confined heating equipment. Another 5% of fires in these properties were caused by electrical distribution and lighting equipment. (See Table 6A.)

Figure 2A. Leading Causes of Structure Fires in Day-Care Centers 2003-2006



The kitchen or cooking area was the leading are of origin for day-care structure fires.
Six percent of the fires started in kitchens or cooking areas; it is likely that most of the confined cooking fires (59%) also started in these areas, although causal information, including area of origin, is not routinely collected for confined fires. Four percent of day-care structure fires began in a bathroom. (See Table 7A.)

Cooking materials or food was the leading item first ignited in day-care center structure fires.
Cooking materials or food was reported as the item first ignited in 3% of structure fires in day-care centers. Confined cooking equipment fires presumably involved the ignition of food or cooking materials and resulted in 59% of these fires. Electrical wiring or cable insulation was the leading item first ignited in fires that were not reported as contained. (See Table 8A.)

Most fires in these properties were small.
Sixty-six percent of the reported fires in day-care centers were confined or contained fires. Version 5.0 of NFIRS introduced shorter reporting for cooking fires confined to the vessel, fires confined to chimney or flues, to incinerators, fuel burners or boilers, and contained trash or rubbish fires with no flame damage to the structure.

In addition to the 66% of fires reported as confined or contained, 17% were confined to the object of origin. Only 9% spread beyond the room of origin. (See Table 9A.)

An annual average of 280 outside and other fires per year were reported at these properties.
During 2003-2006, an estimated annual average of 280 outside and other fires on college classroom building and adult education center property caused an average of $94,000 in direct property damage per year. An average of 50 vehicle fires reported on these properties caused an average of $170,000 in direct property damage per year. No civilian fire deaths or injuries resulted from any outside and other or vehicle fires on these properties that were reported to NFIRS 5.0.

Table 1A. Structure Fires in Day-Care Centers, by Month
2003-2006 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	50	(8%)	0	(N/A)	1	(11%)	$0.2	(8%)
February	40	(7%)	0	(N/A)	0	(8%)	$0.1	(3%)
March	60	(9%)	0	(N/A)	1	(11%)	$0.4	(11%)
April	50	(8%)	0	(N/A)	0	(9%)	$0.2	(7%)
May	40	(7%)	0	(N/A)	0	(9%)	$0.3	(9%)
June	50	(8%)	0	(N/A)	0	(9%)	$0.3	(9%)
July	50	(9%)	0	(N/A)	0	(0%)	$0.2	(8%)
August	50	(8%)	0	(N/A)	0	(0%)	$0.1	(5%)
September	40	(7%)	0	(N/A)	0	(8%)	$0.3	(8%)
October	70	(11%)	0	(N/A)	1	(11%)	$0.5	(15%)
November	50	(9%)	0	(N/A)	0	(0%)	$0.1	(3%)
December	50	(9%)	0	(N/A)	1	(21%)	$0.4	(14%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)
Average	50	(8%)	0	(N/A)	0	(8%)	$0.3	(8%)

Table 2A. Structure Fires in Day-Care Centers, by Day of Week
2003-2006 Annual Averages

Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	30	(5%)	0	(N/A)	0	(0%)	$0.3	(9%)
Monday	100	(16%)	0	(N/A)	0	(9%)	$0.8	(25%)
Tuesday	120	(20%)	0	(N/A)	0	(9%)	$0.2	(8%)
Wednesday	110	(18%)	0	(N/A)	1	(18%)	$0.6	(19%)
Thursday	100	(17%)	0	(N/A)	2	(32%)	$0.2	(5%)
Friday	100	(17%)	0	(N/A)	2	(31%)	$0.3	(11%)
Saturday	40	(6%)	0	(N/A)	0	(0%)	$0.7	(23%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)
Average	90	(14%)	0	(N/A)	1	(14%)	$0.4	(14%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 3A. Structure Fires in Day-Care Centers, by Alarm Time
2003-2006 Annual Averages

Time	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight-12:59 a.m.	10	(1%)	0	(N/A)	0	(0%)	$0.2	(7%)
1:00-1:59 a.m.	0	(1%)	0	(N/A)	0	(0%)	$0.2	(6%)
2:00-2:59 a.m.	0	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
3:00-3:59 a.m.	10	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
4:00-4:59 a.m.	10	(1%)	0	(N/A)	0	(8%)	$0.4	(13%)
5:00-5:59 a.m.	10	(1%)	0	(N/A)	0	(0%)	$0.3	(11%)
6:00-6:59 a.m.	20	(3%)	0	(N/A)	0	(0%)	$0.2	(5%)
7:00-7:59 a.m.	40	(7%)	0	(N/A)	1	(11%)	$0.1	(3%)
8:00-8:59 a.m.	50	(8%)	0	(N/A)	0	(0%)	$0.0	(0%)
9:00-9:59 a.m.	60	(10%)	0	(N/A)	0	(0%)	$0.1	(3%)
10:00-10:59 a.m.	70	(12%)	0	(N/A)	1	(21%)	$0.1	(3%)
11:00-11:59 a.m.	60	(10%)	0	(N/A)	1	(20%)	$0.0	(0%)
12:00-12:59 p.m.	50	(8%)	0	(N/A)	0	(0%)	$0.1	(2%)
1:00-1:59 p.m.	30	(5%)	0	(N/A)	0	(0%)	$0.0	(1%)
2:00-2:59 p.m.	40	(6%)	0	(N/A)	1	(11%)	$0.0	(1%)
3:00-3:59 p.m.	40	(6%)	0	(N/A)	0	(0%)	$0.1	(4%)
4:00-4:59 p.m.	30	(5%)	0	(N/A)	0	(9%)	$0.2	(7%)
5:00-5:59 p.m.	30	(5%)	0	(N/A)	0	(9%)	$0.2	(7%)
6:00-6:59 p.m.	20	(3%)	0	(N/A)	0	(9%)	$0.1	(3%)
7:00-7:59 p.m.	10	(2%)	0	(N/A)	0	(0%)	$0.1	(2%)
8:00-8:59 p.m.	10	(2%)	0	(N/A)	0	(0%)	$0.0	(1%)
9:00-9:59 p.m.	10	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
10:00-10:59 p.m.	10	(1%)	0	(N/A)	0	(0%)	$0.2	(7%)
11:00-11:59 p.m.	0	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)
Average	20	(4%)	0	(N/A)	0	(4%)	$0.1	(4%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 4A Leading Causes of Structure Fires in Day-Care Centers
2003-2006 Annual Averages

Leading Causes	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	390	(65%)	0	(N/A)	3	(67%)	$0.3	(11%)
Confined cooking equipment	*350*	*(59%)*	*0*	*(N/A)*	*1*	*(19%)*	*$0.0*	*(1%)*
Identified cooking equipment	*40*	*(6%)*	*0*	*(N/A)*	*2*	*(48%)*	*$0.3*	*(10%)*
Heating equipment	50	(8%)	0	(N/A)	1	(11%)	$0.2	(7%)
Confined heating equipment	*30*	*(5%)*	*0*	*(N/A)*	*1*	*(11%)*	*$0.0*	*(0%)*
Identified heating equipment	*20*	*(4%)*	*0*	*(N/A)*	*0*	*(0%)*	*$0.2*	*(7%)*
Electrical distribution and lighting equipment	30	(5%)	0	(N/A)	0	(0%)	$0.5	(17%)
Clothes dryer or washer	20	(4%)	0	(N/A)	0	(0%)	$0.0	(0%)
Intentional	20	(3%)	0	(N/A)	0	(0%)	$0.4	(13%)
Contained trash or rubbish fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)

N/A- Not applicable because total is zero.

Note: These are the leading causes, obtained from the following list: intentional (from the NFIRS field "cause"); playing with fire (from factor contributing to ignition); confined heating (including confined chimney and confined fuel burner or boiler fires), confined cooking, and contained trash or rubbish from incident type; identified heating, identified cooking, clothes dryer or washer, torch (including burner and soldering iron), electrical distribution and lighting equipment, medical equipment, and electronic, office or entertainment equipment (from equipment involved in ignition); smoking materials, candles, lightning, and spontaneous combustion or chemical reaction (from heat source), and mobile property involved (from mobile property involved in ignition). The statistics on smoking materials and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material. Exposure fires include fires with an exposure number greater than zero, as well as fires identified by heat source or factor contributing to ignition when no equipment was involved in ignition and the fires were not intentionally set. Because contained trash or rubbish fires are a scenario without causal information on heat source, equipment involved, or factor contributing to ignition, they are shown at the bottom of the table if they account for at least 2% of the fires. Casual information is not routinely collected for these incidents. The same fire can be listed under multiple causes, based on multiple data elements. Details on handling of unknown, partial unknowns, and other underspecified codes may be found in the Appendix.

These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 5A. Structure Fires in Day-Care Centers, by Equipment Involved in Ignition
2003-2006 Annual Averages

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	350	(59%)	0	(N/A)	1	(19%)	$0.0	(1%)
No equipment involved	40	(6%)	0	(N/A)	0	(0%)	$1.3	(41%)
Fan	30	(5%)	0	(N/A)	1	(22%)	$0.3	(9%)
Range	30	(5%)	0	(N/A)	2	(48%)	$0.1	(2%)
Confined fuel burner or boiler fire	20	(4%)	0	(N/A)	1	(11%)	$0.0	(0%)
Clothes dryer	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Contained trash or rubbish fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Wiring switch or outlet	10	(2%)	0	(N/A)	0	(0%)	$0.5	(17%)
Lamp, bulb, or lighting	10	(2%)	0	(N/A)	0	(0%)	$0.0	(0%)
Fixed or portable space heater	10	(2%)	0	(N/A)	0	(0%)	$0.0	(1%)
Water heater	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Central heat, furnace or boiler	10	(1%)	0	(N/A)	0	(0%)	$0.2	(5%)
Air conditioner	0	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Washing machine	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Cord or plug	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Oven or rotisserie	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Motor	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Other known equipment	20	(4%)	0	(N/A)	0	(0%)	$0.6	(19%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the equipment involved was unknown or not reported have been allocated proportionally among fires with known equipment involved. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 6A. Structure Fires in Day-Care Centers, by Heat Source
2003-2006 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	350	(59%)	0	(N/A)	1	(19%)	$0.0	(1%)
Unclassified heat from powered equipment	60	(10%)	0	(N/A)	2	(45%)	$0.7	(22%)
Arcing	40	(6%)	0	(N/A)	0	(0%)	$1.1	(34%)
Radiated, conducted heat from operating equipment	40	(6%)	0	(N/A)	0	(0%)	$0.2	(7%)
Confined fuel burner or boiler fire	20	(4%)	0	(N/A)	1	(11%)	$0.0	(0%)
Contained trash or rubbish fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified heat source	10	(2%)	0	(N/A)	0	(0%)	$0.1	(2%)
Unclassified hot or smoldering object	10	(2%)	0	(N/A)	1	(13%)	$0.2	(5%)
Spark, ember or flame from operating equipment	10	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Candle	10	(1%)	0	(N/A)	1	(12%)	$0.1	(4%)
Smoking materials	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Match	0	(1%)	0	(N/A)	0	(0%)	$0.1	(2%)
Lightning	0	(1%)	0	(N/A)	0	(0%)	$0.1	(3%)
Hot ember or ash	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Other known heat source	10	(2%)	0	(N/A)	0	(0%)	$0.5	(16%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 7A. Structure Fires in Day-Care Centers, by Area of Origin
2003-2006 Annual Average

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	350	(59%)	0	(N/A)	1	(19%)	$0.0	(1%)
Kitchen or cooking area	40	(6%)	0	(N/A)	1	(29%)	$0.2	(8%)
Lavatory, bathroom, locker room or check room	20	(4%)	0	(N/A)	0	(9%)	$0.2	(5%)
Confined fuel burner or boiler fire	20	(4%)	0	(N/A)	1	(11%)	$0.0	(0%)
Laundry room or area	20	(3%)	0	(N/A)	1	(11%)	$0.1	(3%)
Contained trash or rubbish fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Small assembly area, less than 100 person capacity	10	(2%)	0	(N/A)	0	(0%)	$0.2	(7%)
Attic or ceiling or roof assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$0.4	(13%)
Unclassified function area	10	(1%)	0	(N/A)	0	(8%)	$0.2	(5%)
Heating equipment room	10	(1%)	0	(N/A)	0	(0%)	$0.3	(10%)
Exterior roof surface	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified storage area	10	(1%)	0	(N/A)	0	(0%)	$0.2	(6%)
Bedroom	10	(1%)	0	(N/A)	1	(11%)	$0.2	(5%)
Exterior wall surface	10	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Duct for HVAC, cable, exhaust, heating, or air conditioner	10	(1%)	0	(N/A)	0	(0%)	$0.1	(2%)
Office	10	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
Ceiling or floor assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$0.1	(2%)
Wall assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified outside area	0	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Hallway, corridor, mall	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Lobby or entrance way	0	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Other known area	30	(6%)	0	(N/A)	0	(0%)	$0.7	(24%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the area or origin was unknown or not reported have been allocated proportionally among fires with known area of origin. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 8A. Structure Fires in Day-Care Centers, by Item First Ignited
2003-2006 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	350	(59%)	0	(N/A)	1	(19%)	$0.0	(1%)
Electrical wire or cable insulation	40	(6%)	0	(N/A)	0	(0%)	$0.1	(4%)
Confined fuel burner or boiler fire	20	(4%)	0	(N/A)	1	(11%)	$0.0	(0%)
Cooking materials, including food	20	(3%)	0	(N/A)	1	(14%)	$0.0	(1%)
Contained trash or rubbish fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Appliance housing or casing	10	(2%)	0	(N/A)	0	(0%)	$0.1	(3%)
Unclassified item	10	(2%)	0	(N/A)	0	(0%)	$0.0	(1%)
Structural member or framing	10	(2%)	0	(N/A)	0	(0%)	$0.5	(15%)
Interior ceiling cover or finish	10	(1%)	0	(N/A)	1	(11%)	$0.0	(1%)
Exterior wall covering or finish	10	(1%)	0	(N/A)	1	(10%)	$0.0	(1%)
Mattress and bedding material	10	(1%)	0	(N/A)	0	(0%)	$0.1	(5%)
Insulation within structural area	10	(1%)	0	(N/A)	0	(0%)	$0.4	(13%)
Unclassified structural component or finish	10	(1%)	0	(N/A)	0	(0%)	$0.5	(17%)
Clothing	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Flammable or combustible liquid or gas, filter or piping	10	(1%)	0	(N/A)	1	(14%)	$0.3	(9%)
Cabinetry	10	(1%)	0	(N/A)	0	(0%)	$0.1	(2%)
Exterior roof covering or finish	10	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Linen other than bedding	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Box, carton, bag, basket, barrel	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Dust, fiber, lint, including sawdust or excelsior	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified soft goods, or wearing apparel	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Magazine, newspaper, writing paper	0	(1%)	0	(N/A)	0	(0%)	$0.1	(3%)
Rubbish, trash, or waste	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Interior wall covering. excluding drapes	0	(1%)	0	(N/A)	0	(0%)	$0.1	(4%)
Unclassified storage supplies	0	(1%)	0	(N/A)	0	(0%)	$0.0	(1%)
Other known item	20	(4%)	0	(N/A)	1	(21%)	$0.6	(20%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the item first ignited was unknown or not reported have been allocated proportionally among fires with known item first ignited. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 9A. Structure Fires in Day-Care Centers, by Extent of Flame Damage
2003-2006 Annual Averages

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined or contained fire	390	(66%)	0	(N/A)	2	(30%)	$0.0	(1%)
Confined to object of origin	100	(17%)	0	(N/A)	2	(36%)	$0.4	(12%)
Confined to room of origin	50	(9%)	0	(N/A)	1	(23%)	$0.3	(8%)
Confined to floor of origin	10	(2%)	0	(N/A)	0	(0%)	$0.7	(21%)
Confined to building of origin	40	(6%)	0	(N/A)	1	(11%)	$1.6	(50%)
Beyond building of origin	0	(0%)	0	(N/A)	0	(0%)	$0.2	(7%)
Total	600	(100%)	0	(N/A)	5	(100%)	$3.1	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

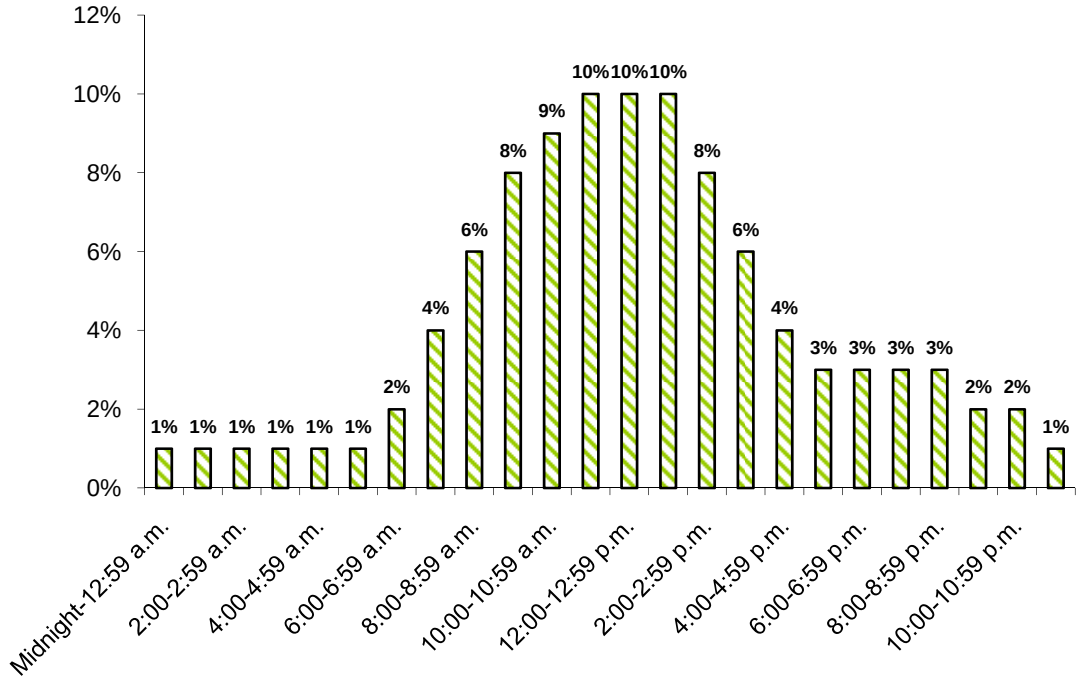
Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools

This analysis examines reported structure fires in nursery, elementary, middle, junior, and high schools, classified as property use codes 210-215 in the National Fire Incident Response System, Version 5.0.

An estimated 4,870 structure fires involving pre-school through grade 12 buildings were reported per year in 2003-2006.
During the four-year period of 2003-2006, an estimated average of 4,870 structure fires in these properties were reported per year. These fires caused an annual average of 65 civilian fire injuries and $74.2 million in direct property damage. There were no civilian deaths reported in these properties during this time period.

0.9% of all reported structure fires occurred in nursery, elementary, middle, junior, and high school buildings.
During 2003-2006, the 4,870 structure fires in pre-school through grade 12 buildings accounted for 0.9% of the 520,100 structure fires, none of the 3,130 civilian structure fire deaths, 0.4% of the 15,200 civilian structure fire injuries, and 0.8% of the $9 billion in direct property loss.

Figure 1B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools, by Time of Day 2003-2006 Annual Averages



Source: NFIRS and NFPA Survey

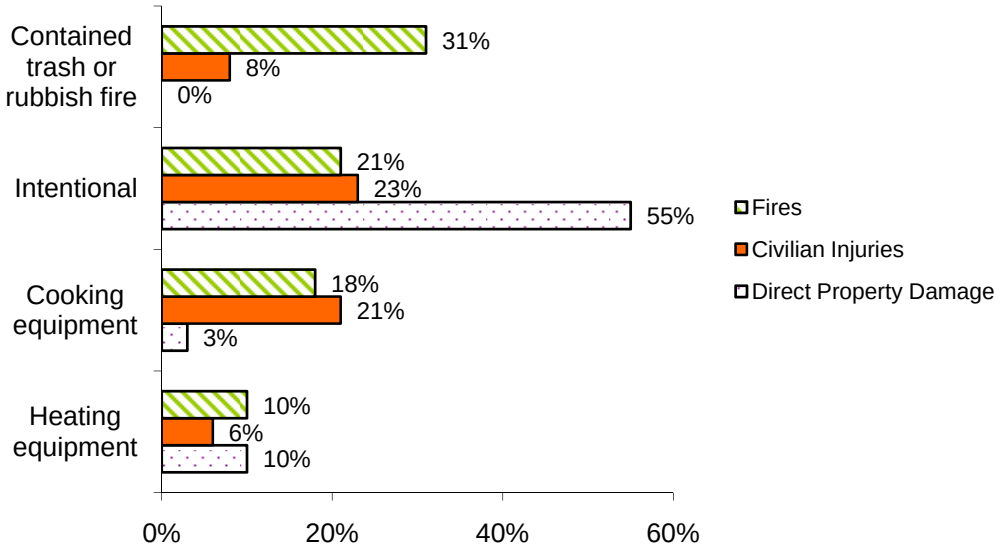
Two out of every three (67%) structure fires in these properties occur between the hours of 8 a.m. and 4 p.m.
Tables 1B-3B show reported structure fires in these properties by month, day of week and alarm time, respectively. Fewer structure fires are reported in these properties during the summer

months. Structure fires in these properties were much more common on weekdays than weekends. Figure 1B shows that 67% of fires in educational properties occurred between 8 a.m. and 4 p.m., peaking during normal lunch time hours (11 a.m.-2 p.m.)

Many of the fires in buildings that house preschool through grade 12 are intentionally set. Figure 2B and Table 4B show the leading causes of fires in these properties with data summarized from several NFIRS fields. In some cases, the equipment involved in ignition is most relevant; heat source, the field "cause," and factor contributing to ignition also provide relevant information. The causes shown in this table are not mutually exclusive when they have been pulled from different fields. More detailed information on equipment involved in ignition may be found in Table 5B; more information on heat source is in Table 6B.

Almost one-third (31%) of the structure fires in buildings that house pre-school through grade 12 were contained trash or rubbish fires. Causal data is not typically collected for fires reported as contained or confined, however an analysis of contained trash or rubbish fires with cause data reported show that the leading cause of these fires was intentional. Another 21% of fires in these properties were reported as intentional. Intentionally set fires resulted in more than half of the direct property damage in schools. Eighteen percent of fires in these properties were caused by cooking equipment, which includes 16% of fires reported as confined cooking equipment fires. (See Table 6B.)

Figure 2B. Leading Causes of Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools, 2003-2006



The bathroom was the leading area of origin (11%) excluding fires reported as confined fires. Eleven percent of the fires started in bathrooms, lavatories, or locker rooms. Although causal information, including area of origin, is not routinely collected for confined fires an analysis of the fires reported as contained to trash and rubbish with a reported area of origin showed that the bathroom was the leading area of origin for these fires as well. (See Table 7B.)

Rubbish, trash, or waste was the item first ignited in 35% of these fires.
Rubbish, trash or waste was the item first ignited in 4% of the structure fires in these properties. Although this information is not routinely collected for confined or contained fires, the contained trash or rubbish fires (31%) almost certainly also began with trash or rubbish. (See Table 8B.)

Most fires in these properties were small.
Fifty-three percent of the reported fires in preschool through grade 12 buildings were confined or contained fires. Version 5.0 of NFIRS introduced shorter reporting for cooking fires confined to the vessel, fires confined to chimney or flues, to incinerators, fuel burners or boilers, and contained trash or rubbish fires with no flame damage to the structure.

In addition to the 53% of fires reported as confined or contained, 28% were confined to the object of origin. Only 6% spread beyond the room of origin. (See Table 9B.)

An annual average of 7,730 outside and other fires per year were reported at these properties.
During 2003-2006, an estimated annual average of 7,730 outside and other fires on college classroom building and adult education center property caused an average of 5 civilian injuries and $1.3 million in direct property damage per year. An average of 840 vehicle fires reported on these properties caused an average 3 civilian injuries and $2.5 million in direct property damage per year. No civilian fire deaths resulted from any outside and other or vehicle fires on these properties that were reported to NFIRS 5.0.

Table 1B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Month 2003-2006 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	460	(10%)	0	(N/A)	8	(12%)	$3.6	(5%)
February	430	(9%)	0	(N/A)	6	(10%)	$7.7	(10%)
March	500	(10%)	0	(N/A)	6	(9%)	$4.9	(7%)
April	470	(10%)	0	(N/A)	3	(4%)	$6.4	(9%)
May	490	(10%)	0	(N/A)	5	(8%)	$2.9	(4%)
June	300	(6%)	0	(N/A)	0	(1%)	$5.3	(7%)
July	260	(5%)	0	(N/A)	1	(2%)	$11.1	(15%)
August	240	(5%)	0	(N/A)	1	(2%)	$18.4	(25%)
September	360	(7%)	0	(N/A)	20	(31%)	$3.5	(5%)
October	500	(10%)	0	(N/A)	6	(9%)	$3.2	(4%)
November	450	(9%)	0	(N/A)	4	(6%)	$3.2	(4%)
December	400	(8%)	0	(N/A)	5	(7%)	$4.3	(6%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)
Average	410	(8%)	0	(N/A)	5	(8%)	$6.2	(8%)

Table 2B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Day of Week 2003-2006 Annual Averages

Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	320	(7%)	0	(N/A)	0	(0%)	$9.0	(12%)
Monday	820	(17%)	0	(N/A)	11	(17%)	$14.1	(19%)
Tuesday	890	(18%)	0	(N/A)	8	(12%)	$9.4	(13%)
Wednesday	880	(18%)	0	(N/A)	11	(17%)	$6.3	(9%)
Thursday	870	(18%)	0	(N/A)	10	(16%)	$25.5	(34%)
Friday	780	(16%)	0	(N/A)	25	(39%)	$6.4	(9%)
Saturday	300	(6%)	0	(N/A)	0	(0%)	$3.5	(5%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)
Average	700	(14%)	0	(N/A)	9	(14%)	$10.6	(14%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 3B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools, by Alarm Time
2003-2006 Annual Averages

Time	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight-12:59 a.m.	70	(1%)	0	(N/A)	0	(1%)	$4.7	(6%)
1:00-1:59 a.m.	60	(1%)	0	(N/A)	0	(0%)	$1.7	(2%)
2:00-2:59 a.m.	50	(1%)	0	(N/A)	0	(1%)	$1.6	(2%)
3:00-3:59 a.m.	50	(1%)	0	(N/A)	0	(0%)	$4.0	(5%)
4:00-4:59 a.m.	40	(1%)	0	(N/A)	0	(0%)	$0.7	(1%)
5:00-5:59 a.m.	40	(1%)	0	(N/A)	0	(0%)	$2.0	(3%)
6:00-6:59 a.m.	100	(2%)	0	(N/A)	1	(1%)	$14.6	(20%)
7:00-7:59 a.m.	180	(4%)	0	(N/A)	1	(1%)	$0.9	(1%)
8:00-8:59 a.m.	290	(6%)	0	(N/A)	16	(25%)	$0.8	(1%)
9:00-9:59 a.m.	390	(8%)	0	(N/A)	13	(21%)	$1.2	(2%)
10:00-10:59 a.m.	440	(9%)	0	(N/A)	7	(10%)	$4.3	(6%)
11:00-11:59 a.m.	480	(10%)	0	(N/A)	7	(11%)	$1.8	(2%)
12:00-12:59 p.m.	480	(10%)	0	(N/A)	5	(8%)	$8.0	(11%)
1:00-1:59 p.m.	480	(10%)	0	(N/A)	7	(10%)	$2.1	(3%)
2:00-2:59 p.m.	400	(8%)	0	(N/A)	3	(4%)	$5.4	(7%)
3:00-3:59 p.m.	270	(6%)	0	(N/A)	3	(4%)	$3.9	(5%)
4:00-4:59 p.m.	190	(4%)	0	(N/A)	1	(1%)	$1.7	(2%)
5:00-5:59 p.m.	160	(3%)	0	(N/A)	0	(0%)	$0.5	(1%)
6:00-6:59 p.m.	150	(3%)	0	(N/A)	1	(2%)	$4.4	(6%)
7:00-7:59 p.m.	140	(3%)	0	(N/A)	0	(0%)	$2.4	(3%)
8:00-8:59 p.m.	120	(3%)	0	(N/A)	0	(0%)	$1.6	(2%)
9:00-9:59 p.m.	100	(2%)	0	(N/A)	0	(0%)	$1.6	(2%)
10:00-10:59 p.m.	100	(2%)	0	(N/A)	0	(0%)	$2.3	(3%)
11:00-11:59 p.m.	70	(1%)	0	(N/A)	0	(0%)	$1.6	(2%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)
Average	200	(4%)	0	(N/A)	3	(4%)	$3.1	(4%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 4B. Leading Causes of Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools 2003-2006 Annual Averages

Leading Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Contained trash or rubbish fire	1,490	(31%)	0	(N/A)	6	(8%)	$0.3	(0%)
Intentional	1,000	(21%)	0	(N/A)	15	(23%)	$40.5	(55%)
Cooking equipment	890	(18%)	0	(N/A)	14	(21%)	$2.0	(3%)
Confined cooking equipment	*790*	*(16%)*	*0*	*(N/A)*	*12*	*(18%)*	*$0.1*	*(0%)*
Identified cooking equipment	*100*	*(2%)*	*0*	*(N/A)*	*2*	*(3%)*	*$1.9*	*(3%)*
Heating equipment	480	(10%)	0	(N/A)	4	(6%)	$7.3	(10%)
Confined heating equipment	*290*	*(6%)*	*0*	*(N/A)*	*0*	*(0%)*	*$0.2*	*(0%)*
Identified heating equipment	*180*	*(4%)*	*0*	*(N/A)*	*4*	*(6%)*	*$7.1*	*(10%)*
Playing with heat source	290	(6%)	0	(N/A)	5	(8%)	$23.1	(31%)
Electrical distribution and lighting equipment	290	(6%)	0	(N/A)	12	(19%)	$13.1	(18%)
Clothes dryer or washer	130	(3%)	0	(N/A)	6	(9%)	$0.5	(1%)
Electronic, office or entertainment equipment	90	(2%)	0	(N/A)	0	(0%)	$3.7	(5%)
Shop tools and industrial equipment excluding torches, burners or soldering irons	90	(2%)	0	(N/A)	3	(5%)	$1.0	(1%)
Torch, burner or soldering iron	90	(2%)	0	(N/A)	3	(4%)	$0.3	(0%)

N/A- Not applicable because total is zero.

Note: These are the leading causes, obtained from the following list: intentional (from the NFIRS field "cause"); playing with fire (from factor contributing to ignition); confined heating (including confined chimney and confined fuel burner or boiler fires), confined cooking, and contained trash or rubbish from incident type; identified heating, identified cooking, clothes dryer or washer, torch (including burner and soldering iron), electrical distribution and lighting equipment, medical equipment, and electronic, office or entertainment equipment (from equipment involved in ignition); smoking materials, candles, lightning, and spontaneous combustion or chemical reaction (from heat source), and mobile property involved (from mobile property involved in ignition). The statistics on smoking materials and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material. Exposure fires include fires with an exposure number greater than zero, as well as fires identified by heat source or factor contributing to ignition when no equipment was involved in ignition and the fires were not intentionally set. Because contained trash or rubbish fires are a scenario without causal information on heat source, equipment involved, or factor contributing to ignition, they are shown at the bottom of the table if they account for at least 2% of the fires. Casual information is not routinely collected for these incidents. The same fire can be listed under multiple causes, based on multiple data elements. Details on handling of unknown, partial unknowns, and other underspecified codes may be found in the Appendix.

These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 5B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Equipment Involved in Ignition, 2003-2006 Annual Averages

Equipment Involved in Ignition	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Contained trash or rubbish fire	1,490	(31%)	0	(N/A)	6	(9%)	$0.3	(0%)
No equipment involved	990	(20%)	0	(N/A)	14	(22%)	$38.7	(52%)
Confined cooking fire	790	(16%)	0	(N/A)	12	(19%)	$0.1	(0%)
Confined fuel burner or boiler fire	270	(5%)	0	(N/A)	0	(0%)	$0.1	(0%)
Clothes dryer	120	(2%)	0	(N/A)	6	(9%)	$0.5	(1%)
Lamp, bulb, or lighting	110	(2%)	0	(N/A)	3	(5%)	$0.2	(0%)
Fixed or portable space heater	100	(2%)	0	(N/A)	0	(0%)	$6.0	(8%)
Air conditioner	90	(2%)	0	(N/A)	0	(0%)	$2.0	(3%)
Torch	80	(2%)	0	(N/A)	3	(4%)	$0.3	(0%)
Wiring switch or outlet	70	(1%)	0	(N/A)	6	(9%)	$7.4	(10%)
Fan	70	(1%)	0	(N/A)	0	(0%)	$2.8	(4%)
Power switch gear or overcurrent protection device	60	(1%)	0	(N/A)	3	(4%)	$4.8	(6%)
Central heat, furnace or boiler	40	(1%)	0	(N/A)	2	(3%)	$0.5	(1%)
Unclassified equipment involved in ignition	40	(1%)	0	(N/A)	0	(0%)	$0.1	(0%)
Computer	30	(1%)	0	(N/A)	0	(0%)	$2.8	(4%)
Range	30	(1%)	0	(N/A)	0	(0%)	$1.8	(2%)
Water heater	30	(1%)	0	(N/A)	2	(3%)	$0.5	(1%)
Portable cooking or warming equipment	30	(1%)	0	(N/A)	2	(3%)	$0.0	(0%)
Other known equipment	390	(8%)	0	(N/A)	6	(9%)	$5.3	(7%)
Other confined fire	50	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	4,870	(100%)	0	(N/A)	63	(100%)	$74.2	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the equipment involved was unknown or not reported have been allocated proportionally among fires with known equipment involved. NFPA treats fires in which EII=NNN and heat source is not in the range of 40-99 as an additional unknown. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 6B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Heat Source 2003-2006 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Contained trash or rubbish fire	1,490	(31%)	0	(N/A)	6	(8%)	$0.3	(0%)
Confined cooking fire	790	(16%)	0	(N/A)	12	(18%)	$0.1	(0%)
Lighter	400	(8%)	0	(N/A)	6	(9%)	$5.8	(8%)
Unclassified heat from powered equipment	330	(7%)	0	(N/A)	10	(16%)	$5.9	(8%)
Confined fuel burner or boiler fire	270	(5%)	0	(N/A)	0	(0%)	$0.1	(0%)
Radiated, conducted heat from operating equipment	250	(5%)	0	(N/A)	7	(11%)	$6.9	(9%)
Match	230	(5%)	0	(N/A)	1	(2%)	$27.1	(37%)
Arcing	230	(5%)	0	(N/A)	10	(15%)	$10.4	(14%)
Spark, ember or flame from operating equipment	150	(3%)	0	(N/A)	2	(2%)	$4.5	(6%)
Unclassified heat source	140	(3%)	0	(N/A)	4	(6%)	$2.9	(4%)
Unclassified hot or smoldering object	110	(2%)	0	(N/A)	1	(2%)	$2.8	(4%)
Smoking materials	70	(1%)	0	(N/A)	1	(1%)	$1.3	(2%)
Incendiary device	50	(1%)	0	(N/A)	0	(0%)	$1.0	(1%)
Molten or hot material	40	(1%)	0	(N/A)	1	(2%)	$0.1	(0%)
Flame or torch used for lighting	40	(1%)	0	(N/A)	3	(5%)	$0.1	(0%)
Hot ember or ash	40	(1%)	0	(N/A)	1	(1%)	$0.3	(0%)
Candle	30	(1%)	0	(N/A)	1	(2%)	$0.3	(0%)
Fireworks	30	(1%)	0	(N/A)	0	(0%)	$0.1	(0%)
Chemical reaction	30	(1%)	0	(N/A)	0	(0%)	$0.2	(0%)
Other known heat source	100	(2%)	0	(N/A)	1	(1%)	$3.8	(5%)
Other confined fire	50	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 7B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Area of Origin 2003-2006 Annual Average

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Contained trash or rubbish fire	1,490	(31%)	0	(N/A)	6	(8%)	$0.3	(0%)
Confined cooking fire	790	(16%)	0	(N/A)	12	(18%)	$0.1	(0%)
Lavatory, bathroom, locker room or check room	520	(11%)	0	(N/A)	11	(16%)	$1.1	(2%)
Confined fuel burner or boiler fire	270	(5%)	0	(N/A)	0	(0%)	$0.1	(0%)
Small assembly area, less than 100 person capacity	170	(3%)	0	(N/A)	7	(10%)	$6.4	(9%)
Hallway, corridor, mall	100	(2%)	0	(N/A)	1	(2%)	$0.8	(1%)
Exterior roof surface	80	(2%)	0	(N/A)	1	(2%)	$0.9	(1%)
Kitchen or cooking area	80	(2%)	0	(N/A)	2	(4%)	$0.9	(1%)
Unclassified area	80	(2%)	0	(N/A)	0	(1%)	$2.2	(3%)
Unclassified function area	70	(1%)	0	(N/A)	0	(1%)	$3.7	(5%)
Unclassified storage area	60	(1%)	0	(N/A)	0	(0%)	$1.1	(1%)
Heating equipment room	60	(1%)	0	(N/A)	1	(2%)	$0.2	(0%)
Duct for HVAC, cable, exhaust, heating, or air conditioner	60	(1%)	0	(N/A)	2	(3%)	$0.2	(0%)
Office	50	(1%)	0	(N/A)	0	(0%)	$4.2	(6%)
Exterior wall surface	50	(1%)	0	(N/A)	0	(1%)	$3.8	(5%)
Unclassified outside area	50	(1%)	0	(N/A)	0	(0%)	$3.2	(4%)
Laundry room or area	50	(1%)	0	(N/A)	9	(14%)	$0.2	(0%)
Wall assembly or concealed space	50	(1%)	0	(N/A)	0	(0%)	$0.4	(1%)
Storage of supplies or tools or dead storage	40	(1%)	0	(N/A)	0	(0%)	$0.7	(1%)
Unclassified means of egress	40	(1%)	0	(N/A)	2	(3%)	$0.2	(0%)
Unclassified equipment or service area	40	(1%)	0	(N/A)	0	(0%)	$0.2	(0%)
Storage room, area, tank, or bin	40	(1%)	0	(N/A)	1	(1%)	$4.6	(6%)
Closet	40	(1%)	0	(N/A)	0	(0%)	$0.6	(1%)
Large assembly area with fixed seats	30	(1%)	0	(N/A)	2	(2%)	$0.9	(1%)
Ceiling or floor assembly or concealed space	30	(1%)	0	(N/A)	0	(0%)	$0.5	(1%)
Unclassified structural area	30	(1%)	0	(N/A)	0	(0%)	$1.5	(2%)
Lobby or entrance way	30	(1%)	0	(N/A)	1	(1%)	$0.4	(0%)
Attic or ceiling or roof assembly or concealed space	30	(1%)	0	(N/A)	0	(1%)	$0.8	(1%)
Large open room without fixed seats	30	(1%)	0	(N/A)	1	(1%)	$4.4	(6%)
Unclassified assembly or sales area,	30	(1%)	0	(N/A)	0	(0%)	$0.6	(1%)
Other known area	360	(7%)	0	(N/A)	6	(9%)	$28.9	(39%)
Other confined fire	50	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)

Table 7B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Area of Origin 2003-2006 Annual Average (Continued)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the area or origin was unknown or not reported have been allocated proportionally among fires with known area of origin. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 8B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Item First Ignited 2003-2006 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Contained trash or rubbish fire	1,490	(31%)	0	(N/A)	6	(8%)	$0.3	(0%)
Confined cooking fire	790	(16%)	0	(N/A)	12	(18%)	$0.1	(0%)
Unclassified item	290	(6%)	0	(N/A)	5	(8%)	$5.0	(7%)
Confined fuel burner or boiler fire	270	(5%)	0	(N/A)	0	(0%)	$0.1	(0%)
Magazine, newspaper, writing paper	230	(5%)	0	(N/A)	1	(2%)	$3.5	(5%)
Electrical wire or cable insulation	230	(5%)	0	(N/A)	6	(9%)	$6.2	(8%)
Rubbish, trash, or waste	210	(4%)	0	(N/A)	2	(2%)	$1.1	(1%)
Rolled, or wound material	140	(3%)	0	(N/A)	3	(5%)	$0.4	(0%)
Flammable or combustible liquid or gas, filter or piping	100	(2%)	0	(N/A)	15	(23%)	$7.3	(10%)
Structural member or framing	70	(1%)	0	(N/A)	0	(1%)	$4.4	(6%)
Exterior roof covering or finish	70	(1%)	0	(N/A)	2	(2%)	$1.4	(2%)
Box, carton, bag, basket, barrel	60	(1%)	0	(N/A)	1	(2%)	$4.1	(6%)
Exterior wall covering or finish	60	(1%)	0	(N/A)	0	(0%)	$1.1	(2%)
Clothing	50	(1%)	0	(N/A)	1	(1%)	$1.5	(2%)
Unclassified structural component or finish	50	(1%)	0	(N/A)	0	(1%)	$2.3	(3%)
Multiple items first ignited	50	(1%)	0	(N/A)	0	(0%)	$22.3	(30%)
Dust, fiber, lint, including sawdust or excelsior	50	(1%)	0	(N/A)	0	(1%)	$0.8	(1%)
Appliance housing or casing	40	(1%)	0	(N/A)	1	(1%)	$0.5	(1%)
Insulation within structural area	40	(1%)	0	(N/A)	0	(0%)	$0.1	(0%)
Unclassified storage supplies	30	(1%)	0	(N/A)	1	(2%)	$1.3	(2%)
Unclassified soft goods, or wearing apparel	30	(1%)	0	(N/A)	0	(0%)	$0.1	(0%)
Linen other than bedding	30	(1%)	0	(N/A)	1	(2%)	$0.2	(0%)
Interior wall covering. excluding drapes	30	(1%)	0	(N/A)	0	(0%)	$0.8	(1%)
Book	30	(1%)	0	(N/A)	0	(0%)	$0.2	(0%)
Floor covering rug, carpet, or mat	30	(1%)	0	(N/A)	0	(0%)	$0.4	(1%)
Interior ceiling cover or finish	20	(1%)	0	(N/A)	0	(0%)	$5.9	(8%)
Other known item	330	(7%)	0	(N/A)	8	(13%)	$2.8	(4%)
Other confined fire	50	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the item first ignited was unknown or not reported have been allocated proportionally among fires with known item first ignited. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 9B. Structure Fires in Nursery, Elementary, Middle, Junior, and High Schools by Extent of Flame Damage 2003-2006 Annual Averages

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined or contained fire	2,590	(53%)	0	(N/A)	18	(27%)	$0.6	(1%)
Confined to object of origin	1,380	(28%)	0	(N/A)	17	(27%)	$10.3	(14%)
Confined to room of origin	580	(12%)	0	(N/A)	27	(41%)	$8.8	(12%)
Confined to floor of origin	60	(1%)	0	(N/A)	1	(2%)	$4.2	(6%)
Confined to building of origin	210	(4%)	0	(N/A)	2	(4%)	$36.8	(50%)
Beyond building of origin	40	(1%)	0	(N/A)	0	(0%)	$13.6	(18%)
Total	4,870	(100%)	0	(N/A)	65	(100%)	$74.2	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

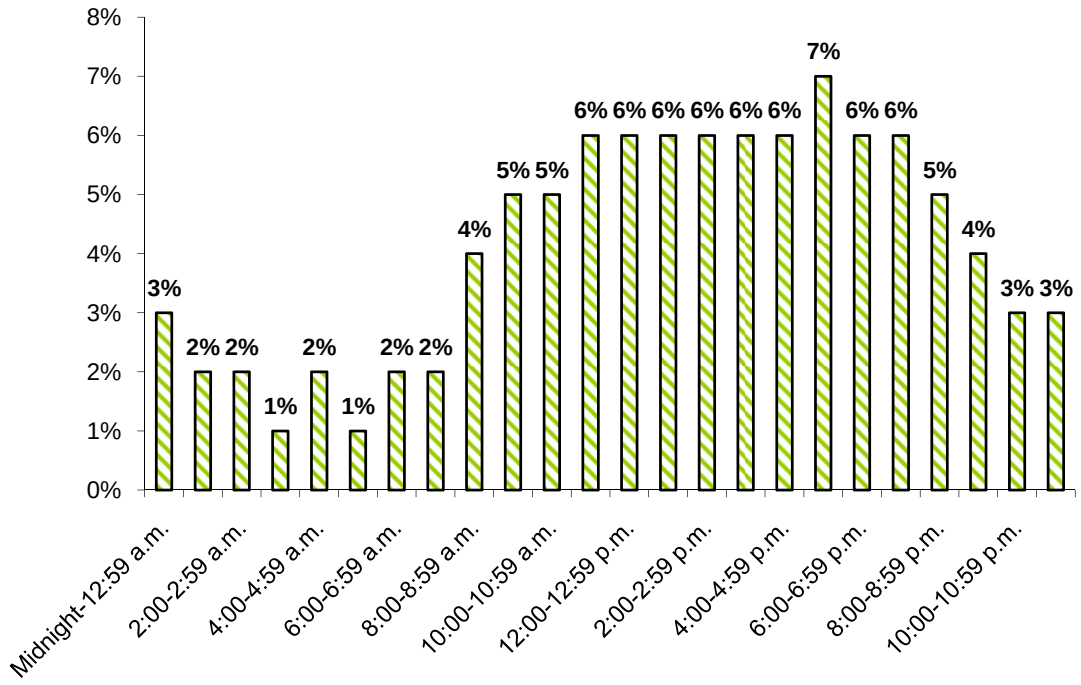
Structure Fires in College Classroom Buildings and Adult Education Centers

This analysis examines reported structure fires in college classroom buildings and adult education centers, classified as property use code 241 in the National Fire Incident Response System, Version 5.0. Dormitories and fraternity or sorority houses are analyzed separately in the report, *Structure Fires in Dormitories, Fraternities, Sororities, and Barracks.*

An estimated 750 structure fires involving college classroom buildings and adult education centers were reported per year in 2003-2006.
During the four-year period of 2003-2006, an estimated average of 750 structure fires in college classroom buildings and adult education centers were reported per year. These fires caused an annual average of 15 civilian fire injuries and $9.4 million in direct property damage. There were no civilian deaths reported in these properties during this time period.

0.1% of all reported structure fires occurred in college classroom buildings and adult education centers.
During 2003-2006, the 750 fires in college classroom buildings and adult education centers accounted for 0.1% of the 520,100 structure fires, none of the 3,130 civilian structure fire deaths, 0.1% of the 15,200 civilian structure fire injuries, and 0.1% of the $9 billion in direct property loss.

Figure 1C. Structure Fires in College Classroom Buildings and Adult Education Centers, by Time of Day 2003-2006 Annual Averages



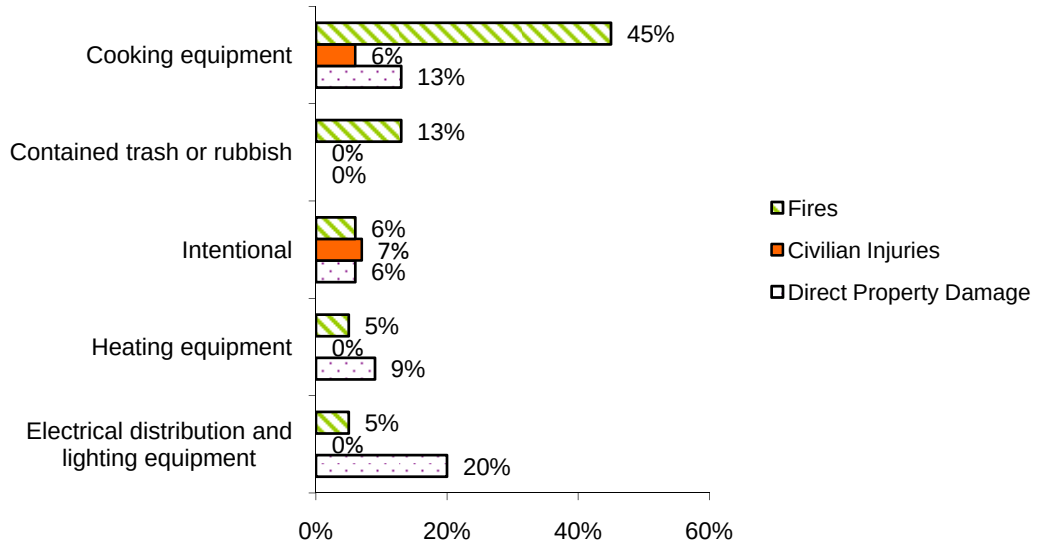
Source: NFIRS and NFPA Survey

Structure fires in these properties peak between 11 a.m. and 8 p.m.
Tables 1C-3C show reported structure fires in these properties by month, day of week and alarm time, respectively. October and November were the peak months for fires in college classroom buildings and adult education centers. Structure fires in these properties were much more common on weekdays than weekends. Figure 1C shows that 56% of fires in college classroom buildings and adult education centers occurred between 11 a.m. and 8 p.m.

Cooking equipment was the leading cause of structure fires in college classroom buildings and adult education centers.
Figure 2C and Table 4C show the leading causes of fires in these properties with data summarized from several NFIRS fields. In some cases, the equipment involved in ignition is most relevant; heat source, the field "cause," and factor contributing to ignition also provide relevant information. The causes shown in this table are not mutually exclusive when they have been pulled from different fields. More detailed information on equipment involved in ignition may be found in Table 5C; more information on heat source is in Table 6C.

Almost half (45%) of the structure fires in college classroom buildings and adult education centers were cooking equipment fires, including 42% which were reported as confined to cooking equipment. Another 13% of fires in these properties were contained trash or rubbish fires. Six percent of the fires in these properties were intentionally set. Heating equipment was involved 5% of the fires, including 4% of fires that were reported as confined to heating equipment fires. Another 5% of fires in these properties were caused by electrical distribution and lighting equipment. (See Table 6C.)

Figure 2C. Leading Causes of Structure Fires in College Classroom Buildings and Adult Education Centers 2003-2006



The laboratory was the leading area of origin (4%) excluding fires reported as confined fires.
One percent of the fires started in kitchens or cooking areas; it is likely that most of the confined cooking fires (42%) also started in these areas, although causal information, including area of origin, is not routinely collected for confined fires. (See Table 7C.)

Rubbish, trash, or waste was the item first ignited in 15% of these fires.
Confined cooking equipment fires presumably involved the ignition of food or cooking materials and resulted in 42% of these fires. Rubbish, trash or waste was the item first ignited in 2% of the structure fires in these properties. Although this information is not routinely collected for confined or contained fires, the contained trash or rubbish fires (13%) almost certainly also began with trash or rubbish. (See Table 8C.)

Most fires in these properties were small.
Fifty-nine percent of the reported fires in college classroom buildings and adult education centers were confined or contained fires. Version 5.0 of NFIRS introduced shorter reporting for cooking fires confined to the vessel, fires confined to chimney or flues, to incinerators, fuel burners or boilers, and contained trash or rubbish fires with no flame damage to the structure.

In addition to the 59% of fires reported as confined or contained, 23% were confined to the object of origin. Only 5% spread beyond the room of origin. (See Table 9C.)

An annual average of 710 outside and other fires per year were reported at these properties.
During 2003-2006, an estimated annual average of 710 outside and other fires on college classroom building and adult education center property caused an average of 2 civilian injuries and $100,000 in direct property damage per year. An average of 140 vehicle fires reported on these properties caused an average one civilian injury and $0.5 million in direct property damage per year. No civilian fire deaths resulted from any outside and other or vehicle fires on these properties that were reported to NFIRS 5.0.

Table 1C. Structure Fires in College Classroom Buildings and Adult Education Centers by Month 2003-2006 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	50	(7%)	0	(N/A)	0	(0%)	$0.5	(5%)
February	60	(7%)	0	(N/A)	7	(48%)	$0.1	(1%)
March	70	(9%)	0	(N/A)	1	(6%)	$0.1	(1%)
April	70	(9%)	0	(N/A)	1	(6%)	$4.8	(50%)
May	60	(7%)	0	(N/A)	0	(3%)	$0.0	(1%)
June	60	(8%)	0	(N/A)	1	(6%)	$0.6	(6%)
July	40	(6%)	0	(N/A)	0	(0%)	$0.5	(5%)
August	50	(7%)	0	(N/A)	2	(10%)	$0.7	(8%)
September	70	(9%)	0	(N/A)	1	(9%)	$0.4	(5%)
October	90	(12%)	0	(N/A)	1	(9%)	$1.1	(11%)
November	80	(11%)	0	(N/A)	0	(0%)	$0.1	(1%)
December	50	(7%)	0	(N/A)	0	(3%)	$0.6	(7%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)
Average	60	(8%)	0	(N/A)	1	(8%)	$0.8	(8%)

Table 2C. Structure Fires in College Classroom Buildings and Adult Education Centers by Day of Week 2003-2006 Annual Averages

Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	70	(10%)	0	(N/A)	0	(3%)	$0.6	(7%)
Monday	110	(15%)	0	(N/A)	2	(12%)	$0.6	(6%)
Tuesday	130	(17%)	0	(N/A)	0	(0%)	$1.0	(11%)
Wednesday	130	(17%)	0	(N/A)	7	(46%)	$4.5	(48%)
Thursday	130	(17%)	0	(N/A)	3	(19%)	$0.9	(9%)
Friday	110	(14%)	0	(N/A)	1	(6%)	$1.6	(17%)
Saturday	80	(10%)	0	(N/A)	2	(14%)	$0.3	(3%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)
Average	110	(14%)	0	(N/A)	2	(14%)	$1.3	(14%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 3C. Structure Fires in College Classroom Buildings and Adult Education Centers, by Alarm Time
2003-2006 Annual Averages

Time	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight-12:59 a.m.	20	(3%)	0	(N/A)	0	(0%)	$0.4	(4%)
1:00-1:59 a.m.	10	(2%)	0	(N/A)	0	(0%)	$0.3	(3%)
2:00-2:59 a.m.	10	(2%)	0	(N/A)	0	(0%)	$0.0	(0%)
3:00-3:59 a.m.	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
4:00-4:59 a.m.	10	(2%)	0	(N/A)	0	(0%)	$0.8	(9%)
5:00-5:59 a.m.	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
6:00-6:59 a.m.	20	(2%)	0	(N/A)	1	(6%)	$0.4	(4%)
7:00-7:59 a.m.	20	(2%)	0	(N/A)	0	(3%)	$0.0	(0%)
8:00-8:59 a.m.	30	(4%)	0	(N/A)	0	(0%)	$0.1	(1%)
9:00-9:59 a.m.	40	(5%)	0	(N/A)	7	(46%)	$0.3	(4%)
10:00-10:59 a.m.	40	(5%)	0	(N/A)	2	(12%)	$0.1	(1%)
11:00-11:59 a.m.	50	(6%)	0	(N/A)	0	(0%)	$0.7	(7%)
12:00-12:59 p.m.	50	(6%)	0	(N/A)	0	(3%)	$0.0	(0%)
1:00-1:59 p.m.	50	(6%)	0	(N/A)	0	(3%)	$0.4	(4%)
2:00-2:59 p.m.	40	(6%)	0	(N/A)	1	(6%)	$0.1	(1%)
3:00-3:59 p.m.	50	(6%)	0	(N/A)	0	(0%)	$4.7	(49%)
4:00-4:59 p.m.	50	(6%)	0	(N/A)	0	(0%)	$0.0	(0%)
5:00-5:59 p.m.	50	(7%)	0	(N/A)	0	(3%)	$0.1	(1%)
6:00-6:59 p.m.	40	(6%)	0	(N/A)	0	(3%)	$0.4	(5%)
7:00-7:59 p.m.	50	(6%)	0	(N/A)	0	(3%)	$0.2	(2%)
8:00-8:59 p.m.	40	(5%)	0	(N/A)	0	(3%)	$0.0	(0%)
9:00-9:59 p.m.	30	(4%)	0	(N/A)	1	(10%)	$0.1	(1%)
10:00-10:59 p.m.	20	(3%)	0	(N/A)	0	(0%)	$0.2	(2%)
11:00-11:59 p.m.	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)
Average	30	(4%)	0	(N/A)	1	(4%)	$0.4	(4%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 4C. Leading Causes of Structure Fires in College Classroom Buildings and Adult Education Centers
2003-2006 Annual Averages

Leading Causes	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	330	(45%)	0	(N/A)	1	(6%)	$1.2	(13%)
Identified cooking equipment	*20*	*(3%)*	*0*	(N/A)	*0*	*(0%)*	*$1.2*	*(12%)*
Confined cooking fire	*310*	*(42%)*	*0*	(N/A)	*1*	*(6%)*	*$0.0*	*(0%)*
Contained trash or rubbish fire	100	(13%)	0	(N/A)	0	(0%)	$0.0	(0%)
Intentional	40	(6%)	0	(N/A)	1	(7%)	$0.5	(6%)
Heating equipment	40	(5%)	0	(N/A)	0	(0%)	$0.8	(9%)
Identified heating equipment	*10*	*(2%)*	*0*	(N/A)	*0*	*(0%)*	*$0.8*	*(9%)*
Confined heating equipment	*30*	*(4%)*	*0*	(N/A)	*0*	*(0%)*	*$0.0*	*(0%)*
Electrical distribution and lighting equipment	40	(5%)	0	(N/A)	0	(0%)	$1.9	(20%)
Torch, burner or soldering iron	20	(3%)	0	(N/A)	0	(0%)	$0.3	(3%)
Clothes dryer or washer	20	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Shop tools and industrial equipment excluding torches, burners or soldering irons	10	(2%)	0	(N/A)	0	(0%)	$3.9	(42%)
Electronic, office or entertainment equipment	10	(2%)	0	(N/A)	0	(0%)	$0.1	(2%)
Smoking materials	10	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)

N/A- Not applicable because total is zero.

Note: These are the leading causes, obtained from the following list: intentional (from the NFIRS field "cause"); playing with fire (from factor contributing to ignition); confined heating (including confined chimney and confined fuel burner or boiler fires), confined cooking, and contained trash or rubbish from incident type; identified heating, identified cooking, clothes dryer or washer, torch (including burner and soldering iron), electrical distribution and lighting equipment, medical equipment, and electronic, office or entertainment equipment (from equipment involved in ignition); smoking materials, candles, lightning, and spontaneous combustion or chemical reaction (from heat source), and mobile property involved (from mobile property involved in ignition). The statistics on smoking materials and candles include a proportional share of fires in which the heat source was heat from an unclassified open flame or smoking material. Exposure fires include fires with an exposure number greater than zero, as well as fires identified by heat source or factor contributing to ignition when no equipment was involved in ignition and the fires were not intentionally set. Because contained trash or rubbish fires are a scenario without causal information on heat source, equipment involved, or factor contributing to ignition, they are shown at the bottom of the table if they account for at least 2% of the fires. Casual information is not routinely collected for these incidents. The same fire can be listed under multiple causes, based on multiple data elements. Details on handling of unknown, partial unknowns, and other underspecified codes may be found in the Appendix.

These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 5C. Structure Fires in College Classroom Buildings and Adult Education Centers by Equipment Involved in Ignition, 2003-2006 Annual Averages

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	310	(42%)	0	(N/A)	1	(6%)	$0.0	(0%)
No equipment involved	110	(14%)	0	(N/A)	14	(94%)	$0.6	(6%)
Contained trash or rubbish fire	100	(13%)	0	(N/A)	0	(0%)	$0.0	(0%)
Torch	20	(3%)	0	(N/A)	0	(0%)	$0.3	(3%)
Confined fuel burner or boiler fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Lamp, bulb, or light fixture	20	(3%)	0	(N/A)	0	(0%)	$1.0	(10%)
Fan	20	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Clothes dryer	20	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Unclassified laboratory equipment	20	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Wiring receptacle, switch or outlet	10	(2%)	0	(N/A)	0	(0%)	$0.2	(2%)
Fixed or portable space heater	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Air conditioner	10	(1%)	0	(N/A)	0	(0%)	$0.1	(1%)
Unclassified equipment involved in ignition	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Portable cooking or warming equipment	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Range	10	(1%)	0	(N/A)	0	(0%)	$1.2	(12%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Power switch gear or overcurrent protection device	0	(1%)	0	(N/A)	0	(0%)	$0.7	(8%)
Other known equipment	50	(6%)	0	(N/A)	0	(0%)	$5.1	(54%)
Other confined fire	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the equipment involved was unknown or not reported have been allocated proportionally among fires with known equipment involved. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 6C. Structure Fires in College Classroom Buildings and Adult Education Centers, by Heat Source
2003-2006 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	310	(42%)	0	(N/A)	1	(6%)	$0.0	(0%)
Contained trash or rubbish fire	100	(13%)	0	(N/A)	0	(0%)	$0.0	(0%)
Radiated, or conducted heat from operating equipment	50	(7%)	0	(N/A)	2	(14%)	$5.8	(61%)
Unclassified heat from powered equipment	50	(6%)	0	(N/A)	0	(3%)	$0.7	(8%)
Arcing	40	(6%)	0	(N/A)	0	(0%)	$0.8	(9%)
Spark, ember or flame from operating equipment	40	(5%)	0	(N/A)	0	(0%)	$0.5	(5%)
Confined fuel burner or boiler fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified hot or smoldering object	20	(2%)	0	(N/A)	0	(3%)	$0.0	(0%)
Unclassified heat source	10	(2%)	0	(N/A)	0	(0%)	$0.0	(0%)
Flame or torch used for lighting	10	(2%)	0	(N/A)	0	(3%)	$0.1	(1%)
Chemical reaction	10	(1%)	0	(N/A)	2	(10%)	$0.3	(3%)
Candle	10	(1%)	0	(N/A)	8	(52%)	$0.1	(1%)
Match	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Molten or hot material	10	(1%)	0	(N/A)	1	(4%)	$0.0	(0%)
Hot ember or ash	10	(1%)	0	(N/A)	0	(0%)	$0.7	(7%)
Smoking materials (i.e. lighted tobacco product)	10	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Lighter	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Heat or spark from friction	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Lightning	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Other known heat source	10	(1%)	0	(N/A)	1	(4%)	$0.2	(2%)
Other confined fire	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the heat source was unknown or not reported have been allocated proportionally among fires with known heat source. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 7C. Structure Fires in College Classroom Buildings and Adult Education Centers, by Area of Origin
2003-2006 Annual Average

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	310	(42%)	0	(N/A)	1	(6%)	$0.0	(0%)
Contained trash or rubbish fire	100	(13%)	0	(N/A)	0	(0%)	$0.0	(0%)
Laboratory	30	(4%)	0	(N/A)	3	(20%)	$1.0	(11%)
Confined fuel burner or boiler fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Office	20	(3%)	0	(N/A)	0	(0%)	$0.4	(4%)
Lavatory, bathroom, locker room or check room	20	(3%)	0	(N/A)	8	(54%)	$0.0	(0%)
Exterior roof surface	20	(2%)	0	(N/A)	0	(0%)	$1.2	(13%)
Machinery room or area	10	(2%)	0	(N/A)	0	(0%)	$0.1	(1%)
Hallway, corridor, or mall	10	(2%)	0	(N/A)	0	(0%)	$0.0	(0%)
Small assembly area with less than 100 person capacity	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Duct for HVAC, cable, exhaust, heating, or air conditioning	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Exterior wall surface	10	(1%)	0	(N/A)	0	(0%)	$0.6	(7%)
Unclassified area	10	(1%)	0	(N/A)	0	(3%)	$0.1	(1%)
Laundry room or area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified function area	10	(1%)	0	(N/A)	0	(0%)	$0.2	(2%)
Kitchen or cooking area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Heating equipment room	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified equipment or service area	10	(1%)	0	(N/A)	1	(4%)	$0.2	(2%)
Ceiling or floor assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Wall assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$4.5	(47%)
Unclassified storage area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified outside area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Storage room, area, tank, or bin	10	(1%)	0	(N/A)	0	(3%)	$0.1	(1%)
Attic or ceiling or roof assembly or concealed space	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified structural area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Lobby or entrance way	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Closet	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified means of egress	0	(1%)	0	(N/A)	0	(3%)	$0.0	(0%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Maintenance or paint shop or area	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Computer room, control room or center	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Bedroom	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Other known area	50	(7%)	0	(N/A)	1	(7%)	$0.8	(8%)
Other confined fire	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)

Table 7C. Structure Fires in College Classroom Buildings and Adult Education Centers, by Area of Origin
2003-2006 Annual Average
(Continued)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the area or origin was unknown or not reported have been allocated proportionally among fires with known area of origin. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 8C. Structure Fires in College Classroom Buildings and Adult Education Centers by Item First Ignited 2003-2006 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	310	(42%)	0	(N/A)	1	(6%)	$0.0	(0%)
Contained trash or rubbish fire	100	(13%)	0	(N/A)	0	(0%)	$0.0	(0%)
Electrical wire or cable insulation	50	(7%)	0	(N/A)	0	(0%)	$0.3	(3%)
Unclassified item first ignited	30	(4%)	0	(N/A)	1	(4%)	$0.0	(0%)
Confined fuel burner or boiler fire	20	(3%)	0	(N/A)	0	(0%)	$0.0	(0%)
Flammable or combustible liquid or gas, filter or piping	20	(3%)	0	(N/A)	1	(8%)	$0.7	(7%)
Structural member or framing	20	(2%)	0	(N/A)	0	(0%)	$5.6	(60%)
Magazine, newspaper, or writing paper	20	(2%)	0	(N/A)	0	(0%)	$0.3	(3%)
Rubbish, trash, or waste	20	(2%)	0	(N/A)	0	(0%)	$0.2	(2%)
Exterior roof covering	10	(2%)	0	(N/A)	0	(0%)	$0.6	(6%)
Appliance housing or casing	10	(1%)	0	(N/A)	0	(0%)	$0.1	(1%)
Insulation within structural area	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified structural component or finish	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Interior wall covering	10	(1%)	0	(N/A)	0	(0%)	$0.2	(2%)
Exterior wall covering or finish	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Box, carton, bag, basket, or barrel	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Rolled or wound material	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Dust, fiber, or lint, including sawdust or excelsior	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Clothing	10	(1%)	0	(N/A)	9	(60%)	$0.0	(0%)
Interior ceiling covering	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Confined chimney or flue fire	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Unclassified soft goods, or wearing apparel	0	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Other known item	60	(8%)	0	(N/A)	3	(21%)	$1.3	(13%)
Other confined fire	10	(1%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Non-confined and non-contained structure fires in which the item first ignited was unknown or not reported have been allocated proportionally among fires with known item first ignited. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Table 9C. Structure Fires in College Classroom Buildings and Adult Education Centers by Extent of Flame Damage 2003-2006 Annual Averages

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined or contained fire	440	(59%)	0	(N/A)	1	(6%)	$0.1	(1%)
Confined to object of origin	180	(23%)	0	(N/A)	4	(30%)	$1.1	(11%)
Confined to room of origin	100	(13%)	0	(N/A)	8	(55%)	$1.2	(13%)
Confined to floor of origin	10	(2%)	0	(N/A)	1	(9%)	$1.2	(13%)
Confined to building of origin	20	(3%)	0	(N/A)	0	(0%)	$5.9	(63%)
Beyond building of origin	0	(0%)	0	(N/A)	0	(0%)	$0.0	(0%)
Total	750	(100%)	0	(N/A)	15	(100%)	$9.4	(100%)

N/A- Not applicable because total is zero.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. These national estimates are projections based on the detailed information collected in Version 5.0 of NFIRS. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. Property damage has not been adjusted for inflation. Confined fires, incident type 113-118 are analyzed separately and included in the table. Totals may not equal sums due to rounding errors. Since there were no civilian deaths the percentage of civilian deaths is not applicable.

Source: NFIRS and NFPA survey.

Appendix A.
How National Estimates Statistics Are Calculated

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

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

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

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

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

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S.

population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

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

Projecting NFIRS to National Estimates

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

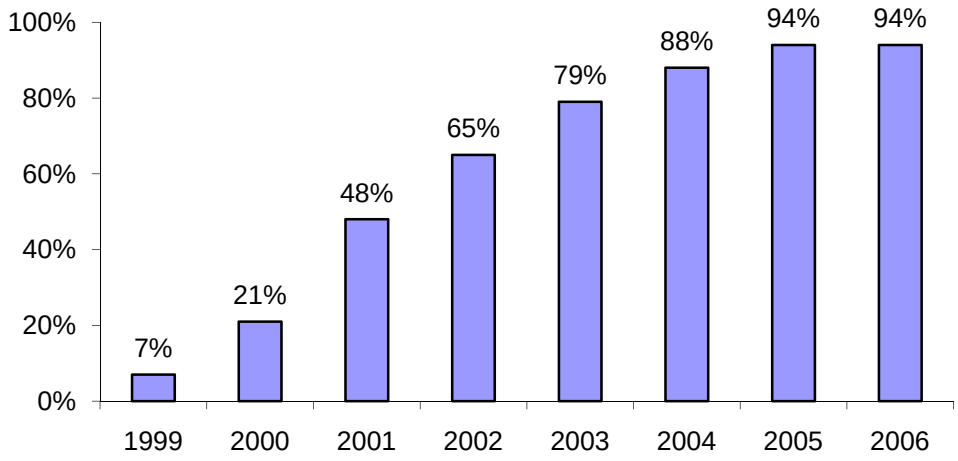
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific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

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

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

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

Figure 1. Fires Originally Collected in NFIRS 5.0 by Year



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

NFPA survey projections
NFIRS totals (Version 5.0)

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

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

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

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases (typically 10-20%). Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

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

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

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

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

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

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

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

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

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

(All fires – TMI Not Required – Undetermined – Blank)

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: "Heat from open flame or smoking material, other." NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

61. Cigarette;
62. Pipe or cigar;
63. Heat from undetermined smoking material;
64. Match;
65. Lighter: cigarette lighter, cigar lighter;
66. Candle;
67 Warning or road flare, fuse;
68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

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

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

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

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

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

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

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100, -

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

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

Code Grouping	EII 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	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Wiring, switch or outlet	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	214	Wiring from meter box to circuit breaker
	216	Electrical branch circuit
	217	Outlet, receptacle
	218	Wall switch
Power switch gear or overcurrent protection device	215	Panel board, switch board, circuit breaker board
	219	Ground fault interrupter
	222	Overcurrent, disconnect equipment
	227	Surge protector
Lamp, bulb or lighting	230	Unclassified lamp or lighting
	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture

	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle
	639	Wok, frying pan, skillet
	641	Breadmaking machine

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

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

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

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

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 1% of the incidents.

Confined cooking fires (cooking fires involving the contents of a cooking vessel without fie 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.

Contained trash or rubbish fires with no flame damage to structure or its contents are identified by incident type 118. No cause can be ascertained for these incidents, but they account for a substantial share of the incidents in some occupancies. When appropriate, these fires are generally shown at the bottom of a cause table.

Confined or contained fires (incident type 113-118) are excluded from the remaining estimates. Unknown data is allocated proportionally among non-confined fires.

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; both convert to intentional.

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." Because of conversion issues, only data originally collected in Version 5.0 of NFIRS is used in the initial calculation. It appears that "none" is often being used in place of "unknown." 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. After the Version 5.0 only data has been run for non-confined fires and the unknown data allocated, percentages are calculated for each code of Version 5.0 non-confined fires. Total non-confined structure fires (all versions) are multiplied by these percentages to obtain national estimates. The final percentage of fires is calculated by dividing these estimates by the total number of confined and non-confined fires from all versions.

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.

> **Identified cooking equipment** refers to equipment used to cook, heat or warm food (codes 600, 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. Unclassified kitchen and cooking equipment (code 600) is included here because a larger share of the whole category involved cooking rather than kitchen equipment.
>
> **Identified heating equipment** (codes 100 and 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. Unclassified heating, ventilation and air condition equipment (code 100) is included here because a larger share of the whole category involved heating rather than air conditioning or ventilation equipment.

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.

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.

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. Because this code was so broad, it unfortunately converts to equipment involved undetermined resulting in underestimates for this type of 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.

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.

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 includes: highway-type vehicles such as cars, trucks, recreational vehicles, and motorcycles; trains, trolleys and subways; boats and ships; aircraft; industrial, agricultural and construction vehicles; and riding lawn mowers, snow removal vehicles and tractors. Because of conversion issues, only data originally collected in Version 5.0 of NFIRS is used in the initial calculation. The data was obtained by first running Version 5.0 non confined fires only to identify vehicles that were involved in ignition whether or not they burned themselves (mobile property involved codes 2 and 3). After the unknown data was allocated, percentages are calculated for each code of Version 5.0 non-confined fires. Total non-confined structure fires (all versions) are multiplied by these percentages to obtain national estimates. The final percentage of fires is calculated by dividing these estimates by the total number of confined and non-confined fires from all versions.

Exposures are fires that are caused by the spread of or from another fire. These include fires in which the exposure number is greater than 0; the factor contributing to ignition is property too close (code 71); or heat source is heat spreading from another fire via direct flame or convection current (code 80-89). Because exposures are identified by the older hierarchical sort, all non-confined fires with exposure number greater than zero are counted as exposures, but those identified by heat source and factor contributing to ignition include only fires that were not grouped in other categories such as cooking or heating equipment.

Appendix C.
Selected Published Incidents

The following are selected published incidents involving educational 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.

Sprinkler Controls Fire in School, Connecticut

Firefighters responding to an automatic fire alarm at an unoccupied high school found a single sprinkler holding a fire in the elevator machine room in check.

The three-story, steel-frame building, which covered nearly 100,000 square feet (9,290 square meters) per floor, had concrete block walls and a metal-deck roof covered with a built-up surface. A wet-pipe sprinkler system and a fire detection system were monitored by a central station alarm company.

Firefighters didn't see anything as they walked through the first floor, but when they entered the basement, they discovered smoke filling the corridor leading to the custodian's office. They laid a hose line and entered the office, where they found the elevator machine room door propped open and a single sprinkler holding in check a fire that was consuming cable insulation, wiring, and hydraulic fluid. The blaze was quickly extinguished.

Investigators discovered that a motor and pulley assembly in the elevator had seized, generating enough energy to ignite the cable insulation and the contents of the machine room. Because the door to the room was propped open, smoke flowed into the custodian's office and through a ventilation shaft to the rest of the building.

Property damage to the building was estimated at $75,000 and to its contents at $81,000. Fortunately, the school was closed for the weekend.

Kenneth J. Tremblay, 2009, "Firewatch," *NFPA Journal*, July/August, 22.

Juveniles Start Fire in School, Texas

A fire set intentionally in the middle of the night in a school closed for the summer did an estimated $2 million in property damage, destroying the structure.

The single-story school, which had brick walls, concrete floor framing, and a metal-deck asphalt roof, covered 16,200 square feet (149 square meters). Smoke detectors in the hallways and common areas were connected to a fire alarm system, but the system was not monitored externally. There were no sprinklers.

The fire alarm operated as designed, but because it was unmonitored, no one noticed it until someone driving by the school saw smoke coming from the building and called 911 around 2:20 a.m.

Fire crews arrived to find heavy smoke coming from the rear of the structure and forced entry. A ladder crew turned the building's power off and laddered the roof to provide ventilation, while other crews advanced additional hose streams. They confined the fire to the classroom of origin, but open fire doors allowed smoke and heat to fill the entire school.
Investigators determined that juveniles intentionally ignited some paper and placed it in a classroom bookcase. The school's video monitoring system showed two individuals leaving the building approximately 20 to 25 minutes before the fire was discovered.

One firefighter suffered heat-related injuries during the blaze.

Kenneth J. Tremblay, 2008, "Firewatch," *NFPA Journal*, July/August 24-25.

Sprinklers Prevent Excessive Arson Fire Damage, Connecticut
An intentionally set fire in a third floor boys' bathroom caused little damage because a single sprinkler activated and extinguished the fire. An unknown person ignited toilet paper and a dispenser that burned until sufficient heat fused the sprinkler. The fully occupied building was evacuated without injury and the loss was estimated at $30,000.

The three-story, steel-frame high school had concrete block walls and a steel roof covered by metal and built-up roof covering. The school had several fire protection and suppression devices including a wet-pipe sprinkler system. A central station alarm company monitored all the systems.

At 12:20 p.m., the fire alarm system sounded and alerted 2,000 students and staff. The fire consumed the dispenser and large toilet paper roll before water from the sprinkler system extinguished the flames. It was not reported who or if anyone was charged with the crime, but the multi-million dollar school and contents was spared significant loss.

Kenneth J. Tremblay, 2008, "Firewatch," *NFPA Journal*, January/February, 22.

Large-Loss Fire at Arizona College Building
Dollar Loss: $34,000,000
Month: November
Time: 12:48 pm

Property Characteristics and Operating Status:
This was a three-story multi-occupancy college building of protected noncombustible construction, including a food court, student union, and conference rooms. The ground floor area was not reported. The building was in full operation.
Fire Protection Systems:
There was complete-coverage automatic detection equipment present, along with manual pull stations. This system was reported to have operated as designed. There was a partial-coverage wet-pipe sprinkler system present. The system was not in the area of the fire and did not operate.

Fire Development:
A fire of suspicious origin broke out in a second-story storage room involving some stored plastic chairs.

Contributing Factors and Other Details:
Approximately 5,000 people evacuated safely during the fire.

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

Large-Loss Fire at Massachusetts Community School
Dollar Loss: $16,000,000
Month: December
Time: 4:40 am

Property Characteristics and Operating Status:
This was a two-story community school of unprotected ordinary construction that covered 1,600 square feet (150 square meters). No one was in the building at the time of the fire.

Fire Protection Systems:
An automatic detection system was present and operated, but its type and coverage were not reported. There was no automatic suppression equipment present.

Fire Development:
The fire broke out in a first-story classroom. The cause was a mechanical failure of some

Contributing Factors and Other Details:
Three firefighters were injured fighting this fire. The loss was estimated as $11,000,000 to the structure and $5,000,000 to the contents.

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

Large-Loss Fire at Alaska High School
Dollar Loss: $13,299,100
Month: June
Time: 7:16 pm

Property Characteristics and Operating Status:
This was a two-story high school that covered 47,000 square feet (4,400 square meters) and was of unprotected wood-frame construction. The building was unoccupied at the time.

Fire Protection Systems:
There were detectors present, but the coverage and operation were not reported. There was a wet-pipe sprinkler system present. Its coverage was not reported. The fire department reported the system operated but there was not enough agent available. No further explanation was given.

Fire Development:
A fire of undetermined cause broke out on the exterior roof surface. No other details were reported.

Contributing Factors and Other Details:
The loss was estimated at $13,230,000 to the structure and $69,100 to the contents.

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

Large-Loss Fire at Tennessee Elementary School
Dollar Loss: $5,000,000
Month: March
Time: 5:16 am

Property Characteristics and Operating Status:
This one-story elementary school was of unprotected ordinary construction and covered 87,500 square feet (8,100 square meters). The school was closed at the time of the fire.

Fire Protection Systems:
There was a smoke detection system present. The coverage and operation of the system were not reported. There was no automatic suppression equipment.

Fire Development:
This fire broke out in the attic area from an unspecified short circuit.

Contributing Factors and Other Details:
The damage was estimated at $4,000,000 to the structure and $1,000,000 to the contents.

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

Fireworks Ignite Plastic Bins, Washington
Two juveniles were charged with arson when fireworks they ignited spread to large plastic trash bins and then to the exterior of an elementary school. Fire spread to the wooden roof structure and to the interior of the school before being detected and extinguished.

The single-story school was constructed in phases over several years with concrete block walls, a brick veneer, and a wooden roof with a built-up roof deck. There were no detection or suppression systems installed in the school, only a burglar alarm that sounded only after the fire was well developed.

The plastic recycle bins with hinged-plastic covers were placed against the school. A lit firework was placed within a bin and it ignited the combustibles and spread to the bin itself. Flame heights reached the roofline and spread to concealed spaces involving structural wood framing.

Police investigating the burglar alarm arrived at 10:34 p.m. and alerted the fire department when smoke and fire was observed. Four minutes later, firefighters arrived and found heavy smoke and fire coming from the north section of the school. They advanced an interior hose line. Crews had some success in extinguishing fire in two of the classrooms and alcove, but fire spread in the concealed ceiling and roof spaces was too extensive. Command ordered an evacuation and began a defensive attack.

A trench cut separated the involved north section of the school from the main building, as aerial master streams were used to control the fire. Firefighters fought the fire for four hours before it was declared under control. Damage to the school was estimated at
$2.5 million for combined structural and contents losses. One firefighter suffered minor injuries during suppression activities.

Kenneth J. Tremblay, 2007, "Firewatch," *NFPA Journal*, May/June, 24.

Sprinkler Extinguishes School Fire Started by Child, Connecticut
A 5-year-old girl playing with matches she had brought from home started a fire at a regional high school that a local church group was using for services. Fortunately, a sprinkler extinguished the blaze before it could do more than damage a stairwell.

The two-story, steel-frame school had brick-veneered concrete walls and a flat, metal-decked roof covered with a membrane. Its fire detection system, which included smoke alarms and manual pull stations, and its wet-pipe sprinkler system were both monitored by a central station alarm company.

The girl, who was with a group of children that had been left unattended in a ground-level stairwell, lit a match, and then dropped it into a cardboard box containing clothing when the flame reached her fingertips. The resulting fire reached the ceiling, where it spread until it activated the sprinkler. Rated firewalls also kept the fire from spreading beyond the stairwell.

The sprinkler flow switch triggered the internal fire alarm and alerted the fire department at 10:29 a.m.

Kenneth J. Tremblay, 2006, "Firewatch," *NFPA Journal*, January/February, 20.

Large-loss Fire at California Middle School
Dollar Loss: $8,572,000
Month: February
Time: 12 pm

Property Characteristics and Operating Status:
This one-story middle school was of protected ordinary construction and covered 14,400 square feet (1,337 square meters). The school was not in session that day but a teacher was in the building preparing for classes.

Fire Protection Systems:
There was partial coverage of heat detection equipment present, though not in the area of fire origin. A detector activated shortly after the fire was discovered. There was no suppression system present.

Fire Development:
The exact source of ignition of this fire could not be determined. It broke out above the ceiling of a classroom in the science wing and burned undetected through the open combustible construction of the attic and mansard roof. The fire destroyed the science wing as well as parts of two other wings.

Contributing Factors and Other Details:
No fire stops or separations in mansard or over-hangs, and no fire rated walls allowed the fire to spread. Loss to the school was listed as $8,072,000 and $500,000 to the contents.

Stephen G. Badger, 2005, "Large-Loss Fire for 2004," *NFPA Journal*, November/December, 49.

Fire Damages School, Massachusetts
Firefighters were already responding to a 5:22 a.m. municipal master box alarm from a middle school when a passerby called 911 to report the fire. The fire department immediately sent additional resources.

The unoccupied four-story, wood-and-brick building had a pitched roof covered with slate tiles. Its smoke and heat detection system was connected to a municipal fire alarm system.

Firefighters arrived within five minutes of the alarm to find smoke and flames venting from a window on the second floor.

As one crew of firefighters advanced a 1 ¾ inch hose line to the second floor, others established a water supply and raised aerial ladders to the second floor. They brought the fire, which started in a computer classroom, under control within a few hours.

Property damage, limited to the room of origin, was estimated at $500,000. No one was injured.

Kenneth J. Tremblay, 2005, "Firewatch," *NFPA Journal*, July/August, 16.

Fire Damages School, North Carolina
A firewall separating two areas of a combined elementary and middle school prevented fire from destroying one section of the building. However, the fire, which started during the evening, burned undetected for approximately an hour before a passerby noticed it and resulted in a multi-million dollar loss.

The two-story, wood-frame structure had been built in two stages, the first in 1928 and the second in 1936. Its exterior walls were made of brick, and the flat wood-deck roof was covered with tar and gravel. The building, which was 500 feet (152 meters) long and 50 feet (15 meters) wide, had a fire detection system, but it only provided a local alarm. There were no sprinklers.

Fire investigators determined that the fire began on the stage in the first-floor auditorium of the 1928 section of the school when an electric arc in the lighting system ignited the stage curtains. The blaze then spread through concealed ceiling spaces to the second floor.

A passerby called 911 at about 2:15 a.m., by which time the fire was well advanced. Fortunately, the firewall kept the blaze from spreading into the 1936 addition.

The school, valued at $5 million, and its contents, estimated at $750,000, sustained damages estimated at $3.5 million and $300,000, respectively. One firefighter received an eye injury during the blaze.

Kenneth J. Tremblay, 2005, "Firewatch," *NFPA Journal*, January/February, 14.

Flash Fire Injures Teacher and Students, Washington
A flash fire that erupted during a science experiment injured a teacher and four students and damaged some of the room's contents. However, it did not last long enough to fuse the room's sprinklers.

The multi-level high school consisted of a variety of construction types, but the area in which the fire occurred was of masonry construction. The school had a fire detection system with smoke and heat detectors and manual pull stations. A wet-pipe sprinkler system provided full coverage.

The experiment involved several beakers containing a solution of water, methanol, and metallic salts to produce flames of different colors. The teacher had performed the demonstration several times earlier during the day without incident. When trying to ignite the vapors with a match this time, however, she didn't detect a flame. She was pouring additional methanol into the beaker from a 3-quart (4-liter) plastic jug when the vapors flashed, igniting her hair and clothing.

A student used his jacket to smother the flames, and the remaining fire was extinguished with a portable fire extinguisher. The fire did not produce enough heat to activate the sprinklers or enough smoke to activate the fire alarm system immediately.

Investigators believe that the vapors had, in fact, ignited the first time the teacher lit them and burned with an invisible flame. Once she added more fuel, the additional vapor flashed, and the fire spread to the combustibles on the teacher's desk.

Fire damage was limited to the classroom. The school, valued at more than $15 million, sustained less than $200 in losses. The teacher and three students were treated for thermal burns, and another student with a heart complaint was also transported from the scene.

Kenneth J. Tremblay, 2005, "Firewatch," *NFPA Journal*, January/February, 14+16.

Sprinkler Controls School Fire, Connecticut

Heat from a fire in a high school's boiler room activated a single sprinkler, which contained the fire while its water flow alarm alerted teachers, students, and the fire department.

The steel-framed school, the dimensions of which weren't reported, had concrete block walls and a metal roof. Sprinklers had been installed throughout, and fire extinguishers were present.

The fire began on a wooden workbench when cigarette butts ignited a polystyrene cup being used as an ashtray. Burning polystyrene dripped between the slats of the workbench to shelving below, igniting wooden blanks, a cardboard box, and accumulations of oil and dust. An occupant of the boiler room tried to put out the fire with a portable fire extinguisher, but was unsuccessful.

Damage to the building and contents was not reported. No one was injured.

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

Torch Ignites Roofing Materials in School, California

A fire that began when a contractor applying a new roof ignited the roof-covering glue with a propane torch fire heavily damaged a high school while classes were in session.

The three-story, wood-framed school had a stucco exterior. Smoke and heat detectors were located throughout the building, as was a wet-pipe fire sprinkler system, but they weren't factors in the incident because of the fire's location.

The contractor was heating the glue with the torch to speed the adhesion process when the glue ignited, starting a fire that quickly spread to other roofing materials. Workers tried to smother the blaze with tar paper, but only increased the fire's intensity.

The workers left the roof, and the contractor called 911 at 11:12 a.m. En route to the incident, officers saw smoke and struck a second alarm.

Firefighters arrived four minutes later to find that the building had already been evacuated and that heavy smoke was coming from the roof. Ladder companies were ordered to place master streams into operation.

Once the firefighters brought the heavy fire under control, they placed hose lines above and below the roof, finally bringing the fire under control hours later.
Two roofers suffered burns and were taken to an area hospital.

The fire heavily damaged the school building, valued at $2.5 million, which sustained property damage of $1.5 million.

Its contents, valued at $1.5 million, were estimated to have sustained $500,000 in damage.

Kenneth J. Tremblay, 2003, "Firewatch," *NFPA Journal*, September/October, 20.

Stage Lights Ignite Backdrop in Auditorium, Connecticut

A student tripped over ropes holding up a stage backdrop in a school auditorium, knocking the combustible backdrop against the stage lights, which eventually ignited it, triggering the building's fire-detection system.

The single-story, steel-frame high school had masonry walls and a metal roof covered with built-up materials. Its fire-detection system consisted of hallway smoke detectors, heat detectors in hazardous storage areas, and manual pull stations. The entire system was connected to a municipal fire alarm system. The school, which was unsprinklered, wasn't in session because it was a weekend, but several people were on hand to attend special events.

Heat from the fire tripped the auditorium's detectors, alerting the custodian and the fire department at 12:46 p.m. Several people also called 911 to report the fire. When fire crews arrived six minutes later, they discovered heavy smoke and struck a second alarm. Firefighters brought the blaze under control five hours later, limiting fire damage to the auditorium and smoke damage to the hallways and areas near the auditorium.

Investigators believe that when the student tripped, the backdrop fell against the stage lights, which later were turned on for about an hour, then turned off. By that time, however, they'd created enough heat to ignite the backdrop.
No dollar loss was reported, and there were no injuries.

Kenneth J. Tremblay, 2002, "Firewatch," *NFPA Journal*, November/December, 22.

Delay in Detection Results in Severe Fire Loss, Missouri

A church school was heavily damaged by a fire that began in the basement kitchen and burned undetected in concealed spaces for more than an hour. Firefighters were forced to pull back an interior attack and fight the fire with exterior hose streams when the wood floor trusses collapsed.

The school had been built in two stages using wood framing and engineered wooden floor and roof trusses for support. Its exterior walls were covered with brick veneer, and it had a metal roof. The front of the structure, which was 220 feet (67 meters) long and 125 feet (38 meters) wide, was one story high, and the rear of the building was two stories high.

A fire detection system provided a local alarm, but the system had been deactivated at the time of the fire for an unknown reason. There were no sprinklers.

Firefighters arrived within four minutes of receiving a report of fire from a neighbor at 1:54 a.m. The crews found heavy smoke coming from the building and saw flames where the building changed height. The firefighters established a water supply and began an interior attack from the rear basement level.

The ceiling/floor above had already collapsed. When the floor of the addition collapsed, firefighters were ordered out of the structure.

Ordinary combustibles at or near a refrigeration unit ignited and the fire spread in concealed spaces until the neighbor noticed it.

The building and its contents had a combined value of $2.25 million and sustained $1.3 million in damage. There were no injuries.

Kenneth J. Tremblay, 2002, "Firewatch," *NFPA Journal*, September/October, 22.

Large-Loss Fire at Kentucky University
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, 2002, *Large-Loss Fires in the United States in 2001*, NFPA Fire Analysis and Research, Quincy, MA

High School Lab Experiment Injures Student, Michigan
A lab experiment caused a flash fire when methanol burning at a counter ignited vapors from methanol being poured from a storage container. Heat from the flash fire ignited nearby combustibles, including a 17-year-old student's clothing. The fire caused little damage.

The single-story, steel-frame 250,000-square-foot (23,226- square-meter) high school had brick and block walls. Its wood roof deck had a built-up flat roof. The school had no smoke alarms or sprinklers.

The fire occurred in a science lab when the teacher placed methanol in a Petri dish and ignited it. When the teacher then poured additional methanol from a 1-gallon (4-liter) container into another Petri dish a short distance away, the flame from the burning methanol ignited the vapors from the methanol being poured, causing a flash fire.

School staff were alerted immediately and called fire and EMS units at 1:23 p.m. The school security director used a portable extinguisher to put out the small fires before the fire department arrived. Four students and the teacher were taken to the hospital, where they were treated and released. The most severely injured student suffered burns to hair, clothing, and exposed skin. Property loss was estimated at $1,500.

Kenneth J. Tremblay, 2001, "Firewatch," *NFPA Journal*, January/February, 20.

Overloaded Power Strip Ignites School Fire, Indiana
An electrical failure in an overloaded power strip in an elementary school classroom ignited a late-night fire that damaged the structure. Appliances and an extension cord to other power strips were plugged into the power strip of origin.

The irregularly shaped, two-story building covered 60,000 square feet (5,574 square meters). The steel-frame structure had a metal bar joist floor and roof framing, and concrete block walls. Smoke detectors were installed in every corridor and monitored by a central station alarm company, but there were no sprinklers.

A neighbor called 911 to report the fire at 3:14 a.m., and fire crews arrived within six minutes to find heavy fire coming from a second-floor classroom and smoke emanating from the entire building. The incident commander sounded a second alarm as crews formed to conduct an interior attack.

After knocking down the fire from the exterior, the interior crews climbed to the second floor, where they controlled the blaze, limiting flame damage to the room of origin although a portion of the roof above the classroom collapsed. Heavy smoke and heat damage was found in the second-floor classrooms and corridor. Water damaged the lower floor. Investigators later determined that the alarm company didn't call the fire department until after firefighters arrived.

Investigators found that a series of power strips providing electricity to several pieces of equipment in a classroom overheated a cord and ignited wooden cabinets. A rechargeable flashlight was plugged into one outlet and a power strip was plugged into another. A coffee

maker and an electrical extension cord were plugged into this strip that led to another power strip that fed a computer and monitor. The same extension cord was plugged into a third power strip that fed a printer. An electrical failure in the power strip closest to the outlet provided the heat of ignition, while open doors allowed the fire to spread.

The building, valued at $10 million, sustained an estimated $500,000 in damage. Its contents, estimated at $7 million, 'also sustained estimated losses of $500,000.
There were no injuries.

Kenneth J. Tremblay, 2001, "Firewatch," *NFPA Journal*, November/December, 23.

School Fire Spreads Due to Sprinkler Shut-Off, California
Fire heavily damaged an unoccupied school, because the water supply to the sprinkler system was shut off, allowing the fire to spread to the attic.

The single-story, wood-framed elementary school, which was 60 feet (18 meters) by 60 feet (18 meters), contained five classrooms, two work rooms, two bathrooms, and two mechanical rooms. The building had a peaked roof with a skylight in the middle. Although the property had sprinklers, the building's well, which supplied its water, was shut-down due to dirt in the system. There was also no fire detection system.

When neighbors saw smoke from the school at 7:07 p.m., they called 911 and activated the fire alarm on the building. Nine minutes later, arriving firefighters found smoke and flames coming from the roof and fire at one end of the interior hallway. They stretched hose lines to the building, entered, and began extinguishment.

Several fire companies coordinated a fire attack and ventilation strategy to extinguish the blaze, which had spread to the attic and roof before it even damaged the classrooms below.

One of the building's heating units was found within inches of the wall of origin. No other potential heat sources were found in the area.

Because there was no detection system or operating sprinkler system, the fire burned undetected into concealed spaces.

The structure, valued at $1 million, sustained an estimated $400,000 in direct property damage. Contents were valued at $150,000 and sustained $60,000 in damage.

Kenneth J. Tremblay, 2000, "Firewatch," *NFPA Journal*, July/August, 20.

Welding Operations Ignite Roof Fire, Maine
The new roof of a high school was damaged when welding operations ignited roofing materials.

The 17,760-square-foot (1,650-square-meter), one-story building of ordinary construction had brick walls and concrete floor framing. The steel-framed roof had a rubber and fiberboard deck

and was covered with tar paper. A system of smoke and heat detectors and wet- and dry-pipe sprinklers, all tied into the city's box alarm circuit, protected the property.

Construction workers had been welding new metal roof rafters into place at the school the day before the fire. Apparently, roofing material between the rafters ignited and smoldered for hours until a passerby detected the fire at approximately 5:15 the next morning. The detection system didn't activate, and the sprinklers failed to operate because the fire was burning above them.

The fire department arrived and extinguished the blaze, limiting damage to the $30-million structure to $2,000.

Kenneth J. Tremblay, 1999, "Firewatch," *NFPA Journal*, July/August, 22.

Malfunctioning Power Strip Ignites Blaze, Massachusetts

Heat from a malfunctioning power strip ignited a blaze in a vocational high school's computer lab while the school was closed for the evening. Fire department notification was delayed while the security guard flagged down a motorist for help instead of activating the building's fire alarm system.

The single-story school, which was constructed of concrete and unprotected steel, was protected by partial fire detection and sprinkler systems, but not in the area of fire origin.
Shortly after arriving at the school at 11 p.m., a security guard began his rounds and found that a stove in the kitchen had been left on. He notified his supervisor, who shut off the stove, and the guard continued his rounds. When he returned inside after checking the school grounds, he smelled smoke. He called his firm and then ran back outside to flag down a motorist, who called the fire department at 12:49 a.m.

Firefighters arrived four minutes after the alarm to find the building filling with smoke. The security guard told them about the oven he'd found on in the kitchen, but crews didn't find any fire in that area. Upon further investigation, firefighters found the fire in a classroom at the rear of the school.

Interior crews coordinated with exterior ventilation crews to control the blaze, which involved one-third of the classroom. Additional apparatus arriving in response to a second alarm provided the water supply and a backup attack. Before fire crews could extinguish the blaze, flames spread into the ceiling above the classroom, and smoke damaged the building's east wing.

Investigators determined that a power strip supplying five computers sitting on a wood bench had arced, igniting the bench, and that the flames had spread to the computers. A school official later said that they'd had problems with some of the monitors. Fire detection and suppression systems were ineffective because they weren't located in the area of origin.

Asked by investigators why he hadn't called 911 or activated the internal alarm system, the security guard said that he'd panicked and run from the school.
Damage to the building, valued at $39 million, wasn't reported. There were no injuries.

Kenneth J. Tremblay, 1999, "Firewatch," *NFPA Journal*, March/April, 25.

Fire Ignites in Chemistry Lab, Washington
A sprinkler extinguished a fire that started in the chemistry lab of a junior high school. Heavy smoke prevented custodians from entering the area with extinguishers.

The two-story school was constructed of concrete slabs on metal framing and masonry walls and had a built-up wood roof. It was protected by a wet-pipe sprinkler system and a smoke and heat detection system, both monitored by a central station.

School had recessed for the day, leaving the custodial staff alone in the building, when the fire department received a water flow alarm at 5:08 p.m. Arriving firefighters found that a sprinkler had extinguished a fire in the second-floor chemistry classroom. The fire had consumed a trash can, its contents, and a section of carpet and had spread to books and other materials on a nearby table.

Investigators determined that the blaze was the result of a science experiment conducted earlier that day involving sodium metal in a Petri dish. The material had been disposed of in the trash can, where it gradually produced an exothermic reaction that ignited other rubbish. The sprinkler activated before the smoke and heat detectors could.

Damage to the building, valued at $1 million, and its contents, valued at $200,000, was estimated at $20,000 and $5,000, respectively. No one was injured.

Kenneth J. Tremblay, 1999, "Firewatch," *NFPA Journal*, May/June, 43.

Fire in Concealed Space Damages Occupied School, California
The lack of fire detectors allowed a fire to spread in the attic and concealed spaces between the ceiling and roof of this single-story elementary school. The school, which measured 292 feet by 30 feet and contained eight classrooms, was constructed of unprotected wood framing with a stucco exterior. It had no fire detection system or sprinklers, and its manual fire alarm was out of service when the fire occurred.

A student walking past an unoccupied classroom discovered the fire, which was started by a short circuit or a circuit overload in fixed wiring in the attic. The fire department was called at 9:17 a.m. By the time firefighters arrived, flames were coming from the building's roof, and two classrooms were fully involved. The fire burned down through the ceiling, igniting the heavy fuel load in the classroom below, which was being used as a library. Lack of fire stops in the attic allowed the blaze to spread horizontally and from the attic to another classroom and through the roof. The first classroom was unoccupied because the responsible teacher was out sick, so the fire grew undetected.

Teachers had reported multiple electrical malfunctions before the fire. The building, valued at $1 million dollars, sustained $365,000 in damage. Its contents, valued at $250,000, sustained damages of $75,000. There were no injuries.

Kenneth J. Tremblay, 1998, "Firewatch," *NFPA Journal*, July/August, 21.

Plumber's Torch Ignites Framing, Massachusetts
A plumber accidentally ignited a fire in the wall void of a college housing building under renovation.

The two-story building of unprotected, wood-framed construction measured 200 by 40 feet and was divided into townhouses separated by fire walls. Its fire alarm system was disconnected, and it wasn't sprinklered. At the time of the fire, the building was vacant, and all its utilities had been shut off.

Campus police patrolling the area detected the blaze and notified the fire department at 7:16 p.m. Firefighters arrived four minutes later to find smoke coming from a unit at one end of the building. They advanced a 1¾- inch hose line to each floor of the dwelling and found fire in the walls and ceilings. The incident commander struck a second alarm and called for another engine company for additional staffing, as crews placed additional hose lines into operation and pulled down ceilings and walls to stop the fire spread. A 2-foot layer of cellulose insulation in the attic blocked vertical fire spread but led to horizontal spread in the insulation, forcing crews to open all the walls and ceilings to check for extension.

Investigators determined that the blaze started in a first-floor bathroom when heat or a flame from a plumber's torch ignited structural wood framing. The contractor, who had left the building at around 4:00 p.m., saw nothing unusual. The fire smoldered and burned for roughly two hours before it was detected.

Damage was estimated at $200,000. No one was injured.

Kenneth J. Tremblay, 1998, "Firewatch," *NFPA Journal*, May/June, 42.

Sprinklers Extinguish School Blaze, Pennsylvania
Sprinklers extinguished a fire that started in a high school's ceramic shop when paper that had been placed too close to an operating kiln ignited and spread to wall coverings.

The four-story school, which measured 200 by 200 feet, was of unprotected, ordinary construction. A wet-pipe sprinkler system provided full coverage and was monitored by a central station alarm company. The building also contained fire extinguishers, which weren't used. Although the fire occurred after school hours, the building was occupied at the time.

The alarm company notified the fire department of a water flow alarm in the first-floor ceramic shop at 6:24 p.m. Arriving firefighters discovered that two sprinklers had operated and limited fire damage. They only had to ventilate the building and perform overhaul. Smoke damage was limited to the room of origin and an adjoining room. Damage was estimated at $75,000.

Kenneth J. Tremblay, 1997 "Firewatch," *NFPA Journal*, May/June, 34.

Sprinklers Control Fire in Vacant School, Virginia
Sprinklers controlled a blaze in a vacant high school scheduled for renovations. The fire began when a fluorescent light ballast overheated and ignited ceiling tiles.

The three-story structure, which measured 300 by 200 feet, was constructed of heavy timber and concrete block walls with a brick veneer. The roof was built up over wood decking. An unsupervised, wet-pipe sprinkler system protected the building, which had no detectors.

It was a Sunday and the school was unoccupied when a passerby noticed smoke issuing from the building and called 911 at 6:49 a.m. Firefighters arrived two minutes later and found light smoke coming from the rear of the school. Entering through the back, they found heavy smoke on the first floor and two sprinklers operating to control a small fire in a storage room. Firefighters used a l 1/2-inch handline to complete extinguishment and positive pressure ventilation to remove the smoke from the building.

Firefighters determined that a fluorescent light fixture in the storage room had been left on and that the ballast had overheated and ignited low-density fiberboard ceiling tiles. Heat from the fire fused two sprinklers, which activated to control the blaze.

Fire damage was limited to the room of origin, but smoke spread throughout the entire building. Damage to the school, valued at $4 million, was estimated at only $500. However, the storage room in which the blaze started contained new electronic voting machines, which were damaged by smoke and by water from the sprinklers and the firefighters' handline. The contents of the room, valued at $500,000, were a total loss.

Kenneth J. Tremblay, 1996, "Firewatch," *NFPA Journal*, September/October, 25.

Fire Started by Torch Rekindles, Igniting $1.8 Million Blaze at University in Kentucky
A 50-year-old university building closed for renovations was heavily damaged when a fire started by cutting torches rekindled 4½ hours later.

The windowless three-story classroom building, which covered 19,950 square feet, was of fire-resistive construction. It consisted of structural concrete and steel framing, concrete floors and walls, and a concrete roof with an asphalt covering. Temporary wood-frame partition walls had been erected to separate construction areas during the renovation. Part of the building contained a fire detection system, but it had been shut off because of renovations. There were no sprinklers.

Construction crews were using cutting torches to remove water and radiator pipes in a second-floor classroom shortly after 12:30 p.m., when several members of the crew detected smoke. They managed to trace it to a smoldering fire at one of the partition walls, which they opened up. Inside, they discovered a 2 by 4 burning at floor level and doused it with water. The crew never notified the fire department because they thought they'd extinguished the fire.

Fires had occurred earlier during construction on the third floor, but the construction crew had always been able to extinguish them with fire extinguishers. The foreman had rechecked these extinguished fires several times and found that none had rekindled on the day of the fire.

At 6:00 p.m., an occupant of the building next to the structure under renovation smelled and saw smoke and called the fire department. Firefighters found a blaze on the north side of the second floor, but because the building had no windows, smoke was heavy and the heat was intense, making the seat of the fire difficult to locate and impossible to approach. Firefighters also were told that two large acetylene tanks were stored near the area of origin and learned that there was a wall breach in the vicinity. Afraid that the wall might collapse or the tanks explode, firefighters moved out of the affected area.

The fire spread through the second floor to the temporary combustible walls and to the third floor through plumbing and duct work openings. Firefighters were able to attack the blaze from the south side of the building and prevent it from spreading to an adjacent building.

Firefighters determined that the blaze was started by embers left by the cutting torch fire earlier in the day.

Damage to the building and its contents, which had an insured value of $4 million, was estimated at $1,827,000. There were no injuries.

Kenneth J. Tremblay, 1995, "Firewatch", *NFPA Journal*, September/October, 35.

Sprinklers Limit Damage to School under Construction, Minnesota

Sprinklers and workers using fire extinguishers saved a school that was under construction from extensive damage when the heat of a welding machine ignited the paper wrapping of some ceiling tiles stored next to it. Fire department notification was delayed because the water flow monitoring alarm had not yet been installed.

Construction had nearly been completed when the fire occurred. The fire-resistive building contained a wet-pipe sprinkler system that was operational, except for its external monitoring alarm.

The fire occurred in the storage and loading dock, where the ceiling tiles were stored next to the operating, gasoline-powered welding machine. Heat from the machine's exhaust pipe ignited the tiles' paper wrapping, and the blaze burned until a single sprinkler located directly overhead activated. Interior horns and signal lights activated, notifying workers, who called the fire department. When they went to investigate, the workers found the remnants of the blaze and used a dry chemical fire extinguisher to complete extinguishment before firefighters arrived. Damage to the school, which was valued at $15 million, was estimated at $100.

Kenneth J. Tremblay, 1995, "Firewatch," *NFPA Journal*, May/June, 39.

Sparks from Welder's Torch Ignite Exercise Mats in Athletic Complex in Arizona
When sparks from a welder's torch ignited polyurethane exercise mats in an athletic complex, workers tried unsuccessfully to extinguish the fire before calling the fire department. This delay in alarm allowed the fire to gain substantial headway before firefighters arrived.

The four-story athletic complex, which was part of a large university, was of ordinary construction with brick walls, a structural wood frame roof, and a wood deck. The 16,500-foot building contained a gym, a gymnastics room, a pool, offices, and classrooms. There were no automatic fire or smoke detection systems in the area of origin, but an automatic sprinkler system covered the areas below grade. The building did not contain any portable fire extinguishers.

The building was open at the time of the fire except for the gymnastics room, which was being renovated. Shortly before 3:30 p.m., welders were installing steel reinforcements for the wood roof rafters when a spark from a torch ignited the floor mats below them. The workers tried unsuccessfully to put out the fire using portable fire extinguishers and finally called the fire department approximately 5 minutes later.

Arriving firefighters observed white smoke coming from the building and decided to stage an offensive interior attack. However, intense heat and smoke, the configuration of the room of origin, and the threat of collapse of unsecured steel beams and scaffolding prevented the crews from reaching the seat of the fire. They then switched to a defensive attack and used master streams to protect exposures and to attack the blaze through breached wall openings. Additional alarms were struck before firefighters were able to bring the fire under control approximately 2 1/2 hours later.

The gymnastics room sustained severe damage, but a masonry wall that divided an interior portion of the building limited fire spread. Damage to the building and its contents, which were valued at $6.5 million, was estimated at $1.8 million.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, September/October, 30.

Detectors Alert Occupants to Fire in School, Oregon
A school's automatic smoke detection system alerted students and faculty to an electrical fire that started in ceiling and roof voids, allowing them to escape without injury.

The two-story middle school was constructed of unprotected wood framing. A brick veneer covered the exterior walls, and several layers of roofing material had been added to the flat roof. Smoke detectors connected to an automatic dialer alarm protected the building. There were no sprinklers.
The fire department received an alarm from the automatic dialer system at 7:46 a.m. Upon hearing the alarm, faculty and students evacuated the building.

Arriving firefighters found the blaze in concealed wall voids and in the attic, where it was spreading laterally over classrooms. Firefighters made a trench cut, or a narrow opening, along the roof ahead of the burning wing, providing ventilation, which helped stop the spread of fire in the concealed attic. The trench cut confined the fire to one wing of the building, limiting damage

to classrooms, offices, lockers, and a bathroom. Firefighters used interior handlines to complete extinguishment.

Investigators determined that an electrical conduit in a wall void had been placed directly against wood shiplap siding and had heated the siding over a period of time. As the ignition temperature of the siding dropped, it eventually ignited at a spot level with the ceiling. The fire spread into the attic. There were no injuries. Damages were estimated at $1.35 million.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, September/October, 28.

Flash Fire in Science Lab Injures Teacher and Student, Tennessee

When a science teacher used duplicating fluid as a cleaning solvent and then tried to burn off the residual vapors during a science class, a flash fire erupted, followed by an explosion. The fire was quickly extinguished, but not before it burned the teacher and a student.

The single-story junior high school, which was occupied on the morning of the incident, was of unprotected, noncombustible construction. Smoke detectors were located in the hallways, and portable fire extinguishers were located at the doorway to each classroom. There was no automatic suppression equipment. The classroom in which the incident occurred measured 40 feet by 20 feet.

The science instructor was using duplicating fluid to clean the top of a table and spilled some of the liquid over the side. The teacher asked a student to light a match and burn off the excess fluid. When the student ignited the residue, a flash fire occurred and burned back to the open can of duplicating fluid, which was on the floor. The can exploded, igniting the student's and teacher's clothing.

A teacher in an adjacent room heard the explosion and used a dry chemical fire extinguisher to put out the fire. Smoke detectors in the hallway were not a factor because the fire was extinguished quickly.

According to students, the teacher had routinely used the duplicating fluid as a cleaning solvent, burning off the excess fluid without incident. The school sustained $1,500 in damages.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, March/April, 30.

Sprinklers Extinguish Arson Fire in Unoccupied High School, Florida

An arsonist used flammable liquids and a long string fuse to set a fire in a school that was closed for the weekend. Fortunately, the building's automatic smoke detection and sprinkler systems activated, notifying the fire department and extinguishing the fire.

The two-story high school was of unprotected, noncombustible construction. A hard-wired smoke detection system and a wet-pipe sprinkler system that was monitored by a central station alarm company protected the hallways. The school also was equipped with manual pull stations and portable fire extinguishers.

At approximately 7:30 a.m, the alarm company notified the school's head janitor that the school's alarm had activated. Because the school had been experiencing problems with the alarm system,

the company asked the janitor if he wanted them to silence the alarm. The janitor decided to check the school himself and arrived about 10 minutes after he was called. When he reached the second floor of the building, he found a fire and called the fire department.

Firefighters found several hundred feet of a string fuse leading to the area of fire origin and flammable liquid covering the second floor. As a precaution, a hazardous materials team was called in to check the explosive range of the unburned flammable liquids.

Investigators determined that an arsonist had covered the second floor with flammable liquid and positioned stacked rolls of toilet paper to further aid the spread of fire. The arsonist then ran several hundred feet of string fuse from the area of origin, down a hallway, and into a closet. The fuse led to an unlocked roof hatch, through which the arsonist may have entered and left the school. When the fire started, however, a single sprinkler extinguished it before flames could ignite the remaining accelerant.

The second-floor hallways were extensively damaged by smoke, and the first-floor and second-floor classrooms sustained water damage. Damage to the school and its contents, valued at approximately $2.1 million, was estimated at $250,000.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, January/February, 29.

Plumber Ignites Insulation in School, California

A plumber using a propane torch ignited paper-backed insulation in the ceiling space of an elementary school. He used a fire extinguisher to put out the flames and prevented a potentially devastating fire in the school's concealed spaces.

The single-story elementary school was not in use at the time of the fire because it was summer vacation. The 4,000-square-foot building of unprotected, wood-frame construction had an exterior stucco veneer and was not equipped with automatic fire detection or suppression equipment.

The plumber was soldering fittings on water pipes in the space between a classroom ceiling and the roof. When the flame from his propane torch ignited the paper backing on some insulation, the fire spread about 10 feet along the combustible backing before he was able to use a 2-A:20-B:C, dry-chemical fire extinguisher to put out the fire.

The fire department was called immediately and responded to the alarm at 2:35 p.m. The fire was extinguished when firefighters arrived, so they had only to remove the burned insulation and check for flame extension. The quick detection by the plumber and his rapid reaction prevented excessive damage. The fact that extinguishers were located every 75 feet in the property helped him to react quickly. Damage to the structure and contents was estimated at $1,000 against a total value of $200,000.

Kenneth J. Tremblay, 1993, "Firewatch," *NFPA Journal*, July/August, 28.

Student with Lighter Ignites Occupied School, Massachusetts

An elementary school student accidentally ignited papers in an unoccupied classroom using a disposable lighter he had found. Because teachers and the building's automatic detection system quickly detected the fire and all occupants were proficient at evacuation as the result of repeated exit drills, the students were safely evacuated and the fire department was promptly notified.

Built in 1960 as an addition to the school, the single-story wing where the fire occurred was of unprotected, concrete block and steel bar-joist construction. The building was not equipped with sprinklers or a hydrant system, but smoke detectors in the corridors and heat detectors in the attic space were monitored by an alarm company.

When a teacher took her students to the school lunchroom for an afternoon break at about 12:20 p.m., a student entered the vacant classroom and ignited paper products in a plastic trash barrel. He said he was scared by the flame and threw the lighter away.

The student left to ask a teacher for help with the lost lighter, but became involved in the alarm and evacuation before he could do so. The youngster did not see where the lighter landed, so it is not clear whether he meant to ignite the specific items that led to the larger fire.

The fire consumed the rubbish and the combustible barrel, and then spread to a desk and an adjacent bulletin board. One or more students noticed smoke and reported it to a teacher who was about to pull a hallway fire alarm when smoke detectors in the corridor sounded.

The local fire department's response to the 12:29 p.m. alarm included six engines, a tanker, a rescue unit, and support vehicles. Mutual-aid companies dispatched an additional engine and a truck company to the scene, and provided coverage at stations.

Arriving firefighters saw dense, black smoke coming from the school's northeast wing and advanced 1 ½-inch handlines through a corridor. A roof team ventilated, using the building's skylights.

The fire was declared under control at 1:37 p.m. After it was knocked down, firefighters used positive-pressure ventilation to remove smoke and then overhauled the scene. Fire damage was limited to the classroom of origin, and smoke damage was moderate in the corridor and minimal in other areas of the school.

Unable to find an accidental cause for the fire, investigators interviewed students, which led to a student who initially denied any wrong-doing. However, he eventually confessed to his mother, who notified officials.

According to the child, he found a disposable cigarette lighter while visiting relatives and brought it to school. While he was playing with it, the lighter came apart, causing a larger flame, which led him to throw the lighter away.

The safe and orderly evacuation of students before firefighters arrived demonstrated that school officials had conducted frequent fire drills. Fire officials expressed concern about the plastic

rubbish container, which created a large amount of acrid smoke and contributed to the fire's rapid spread.

Officials also were concerned that some corridor doors had been left open, facilitating the spread of smoke to sections of the school that otherwise would have been unaffected. On the other hand, because there was only partial coverage with no detector in the room of origin, officials believe there would have been a significant delay in detection if the door to the unprotected classroom had been closed. In addition, an unfavorable pattern of parked vehicles made access to the school difficult and hazardous for emergency vehicles. Damage was estimated at $68,000.

Kenneth J. Tremblay, 1993, "Firewatch," *NFPA Journal*, May/June, 33.

Students and Staff Evacuated Safely Despite Delay in Alarm, California

Despite a delay in alarm caused by a nonfunctioning smoke detector and the failure of school personnel to use manual alarms, the students and staff of a California school were evacuated safely when a grease fire ignited on a stove in a home economics classroom. Before school personnel detected the fire, however, it had impinged on the room's ceiling.

The school was a single-story, 4,800-square-foot building of unprotected, ordinary construction. When personnel saw smoke coming from the classroom, they investigated the source but failed to signal an alarm using the building's manual pull stations. Although staff members extinguished the fire using portable dry-chemical extinguishers, it soon reignited.

The fire department was notified at 11:35 a.m. and responded with three engines, a ladder company, and a chief officer. When firefighters arrived, the building was still occupied by some 1,000 students and staff. Fire officers ordered the evacuation of the school, using the manual alarm system, and then advanced a l 3/4-inch handline to the involved classroom to extinguish the fire.

Damage to the building and its contents was estimated at $2,500. No reason was given for the failure of the smoke detector. School officials reportedly failed to use the internal local alarm system because there were only a few students in the involved section of the building.

Fire officials reminded the school superintendent that the use of evacuation alarms and the immediate notification of the fire department are vitally important when fire or smoke is detected.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, November/December, 29.

Juveniles Ignite Fires in Unoccupied School; $3 Million Loss Results, Nova Scotia, Canada

Incendiary fires set by juveniles destroyed about half of an unoccupied school building after they burned undetected for some 30 minutes. The lack of automatic detection or sprinkler systems and an absence of fire walls or stops in void spaces contributed to fire spread.

The two-story junior and senior high school, which measured 190 feet by 120 feet, had wood and concrete-block construction, as well as a wood and steel roof with a built-up covering. The building was not equipped with automatic detection systems. There was a partial wet-pipe sprinkler system in the vicinity of the stage and a halon system in the cooking areas of the cafeteria.

According to reports, three boys broke into the school at about midnight and ignited two fires, using a lighter and common combustibles. A fire in an office burned itself out. The second fire, which was ignited in the cafeteria, penetrated the ceiling and entered concealed spaces and structural voids.

A passerby notified the fire department at 12:30 a.m., some 30 minutes after the fires were set.

Firefighters quickly extinguished the visible fire. During overhaul, however, they uncovered fire in roof and ceiling voids. Difficult access and the fire's intensity made extinguishment arduous. As the fire spread and burned through the roof, there was a call for additional staffing and resources.

More than 150 firefighters from 20 fire fighting units took part in suppression operations. Because there was no hydrant system, fire fighters had to use transported water. Although this limited the initial attack, personnel were able to attack the fire effectively. They also tried to limit damage to the structure by performing a trench cut in the center of the roof.

Although the building's partial protection systems operated, they were ineffective because they were located away from areas of fire origin and spread. The fire severely damaged half of the building; the remainder sustained moderate to severe water and smoke damage. The combined loss for the structure and its contents was estimated at $3 million.

No injuries were reported. According to news accounts, volunteers and members of the staff salvaged and cleaned what remained of the school, which reopened 1 week after the fire, and the juveniles were arrested and charged with breaking and entering and arson.

Kenneth J. Tremblay, 1992, “Firewatch,” *NFPA Journal*, September/October, 30.

Student Prank with Pyrotechnic Device Ignites School Roof, Massachusetts

Fireworks ignited a fire on the roof of a regional high school soon after an outside assembly for graduating students had begun. When smoke was seen coming from the area of origin after the initial fireworks effects had subsided, a school official climbed to the roof and discovered an intense fire involving the roof covering.

As school officials unsuccessfully tried to extinguish the fire with portable extinguishers, others notified the fire department and initiated an evacuation of the building.

Firefighters found a fire involving the tar and rubber covering on the built-up roof of the brick, block, concrete, and steel building. A 15-mph wind was spreading the blaze. Using the resources

of three fire departments, personnel extinguished the fire and prevented its extension to the building's interior.

Following the incident, investigators found a device consisting of firecrackers, rockets, and a gasoline-operated catapult that was intended to launch a class banner into the air during a school assembly. The device, which was remotely activated by an electronic control, had been placed on the roof the night before. Apparently, it malfunctioned on detonation and generated enough heat to ignite the tar and rubber roof covering.

No injuries resulted from the incident, and the evacuation of the occupied school was without incident. Five students reportedly were charged with constructing, installing, and activating the device. Damage was estimated at $15,000.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, July/August, 27.

11-Year-Old Ignites $1 Million Fire, Oregon

A fire, which an 11-year-old student set in a closet of an unoccupied classroom, quickly spread to the school's attic space and destroyed about one-third of the building.

Some 450 students were in the elementary school when the fire broke out. A passerby saw smoke coming from the attic and called 911 to report the fire at 12:04 p.m. Independently, a teacher noticed the blaze and activated a manual evacuation alarm, alerting students and staff to leave the building.

The single-story structure, built in stages during the 1940s and completed in 1948, consisted primarily of wood-frame components and measured about 250 feet by 150 feet. The outside walls had a brick veneer, and the wood-truss roof combined both pitched and flat styles. Classrooms encircled an interior courtyard on three sides. In 1975, a partial wet sprinkler system that covered common hallways and the areas above classroom doors had been installed. There were no other suppression systems in the building.

According to reports, the student ignited a paper display that was hanging in the closet of a fifth-grade classroom. Fire consumed the material quickly, and the frightened boy left without telling anyone about the fire. The blaze spread into fresh-air vents that led directly through a stack to the attic.

Fire personnel arrived 2 minutes after the initial report and found the evacuation in progress and light smoke issuing from roof vents. Command was established and there was a call for assistance as personnel established a water supply, laddered the building, and attacked the fire. A trench cut was made in the roof on either side of the fire to limit damage, a strategy that was instrumental in saving more two-thirds of the building. Firefighters brought the fire under control, using handlines and master streams. They also had the support of the sprinkler system.

Investigators determined that the attic had fire walls, but breaches by contractors limited their effectiveness. Fire damage was confined to the attic area and to classrooms below those sections

where the roof and ceiling collapsed. The partial sprinkler system was of limited effectiveness because the fire had spread to unprotected sections of the building.

Students and staff were evacuated without injury and taken to a nearby school. A police officer directing traffic near the scene sustained the only incident-related injury when he was exposed to smoke from the fire.

The student admitted to setting the fire. It resulted in $1 million damage to the school, which was valued at $3 million.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, March/April, 25.

Arsonist Torches Abandoned School Building, Mississippi

An intentionally set fire destroyed a gymnasium at an abandoned school complex. The property had no automatic detection or suppression equipment.

A passerby drove two blocks to a nearby fire station to report the fire in the three-story, 123 1/2,-by-102-foot gym. Firefighters arrived within 1 to 2 minutes of the 12:42 p.m. alarm and initiated an interior attack after cutting the lock and chain from the front door.

Heavy fire engulfed the gym's wood floor and stage. Conditions deteriorated in minutes, necessitating the withdrawal of crews and the initiation of defensive operations. Although the gym was destroyed, firefighters prevented the fire from extending to other sections of the building.

Following an extensive investigation, local and federal authorities determined that the fire had three points of origin and that paint thinner had been used as an accelerant. Agents from the U.S. Bureau of Alcohol, Tobacco and Firearms and local police interviewed numerous suspects, and the police made an arrest within 1 day.

Investigators learned that a gang leader had ordered the burning of the gym, as well as other undisclosed acts, if anything were to happen to him. The day before the fire, the gang leader was killed by gunfire in a local bar. The gym was the gang's meeting place.

Kenneth J. Tremblay, 1991, "Firewatch,"*NFPA Journal*, May/June, 27.

Location, Date, Time of Alarm and Dollar Loss	Occupancy Type and Use, Construction Type, Number of Stories, and Operating Status	Deaths & Injuries	Detection & Suppression Systems	Fire Origin and Path	Contributing Factors
Kentucky August 13, 1989 4:00 a.m. $8,104,000	Junior high school at military base; Unprotected noncombustible construction; 70,000 square feet; 1 story Closed for night.	No deaths 5 firefighter injuries.	Heat detectors were present, but their coverage was not reported. The system did not activate because the fire impaired its wiring. There was no suppression system.	Flammable liquids were poured throughout the building in several locations and ignited in the library/media center. As the fire spread, other areas became involved.	Acetylene and propane tanks involved in the fire released their contents through pressure relief valves, thus intensifying the fire. Concrete block walls extended only to the ceiling, allowing the fire to travel in a cockloft-type space. High-value electronic and computer equipment stored in the building contributed to the high loss.

Kenneth T. Taylor and Kenneth J. Tremblay, 1990, "Large-Loss Fires in the United States During 1989". *NFPA Journal*, November/December, 66.

High School Light Fixture Blamed in $1.3 Million Dollar Fire, California
An accidental fire started by a faulty ceiling mounted light destroyed the fine-arts building of this high school.

The one-story building measured 112 by 77 feet and was composed of a wood-frame superstructure with stucco walls and an asphalt roof. Only two small store rooms were equipped with wet-pipe sprinklers, one head in each room, and these rooms survived the fire undamaged. The building had no detectors.

The fire was discovered at 5:15 am by a passerby, who went to a fire station to report it. Responding firefighters were able to keep the blaze from spreading to the gym on one side and to additional classrooms on the other.

The fire began when the ballast in a fluorescent light fixture malfunctioned, overheated, and ignited the wood framing that supported the fixture. Officials believe that the fire may have smoldered for as long as 12 hours before it began burning freely.

The loss was placed at $1.3 million.

Neil Courtney, 1990, *NFPA Journal*, January/February, 13.