STRUCTURE FIRES IN DORMITORIES, FRATERNITIES, SORORITIES AND BARRACKS

Jennifer D. Flynn

August 2009

National Fire Protection Association
Fire Analysis and Research Division

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Abstract

In 2003-2006, U.S. fire departments responded to an estimated annual average of 3,570 structure fires in dormitories, fraternities, sororities, and barracks. These fires caused an annual average of 7 civilian deaths, 54 civilian fire injuries, and $29.4 million in direct property damage. Fires in these properties accounted for 0.7% of all reported structure fires within the same time period. 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. Cooking equipment was involved in 75% of reported structure fires. Only 5% of fires in these properties began in the bedroom, but these fires accounted for 62% of the civilian deaths and 26% of civilian fire injuries. Fires in dormitories, fraternities, sororities, and barracks are more common during the evening hours, between 5 p.m. and 11 p.m., and on weekends.

Keywords: fire statistics, dormitory fires, fraternity fires, sorority fires, barrack fires

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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.

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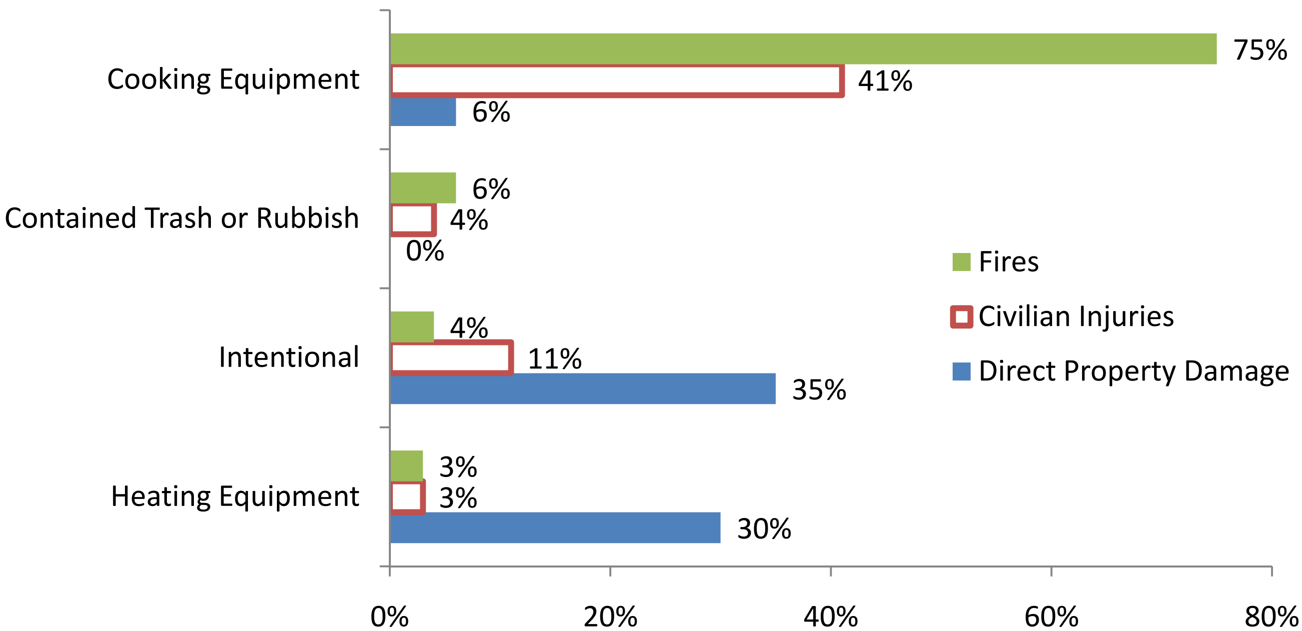
Dormitory, Fraternity, Sorority and Barrack Structure Fires

In 2003-2006, U.S. fire departments responded to an estimated annual average of **3,570 structure fires** in dormitories, fraternities, sororities, and barracks that resulted in **7** civilian deaths, 54 civilian fire injuries, and $29.4 million in direct property damage, annually.

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

Leading Cause of Fires, Civilian Injuries, and Direct Property Damage in Structure Fires Involving Dormitories, Fraternities, Sororities, and Barracks, 2003-2006 Annual Averages



- **Smoking materials** caused 2% of structure fires in these properties, but resulted in 39% of the deaths.
- **75%** of the reported structure fires **involved cooking equipment**. 72% of fires were specifically reported as contained or confined to cooking equipment.
- **Structure fires** in dormitories, fraternities, sororities, and barracks are **more common during the evening hours** between 5 p.m. and 11 p.m., and on weekends.

College Campus Fire Safety

College students living away from home should take a few minutes to make sure they are living in a fire-safe environment. Educating students on what they can do to stay safe during the school year is important and often overlooked.

SAFETY TIPS

- Look for fully sprinklered housing when choosing a dorm or off-campus housing.
- Make sure your dormitory or apartment has smoke alarms inside each bedroom, outside every sleeping area and on each level. For the best protection, all smoke alarms should be interconnected so that when one sounds they all sound.
- Test all smoke alarms at least monthly.
- Never remove batteries or disable the alarm.
- Learn your building's evacuation plan and practice all drills as if they were the real thing.
- If you live off campus, have a fire escape plan with two ways out of every room.
- When the smoke alarm or fire alarm sounds, get out of the building quickly and stay out.
- During a power outage, use a flashlight.
- Cook only where it is permitted.
- Stay in the kitchen when cooking.
- Cook only when you are alert, not sleepy or drowsy from medicine or alcohol.
- Check with your local fire department for any restrictions before using a barbeque grill, fire pit, or chimenea.
- Check your school's rules before using electrical appliances in your room.
- Use a surge protector for your computer and plug the protector directly into an outlet.

Smoking Sense

If you smoke, smoke outside and only where it is permitted, Use sturdy, deep, non-tip ashtrays. Don't smoke in bed or when you've been drinking or are drowsy.

Candle Care

Burn candles only if the school permits their use. A candle is an open flame and should be placed away from anything that can burn. Never leave a candle unattended. Blow it out when you leave the room or go to sleep.

FACTS

- Fires in dormitories, fraternities, sororities, and barracks are more common during the evening hours, between 5 p.m. and 11 p.m., as well as on weekends.
- In 2003–2006 U.S. fire departments responded to an estimated annual average of 3,570 structure fires in dormitories, fraternities, sororities, and barracks.

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Structure Fires in Dormitories, Fraternities, Sororities and Barracks

This analysis contains information about structures fires in school, college and university dormitories, fraternity and sorority houses, monasteries, bunk houses, barracks, and nurses' quarters or related properties reported to local fire departments. In the National Fire Incident Reporting System (NFIRS), these are identified by property use codes 460-469.

Only fires reported to municipal fire departments are included in these statistics. The statistics in this analysis are national estimates derived from data collected in Version 5.0 of the U.S. Fire Administration's (USFA) National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey. Details on the methodology used may be found in the Appendix.

Many students live at home or in off-campus housing not owned by the university or by any fraternal organization. These numbers are not reflected in the statistics in this analysis. Further complicating the picture is the change in dormitory properties themselves. In the past, dormitories did not have kitchens in the individual units. Many of today's dormitories more closely resemble apartment buildings with suite style apartments that include kitchens. The distinction between apartments and dormitory properties is now quite blurred.

On average, 3,570 structure fires were reported in these properties per year in 2003-2006. During the four-year period of 2003-2006, an estimated average of 3,570 structure fires were reported in dormitories, fraternities, sororities and barracks per year. These fires caused an annual average of seven civilian deaths, 54 civilian injuries, and $29.4 million in direct property damage. (See Table A)

Table A. Structure Fires in Dormitory Properties, by Occupancy
2003-2006 Annual Averages

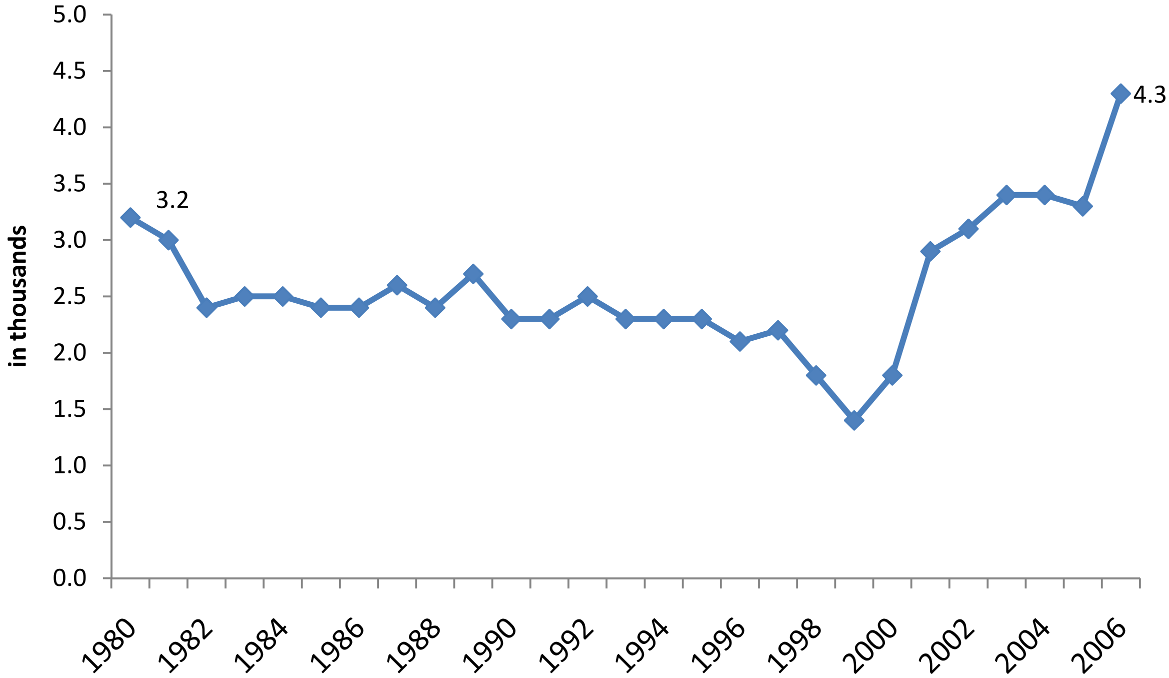
	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified dormitory type residence	2,610	(73%)	4	(63%)	42	(77%)	$23.8	(81%)
Fraternity or sorority house	200	(6%)	2	(29%)	4	(8%)	$2.6	(9%)
Dormitory or barracks	760	(21%)	1	(9%)	8	(15%)	$2.9	(10%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections; therefore, 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.

Source: NFIRS and NFPA survey.

0.7% of all reported structure fires occurred in dormitory properties.
During 2003-2006, the 3,570 fires in dormitory properties accounted for 0.7% of the 520,100 structure fires, 0.2% of the 3,130 civilian structure fire deaths, 0.4% of the 15,200 civilian structure fire injuries, and 0.3% of the $9 billion in direct property loss.

Figure 1. Structure Fires in Dormitories, Fraternities, Sororities, and Barracks, by Year 1980-2006



Source: NFIRS and NFPA survey

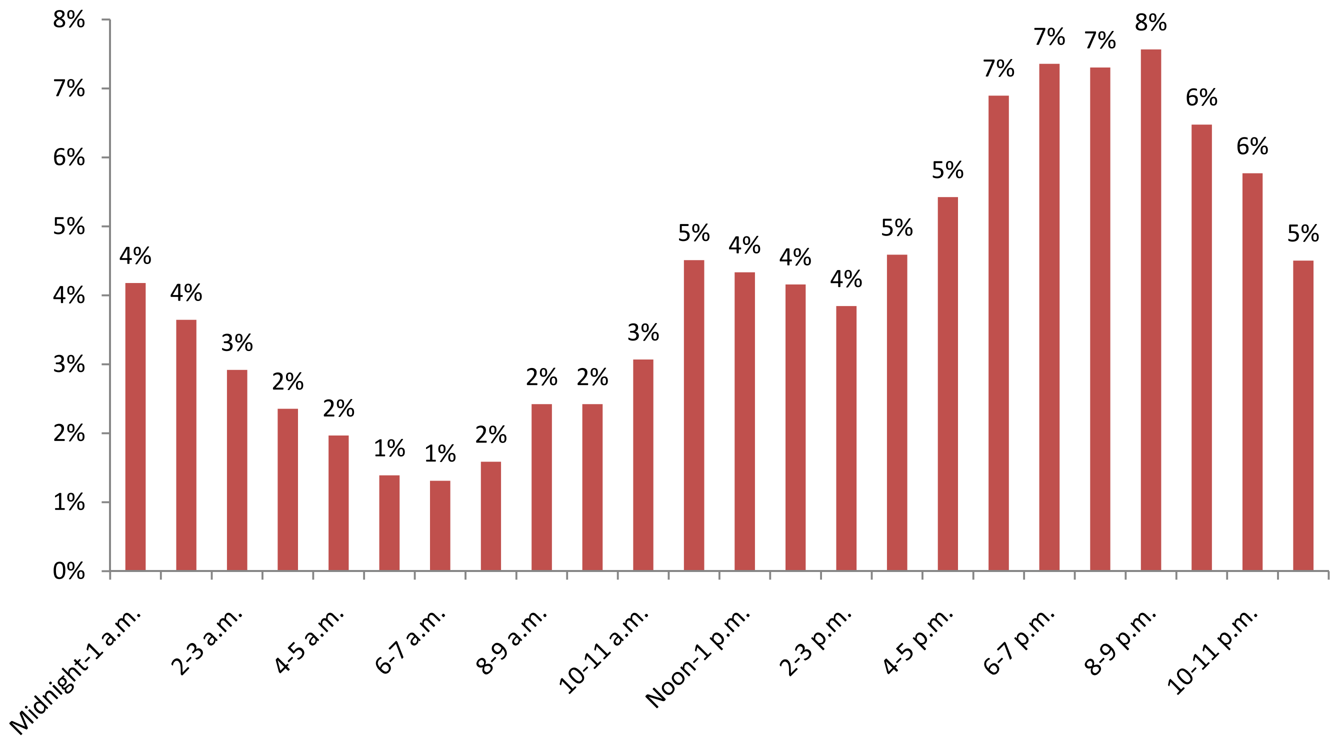
Since 1980, structure fires in this property group have increased 34%.
As shown in Table 1 and Figure 1, the number of reported fires in the dormitory occupancy group increased 34% from 3,200 in 1980 to 4,290 in 2006. The number of fires reported in 2006 was at its highest point since 1980. Fires fell in the range of 2,300 to 2,700 from 1982 through 1995, and then declined further in 1996 to 1998. Estimates increased after 1998, including a sharp increase in 2002 that was sustained in subsequent years. In comparison, structure fires of all types declined 51% from 1980 to 2006.

At least some of the increase in dormitory property structure fires 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. If use of automatic detection/alarm equipment with automatic fire department notification increased, the share of fires reported might have been expected to increase as well.

In 2000, a New Jersey dormitory fire that killed three people focused the nation's attention on dormitory fires. In its aftermath, it is possible that more dormitories installed smoke detection systems that automatically alert the fire department, although no data on usage of this equipment has been found to confirm this. Such a change in detection and notification could lead to greater reporting of dormitory fires even if the actual fire frequency did not increase.

Dormitory property structure fires were more common on weekends than during the week. Tables 2, 3, and 4 show reported structure fires in these properties by month, day of week and alarm time, respectively. October was the peak month for fires in dormitory properties. The fewest occurred in June, July, and August. Saturday and Sunday were the peak days, with 32% of dorm fires taking place on the weekend. As shown in Figure 2, the peak time of day was between 5 p.m. and 11 p.m. These fires were less common between 3 a.m. and 10 a.m.

Figure 2. Structure Fires in Dormitories, Fraternities, Sororities, and Barracks, by Time of Day in 2003-2006



Source: NFIRS and NFPA Survey

Cooking equipment was involved in 75% of the reported dormitory property fires. Table 5 shows 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 6; more information on heat source is in Table 7.

Cooking equipment was listed as the equipment involved in ignition in 75% of these fires; although causal information is not routinely collected for confined or contained fires, some type of cooking equipment was presumably involved in the confined cooking fires (72% of total fires). Six percent of the fires in these properties were contained trash or rubbish fires. Four percent of fires in these properties were intentionally set. Heating equipment was identified as the equipment involved in 2% of these fires; an additional 1% were confined heating equipment fires. Smoking materials[1] caused 2% of the fires and 39% of the civilian fire deaths in these properties.

Most civilian deaths occurred in fires that started in the bedroom.
Five percent of the reported structure fires in dormitory properties originated in the bedroom. These fires resulted in 62% of the civilian fire deaths and 26% of civilian fire injuries. The remainder of the deaths resulted from fires that started in a common room, living room or den. (See Table 8.)

Food or cooking materials were most common item first ignited.
Cooking materials, including foods, were specifically identified as the item first ignited in 2% of these fires. Presumably most of the confined cooking fires (72%) also began with food or cooking materials. Rubbish, trash or waste was identified as the item first ignited in 8%. Two percent of the fires in these properties began with magazines or papers. Only 1% of the fires began with upholstered furniture, but these fires accounted for 54% of the civilian fire deaths and 21% of the civilian fire injuries. (See Table 9.)

In 2006, 58.1% of structure fires in these properties occurred in structures with automatic suppression systems present.
Dormitories and barracks showed a jump in reported presence of automatic extinguishing equipment in 2006, which may reflect the influence of national campaigns to increase fire protection and fire safety on campuses.[2]

During 2003-2006, when automatic suppression equipment was present in structure fires in these properties and the type of equipment was known, 93% were sprinklers. Of these fires, 99% 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, 71% of failures were due to the system being shut off and 29% were due to manual intervention, which defeated the system. See NFPA's report, *U.S. Experience with Sprinklers and Other Automatic Fire Extinguishing Equipment* for more information.

Most fires in these properties were small.
Eighty percent of the reported structure fires in these properties were confined or contained fires. In addition to the 80% that were identified as contained or confined fires, 10% were confined to the object of origin. Only 3% of these fires spread beyond the room of origin. Roughly two-thirds of the deaths resulted from fires in which flame damage was confined to the room of fire origin. (See Table 10.)

880 outside or other non-structure, non-vehicle fires, on average, were reported per year at these properties.
During 2003-2006, an estimated annual average of 880 outside and other fires on these properties caused an average of three civilian injuries and $40,000 in direct property damage per year. An average of 30 vehicle fires reported on these properties caused an annual average loss of $50,000. No civilian fire injuries or deaths resulted from any vehicle fires on these properties reported to NFIRS. No outside fire deaths on dormitory, fraternity, sorority, or barracks properties were reported to NFIRS during this time either.

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[1] A proportional share of heat from unclassified open flame or smoking materials is included in the estimates for candles and smoking materials.
[2] John R. Hall, Jr., *U.S. Experience With Sprinklers and Other Automatic Fire Extinguishing Equipment,* NFPA Division of Fire Analysis and Research, January 2009.

Table 1. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Year, 1980-2006

Year	Fires	Civilian Injuries	Direct Property Damage (in Millions) As Reported	In 2006 Dollars
1980	3,200	122	$9	$22
1981	2,960	118	$13	$29
1982	2,420	103	$9	$19
1983	2,490	156	$24	$49
1984	2,510	50	$11	$21
1985	2,440	68	$8	$15
1986	2,350	55	$47	$86
1987	2,560	76	$11	$20
1988	2,430	91	$8	$14
1989	2,650	109	$17	$28
1990	2,330	80	$25	$39
1991	2,270	61	$37	$55
1992	2,470	147	$7	$10
1993	2,270	73	$9	$13
1994	2,320	75	$13	$18
1995	2,330	143	$20	$26
1996	2,050	78	$10	$13
1997	2,200	73	$12	$15
1998	1,810	143	$10	$12
1999	1,380	190	$5	$6
2000	1,780	168	$23	$27
2001	2,940	67	$104	$118
2002	3,110	19	$20	$22
2003	3,350	50	$23	$25
2004	3,380	48	$18	$19
2005	3,270	59	$37	$38
2006	4,290	58	$40	$40

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. Estimates for 1999-2006 are based on data collected originally in NFIRS Version 5.0. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because of the small numbers, civilian deaths are not shown. Fires are rounded to the nearest ten, civilian fire injuries are rounded to the nearest one, and direct property damage is rounded to the nearest million dollars. *Because of low participation in NFIRS Version 5.0 during 1999-2001, estimates for those years are highly uncertain and must be used with caution.* Source: 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."

Table 2. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Month: 2003-2006 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	300	(8%)	1	(9%)	4	(7%)	$1.0	(4%)
February	340	(10%)	0	(0%)	4	(8%)	$1.2	(4%)
March	300	(8%)	0	(0%)	8	(15%)	$8.3	(28%)
April	340	(9%)	2	(25%)	7	(13%)	$5.1	(17%)
May	290	(8%)	1	(10%)	2	(3%)	$1.4	(5%)
June	180	(5%)	0	(0%)	1	(1%)	$1.4	(5%)
July	170	(5%)	1	(19%)	7	(13%)	$0.6	(2%)
August	180	(5%)	2	(29%)	5	(10%)	$1.9	(6%)
September	390	(11%)	1	(9%)	5	(9%)	$1.0	(4%)
October	440	(12%)	0	(0%)	5	(9%)	$0.8	(3%)
November	340	(10%)	0	(0%)	4	(8%)	$4.1	(14%)
December	290	(8%)	0	(0%)	2	(5%)	$2.6	(9%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)
Average	298	(8%)	1	(8%)	5	(8%)	$2.4	(8%)

Table 3. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Day of Week: 2003-2006 Annual Averages

Day	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	600	(17%)	1	(18%)	11	(21%)	$2.2	(7%)
Monday	480	(13%)	0	(0%)	5	(9%)	$13.2	(45%)
Tuesday	510	(14%)	1	(9%)	6	(11%)	$3.1	(10%)
Wednesday	440	(12%)	1	(9%)	8	(15%)	$3.8	(13%)
Thursday	490	(14%)	1	(10%)	7	(13%)	$1.6	(6%)
Friday	490	(14%)	3	(35%)	7	(12%)	$3.4	(12%)
Saturday	550	(15%)	1	(19%)	10	(18%)	$2.1	(7%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)
Average	510	(14%)	1	(14%)	8	(14%)	$4.2	(14%)

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.

Table 4. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Alarm Time, 2003-2006 Annual Averages

Time	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight-12:59 a.m.	150	(4%)	0	(0%)	1	(2%)	$7.4	(25%)
1:00-1:59 a.m.	130	(4%)	0	(0%)	2	(4%)	$0.8	(3%)
2:00-2:59 a.m.	100	(3%)	0	(0%)	1	(1%)	$0.3	(1%)
3:00-3:59 a.m.	80	(2%)	1	(9%)	2	(4%)	$1.0	(4%)
4:00-4:59 a.m.	70	(2%)	3	(38%)	1	(2%)	$1.3	(4%)
5:00-5:59 a.m.	50	(1%)	0	(0%)	1	(3%)	$0.8	(3%)
6:00-6:59 a.m.	50	(1%)	0	(0%)	1	(1%)	$0.2	(1%)
7:00-7:59 a.m.	60	(2%)	0	(0%)	0	(0%)	$1.8	(6%)
8:00-8:59 a.m.	90	(2%)	0	(0%)	4	(8%)	$0.8	(3%)
9:00-9:59 a.m.	90	(2%)	0	(7%)	0	(0%)	$0.1	(0%)
10:00-10:59 a.m.	110	(3%)	0	(0%)	0	(0%)	$0.5	(2%)
11:00-11:59 a.m.	160	(5%)	1	(9%)	2	(4%)	$0.8	(3%)
12:00-12:59 p.m.	150	(4%)	0	(0%)	1	(2%)	$1.2	(4%)
1:00-1:59 p.m.	150	(4%)	0	(0%)	4	(8%)	$4.3	(15%)
2:00-2:59 p.m.	140	(4%)	0	(0%)	3	(6%)	$0.4	(1%)
3:00-3:59 p.m.	160	(5%)	0	(0%)	0	(0%)	$0.8	(3%)
4:00-4:59 p.m.	190	(5%)	1	(10%)	2	(4%)	$0.5	(2%)
5:00-5:59 p.m.	250	(7%)	0	(0%)	5	(10%)	$3.3	(11%)
6:00-6:59 p.m.	260	(7%)	0	(0%)	3	(6%)	$0.6	(2%)
7:00-7:59 p.m.	260	(7%)	0	(0%)	2	(3%)	$0.2	(1%)
8:00-8:59 p.m.	270	(8%)	0	(0%)	2	(4%)	$0.8	(3%)
9:00-9:59 p.m.	230	(6%)	1	(19%)	5	(9%)	$0.2	(1%)
10:00-10:59 p.m.	210	(6%)	1	(9%)	7	(13%)	$0.4	(1%)
11:00-11:59 p.m.	160	(5%)	0	(0%)	4	(8%)	$0.9	(3%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)
Average	149	(4%)	0	(4%)	2	(4%)	$1.2	(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.

Table 5. Leading Causes of Structure Fires in Dormitories, Fraternities, Sororities and Barracks, 2003-2006 Annual Averages

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Cooking equipment	2,700	(75%)	0	(0%)	22	(41%)	$1.7	(6%)
Confined cooking fire	*2,570*	*(72%)*	*0*	*(0%)*	*11*	*(20%)*	*$0.3*	*(1%)*
Identified cooking equipment	*120*	*(3%)*	*0*	*(0%)*	*12*	*(22%)*	*$1.5*	*(5%)*
Contained trash or rubbish fire	230	(6%)	0	(0%)	2	(4%)	$0.0	(0%)
Intentional	140	(4%)	0	(0%)	6	(11%)	$10.3	(35%)
Heating equipment	110	(3%)	0	(0%)	1	(3%)	$8.8	(30%)
Identified heating equipment	*60*	*(2%)*	*0*	*(0%)*	*1*	*(3%)*	*$8.8*	*(30%)*
Confined heating equipment	*50*	*(1%)*	*0*	*(0%)*	*0*	*(0%)*	*$0.0*	*(0%)*
Smoking materials (i.e., lighted tobacco products)	70	(2%)	3	(39%)	10	(18%)	$2.6	(9%)
Candle	70	(2%)	1	(19%)	6	(11%)	$3.7	(13%)
Electrical distribution and lighting equipment	60	(2%)	0	(0%)	6	(12%)	$3.3	(11%)
Clothes dryer or washer	60	(2%)	0	(0%)	1	(2%)	$0.1	(0%)

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.

Source: NFIRS and NFPA survey.

Table 6. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Equipment Involved in Ignition, 2003-2006 Annual Averages

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	2,570	(72%)	0	(0%)	11	(20%)	$0.3	(1%)
No equipment involved	310	(9%)	7	(100%)	19	(35%)	$14.4	(49%)
Contained trash or rubbish fire	230	(6%)	0	(0%)	2	(4%)	$0.0	(0%)
Range with or without oven, cooking surface	80	(2%)	0	(0%)	10	(19%)	$1.3	(4%)
Clothes dryer	50	(1%)	0	(0%)	0	(0%)	$0.1	(0%)
Lamp, bulb, or lighting	40	(1%)	0	(0%)	3	(5%)	$0.3	(1%)
Confined fuel burner or boiler fire	40	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Fixed or portable space heater	30	(1%)	0	(0%)	1	(3%)	$0.7	(2%)
Fan	20	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Microwave oven	20	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Other confined fire	30	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known equipment	160	(4%)	0	(0%)	7	(14%)	$12.0	(41%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. 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. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 7. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Heat Source, 2003-2006 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	2,570	(72%)	0	(0%)	11	(20%)	$0.3	(1%)
Contained trash or rubbish fire	230	(6%)	0	(0%)	2	(4%)	$0.0	(0%)
Radiated or conducted heat from operating equipment	120	(3%)	0	(0%)	6	(11%)	$1.5	(5%)
Unclassified heat from powered equipment	110	(3%)	0	(0%)	3	(5%)	$1.3	(4%)
Smoking materials (i.e., lighted tobacco products)	70	(2%)	3	(39%)	10	(18%)	$2.6	(9%)
Candle	70	(2%)	1	(19%)	6	(11%)	$3.7	(13%)
Arcing	50	(2%)	0	(0%)	2	(4%)	$7.2	(24%)
Unclassified hot or smoldering object	40	(1%)	0	(0%)	1	(1%)	$0.2	(1%)
Unclassified heat source	40	(1%)	3	(42%)	3	(5%)	$2.0	(7%)
Hot ember or ash	40	(1%)	0	(0%)	3	(5%)	$1.4	(5%)
Lighter	40	(1%)	0	(0%)	1	(1%)	$0.4	(1%)
Spark, ember or flame from operating equipment	40	(1%)	0	(0%)	3	(6%)	$6.7	(23%)
Confined fuel burner or boiler fire	40	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Match	30	(1%)	0	(0%)	3	(5%)	$0.6	(2%)
Other confined fire	30	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known heat source	50	(1%)	0	(0%)	1	(2%)	$1.6	(5%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. 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. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 8. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Area of Origin, 2003-2006 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	2,570	(72%)	0	(0%)	11	(20%)	$0.3	(1%)
Contained trash or rubbish fire	230	(6%)	0	(0%)	2	(4%)	$0.0	(0%)
Bedroom	180	(5%)	4	(62%)	14	(26%)	$3.5	(12%)
Kitchen or cooking area	120	(3%)	0	(0%)	10	(19%)	$1.3	(4%)
Hallway, corridor, mall	50	(1%)	0	(0%)	0	(0%)	$0.1	(0%)
Lavatory, bathroom, locker room or check room	40	(1%)	0	(0%)	1	(1%)	$0.1	(0%)
Confined fuel burner or boiler fire	40	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Common room, living room, family room, lounge or den	30	(1%)	3	(38%)	5	(10%)	$1.7	(6%)
Laundry room or area	30	(1%)	0	(0%)	1	(2%)	$0.1	(0%)
Unclassified function area	20	(1%)	0	(0%)	4	(8%)	$0.3	(1%)
Other confined fire	30	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known area	240	(7%)	0	(0%)	6	(11%)	$22.0	(75%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. 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. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 9. Structure Fires in Dormitories, Fraternities, Sororities and Barracks by Item First Ignited, 2003-2006 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Confined cooking fire	2,570	(72%)	0	(0%)	11	(20%)	$0.3	(1%)
Rubbish, trash, or waste	280	(8%)	0	(0%)	2	(4%)	$0.6	(2%)
Cooking materials, including food	60	(2%)	0	(0%)	7	(13%)	$0.6	(2%)
Magazine, newspaper, writing paper	50	(2%)	0	(0%)	0	(0%)	$0.2	(1%)
Mattress and bedding material	50	(1%)	0	(0%)	2	(4%)	$1.2	(4%)
Unclassified item first ignited	40	(1%)	2	(31%)	1	(2%)	$0.2	(1%)
Confined fuel burner or boiler fire	40	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Electrical wire or cable insulation	30	(1%)	0	(0%)	3	(5%)	$0.7	(2%)
Upholstered furniture	30	(1%)	4	(54%)	11	(21%)	$2.9	(10%)
Clothing	30	(1%)	0	(0%)	1	(2%)	$0.1	(0%)
Unclassified furniture or utensil	20	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Exterior wall covering or finish	20	(1%)	0	(0%)	1	(1%)	$1.5	(5%)
Appliance housing or casing	20	(1%)	0	(0%)	1	(1%)	$0.7	(2%)
Linen other than bedding	20	(1%)	0	(0%)	0	(0%)	$0.2	(1%)
Structural member or framing	20	(1%)	0	(0%)	1	(1%)	$8.3	(28%)
Box, carton, bag, basket, or barrel	20	(1%)	0	(0%)	4	(8%)	$6.2	(21%)
Flammable or combustible liquid or gas, filter or piping	20	(1%)	0	(0%)	1	(2%)	$1.5	(5%)
Other confined fire	30	(1%)	0	(0%)	0	(0%)	$0.0	(0%)
Other known item	200	(6%)	1	(15%)	8	(15%)	$3.9	(13%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. 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. Totals may not equal sums due to rounding errors.

Source: NFIRS and NFPA survey.

Table 10.
Structure Fires in Dormitories, Fraternities, Sororities and Barracks
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	2,860	(80%)	0	(0%)	13	(24%)	$0.3	(1%)
Confined to object of origin	360	(10%)	3	(37%)	10	(18%)	$2.1	(7%)
Confined to room of origin	250	(7%)	2	(26%)	28	(51%)	$3.0	(10%)
Confined to floor of origin	30	(1%)	0	(0%)	2	(3%)	$1.8	(6%)
Confined to building of origin	60	(2%)	3	(37%)	2	(4%)	$20.5	(70%)
Beyond building of origin	10	(0%)	0	(0%)	0	(0%)	$1.7	(6%)
Total	3,570	(100%)	7	(100%)	54	(100%)	$29.4	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. 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.

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.

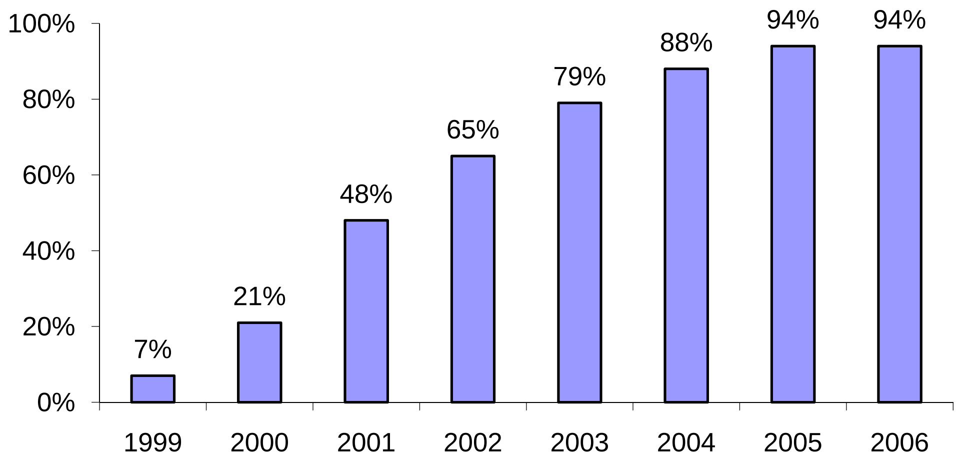
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Code Grouping	EII 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

Fatal College/University Fraternity and Sorority House Fires Reported to U.S. Fire Departments

NFPA FIDO Summary Report
Fatal College/University Fraternity and Sorority House Fires
Reported to U.S. Fire Departments

Date	Location	Civilian Deaths	Civilian Injuries	Property Loss
March, 1973	Dormitory, Alabama	1	0	Not Reported
February, 1974	Dormitory, Maine	1	0	Not Reported
March, 1975	Fraternity House, Vermont	1	1	$100,000
July, 1975	Dormitory, Massachusetts	1	0	Not Reported
January, 1976	Fraternity House, Ohio	2	6	Not Reported
April, 1976	Dormitory, New York	1	27	Not Reported
August, 1976	Fraternity House, Kansas	5	2	Not Reported
December,1977	Dormitory, Rhode Island	10	16	Not Reported
January, 1978	Fraternity House, Texas	1	2	$525,000
March, 1979	Dormitory, Pennsylvania	1	3	Not Reported
April, 1980	Fraternity House, Oregon	1	1	$60,000
July,1980	Dormitory, Iowa	1	0	Not Reported
September, 1981	Dormitory, Texas	1	8	$300,000
March, 1982	Dormitory, Illinois	1	0	Not Reported
September, 1982	Fraternity House, Pennsylvania	1	8	Not Reported
September, 1982	Dormitory, Massachusetts	1	3	$20,000
May, 1983	Fraternity House, Massachusetts	1	1	$75,000
December, 1983	Fraternity House, Texas	1	1	$335,000
January, 1984	Fraternity House, Louisiana	1	0	Not Reported
April, 1984	Fraternity House, Virginia	1	0	$420,000
October, 1984	Fraternity House, Indiana	1	30	$100,000
December, 1984	Fraternity House, New York	1	0	Not Reported
March, 1985	Fraternity House, California	1	1	$117,000
April, 1986	Fraternity House, Kentucky	1	0	Not Reported

NFPA FIDO Summary Report
Fatal College/University Fraternity and Sorority House Fires
Reported to U.S. Fire Departments, (Continued)

Date	Location	Civilian Deaths	Civilian Injuries	Property Loss
November, 1986	Dormitory, New Jersey	1	1	Not Reported
April, 1987	Dormitory, Delaware	1	4	Not Reported
September, 1990	Fraternity House, California	3	2	$2,100,000
December, 1990	Fraternity House, Pennsylvania	1	4	Not Reported
February, 1992	Fraternity House, Pennsylvania	1	0	$70,000
October, 1993	Sorority House, Wisconsin	1	2	Not Reported
October, 1994	Fraternity House, Pennsylvania	5	0	$70,000
May, 1996	Fraternity House, North Carolina	5	3	$475,000
October, 1996	Fraternity House, Ohio	1	0	$175,000
January, 1997	Dormitory, Missouri	1	0	$45,000
January, 1997	Dormitory, Tennessee	1	5	$68,000
February, 1997	Dormitory, New York	1	0	Not Reported
December, 1997	Dormitory, Illinois	1	0	Not Reported
September, 1998	Dormitory, Kentucky	1	15	Not Reported
February, 1999	Fraternity House, Missouri	1	0	$1,000,000
February, 1999	Fraternity House, New York	1	0	Not Reported
May, 1999	Fraternity House, Missouri	1	0	Not Reported
January, 2000	Dormitory, New Jersey	3	62	Not Reported
March, 2000	Fraternity House, Pennsylvania	3	0	Not Reported
April, 2000	Dormitory, Massachusetts	1	7	$2,000
June, 2000	Fraternity House, Illinois	1	2	$60,000
May, 2001	Dormitory, Texas	1	1	$50,000
October, 2001	Dormitory, North Carolina	1	0	$155,000

NFPA FIDO Summary Report
Fatal College/University Fraternity and Sorority House Fires
Reported to U.S. Fire Departments
(Continued)

Date	Location	Civilian Deaths	Civilian Injuries	Property Loss
August, 2002	Fraternity House, Michigan	1	0	$200,000
November, 2003	Dormitory, Kentucky	1	0	$4,000
August, 2004	Fraternity House, Mississippi	3	0	$250,000
April, 2005	Dormitory, Tennessee	1	2	$1,500,000
November, 2006	Fraternity House, Nebraska	1	3	$900,000
November, 2006	Fraternity House, Missouri	1	0	Not Reported
January, 2007	Dormitory, Arizona	0	2	Not Reported
January, 2008	Fraternity House, Pennsylvania	0	2	$1,200
January, 2008	Dormitory, Indiana	0	3	Not Reported
May, 2008	Dormitory, Ohio	0	5	Not Reported
May, 2008	Dormitory, Arkansas	0	3	Not Reported
November, 2008	Dormitory, Indiana	0	2	Not Reported
November, 2008	Fraternity House, Pennsylvania	0	1	Not Reported
December, 2008	Fraternity House, Missouri	1	0	Not Reported

Source: NFPA's Fire Incident Data Organization data base.

Note that the civilian casualty figures often differ from the statistical estimates which come from records on a sample of fires. Because deaths are very rare, it is possible for the estimate to show no deaths in a year when a fatal fire did occur and is on NFPA's list of fatal campus fires.

This table lists fatal college dormitory and fraternity and sorority house fires and associated losses identified by the National Fire Protection Association's Fire Incident Data Organization. This listing should not be considered complete since only those incidents for which information was obtained by the National Fire Protection Association were listed.

Revised: July, 2009

Appendix D.
Selected Published Incidents

The following are selected published incidents involving dormitories, fraternities, sororities and barracks. 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.

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.

Sprinklers Control Fire in Dorm, Idaho
Two sprinklers controlled a fire in a dorm room that began when a microwave sitting on a cooktop ignited.

The two-story, wood-and-concrete-block building had a steel-frame roof and a built-up roof surface. The sprinklers had been installed in the building about four years earlier. The cooktop had not been working for some time, but somehow it became operational and ignited the microwave.

Firefighters responded to a waterflow alarm at 10:44 a.m. and found sprinklers controlling a small fire in the dorm room's kitchen. The fire had spread from the microwave to the cabinets above the stove before the sprinklers operated.

The building, valued at $2,900,000, and its contents, valued at $250,000, sustained damages of $5,200 and $800, respectively. There were no injuries

Kenneth J. Tremblay, 2008, "Firewatch", *NFPA Journal*, November/December, 21-22.

Fire in Dormitory Room Extinguished by Sprinkler, Nebraska
A sprinkler extinguished a fire in a school dormitory, however two students suffered smoke inhalation injuries when they tried to fight the fire using portable fire extinguishers.

The fire occurred in a three-story, 75-room dormitory. It was constructed of concrete block walls with concrete floors, and had a roof covered with tar and gravel. A wet-pipe sprinkler system provided full coverage and was operational at the time of the fire. A fire detection system provided coverage in the hallways only and notification to the schools public safety center. There were no local smoke alarms or detectors in the individual rooms. At the time of the fire the building was operating.

A burning candle on a shelf radiating heat or direct flame ignited stored papers and books. Flaming debris fell to a countertop below and ignited other combustibles. An occupant investigating the odor of smoke opened the door to the room, as heat and smoke escaped and triggered the fire detection system.

Occupants first used a portable fire extinguisher on the flames, however, it malfunction releasing only air and no agent. A second extinguisher was used, just as the sprinkler fused and extinguished the flames.

Two male students, both 20, suffered smoke inhalation injuries. Damage to the building was estimated at $75,000 and lost contents were estimated at $75,000.

The fire department found that an exterior water motor gong for the sprinkler did not work and the room to the sprinkler valve was not marked and locked. A delay in controlling water from the sprinkler occurred, as firefighters could not locate the sprinkler room nor did the system include an exterior post indicator valve to shutdown the system. A lack of smoke detectors extending the detection system into the sleeping rooms is being evaluated with the school.

Kenneth J. Tremblay, 2007, "Firewatch", *NFPA Journal*, March/April, 21-22.

Dormitory Destroyed by Fire, All Occupants Escape, Rhode Island

A building used as a college dormitory suffered a total loss when a fire in an attached garage spread quickly. Smoke from the fire triggered detectors and alerted occupants who called 911 and reported the fire at 9:42 a.m. All escaped, but a male and female, both 21, suffered smoke inhalation injuries.

The three-story building measured 71 feet (21 meters) by 50 feet (15 meters) and constructed of wood framing, heavy wood joists and beams, and it had a wooden decked roof covered by asphalt and slate shingles. Containing eight units, the building was protected by a hardwired smoke detection system providing full coverage per local code and connected to a municipal fire alarm. There were no sprinklers.

The fire department arrived within one minute of the alarm and faced considerable smoke coming from the building. Additional resources were called and firefighters entered the building and then entered the garage were the occupants reported the fire was burning. Shortly after, fire quickly engulfed the structure and command ordered all firefighters from the building.

The origin of the fire began in the garage located on the first floor in a rear wall where wooden wall studs met the wooden sill plate. The building valued at $500,000 with contents of $150, 000 was a total loss. In addition to the two civilian injuries, three firefighters suffered non-life threatening injuries.

Kenneth J. Tremblay, 2007, “Firewatch”, *NFPA Journal*, March/April, 22.

Rhode Island, 2006

A building used as a college dormitory was destroyed when a fire started by electrical wiring in the rear wall of an attached garage spread throughout the structure. Smoke from the fire triggered detectors and alerted occupants, who called 911 and reported the fire. All escaped, but a male and female, both 21, suffered smoke inhalation injuries. The fire department arrived to find smoke coming from the building and additional resources were called. In addition to the two civilian injuries, three firefighters suffered non-life threatening injuries.

Source: NFPA's Fire Incident Data Organization.

New Hampshire, 2007

A fire began in a prep school’s girl’s dormitory when a pillow on a bottom bunk came into direct contact with the light bulb of a flexible bed lamp. The student turned on the lamp that was attached to a bed post, pointed the light towards the bed, and went to the bathroom. Upon returning to the room the student found a foul smell and black smoke coming from the pillow. When she picked up the pillow, it started to flame. She threw it into the hallway and began yelling to alert others. Another student called 911 and the dormitory was evacuated. Firefighters arrived at the scene to find a sprinkler had extinguished the fire.

Source: NFPA's Fire Incident Data Organization.

Cell Phone Battery Explodes, Injuring One, Wyoming
A 19-year old college student suffered second- and third-degree burns to her right upper arm and shoulder when a cell phone exploded in her dorm room while it was being charged.

The three-story, concrete-block dormitory building, which was 15 feet (5 meters) long and 12 feet (4 meters) wide, had a flat tar and gravel roof. Its complete-coverage fire detection system included hardwired smoke alarms with battery back-up in the two-occupant rooms. A wet-pipe sprinkler system with unknown coverage was also present.

Both the room's occupants were asleep in their beds when a popping sound woke them just after 11 a.m. The victim saw flames by her pillow and quickly moved away, using a blanket to smother them. She did not realize she had been burned until she reached up to try and silence the room's smoke alarm, which had activated, alerting the dorm's occupants and the fire department. Heat from the fire was not sufficient to activate the room's sprinkler.

A 911 call to the fire department sent crews to the scene at 11:06 a.m. to find that the fire had already been extinguished. Firefighters applied emergency medical treatment and took the burned girl to the hospital.

Investigators determined that the battery of a cell phone plugged into an AC charger on the bed near the victim's pillow failed and exploded. The explosion destroyed the battery. The victim normally kept the cell phone near her pillow, as she used it as an alarm clock.

The building was not damaged and damage to the room's contents was estimated at $500.

Kenneth J. Tremblay, 2006, “Firewatch”, *NFPA Journal*, November/December, 23-24.

New Hampshire, 2006
A 20-year-old woman twisted her ankle when she fled a candle fire in her three-story sorority house. The fire started in a third-floor, oversized walk-in closet when the heat from a tea light candle melted and then ignited the plastic cover of the stereo on which the candle had been placed. Detectors alerted occupants and the fire department. A sprinkler activated and controlled the fire before firefighters reached the floor. However, propped open fire doors allowed smoke to spread throughout the third story. The building and its contents, valued at $665,000, suffered an estimated combined loss of $65,000.

Source: NFPA's Fire Incident Data Organization.

Unattended Cooking Starts Dorm Fire, Vermont
A pan of oil left cooking unattended in the first-floor kitchen of a university dormitory ignited, and the resulting fire spread to the kitchen cabinets before a heat detector activated and alerted the occupants.

The three-story dormitory, one of six in a cluster of dorms, had concrete block walls, concrete slab floors, and a metal deck roof with a built-up surface. The building's fire detection system included smoke detectors in the hallways, heat detectors in the lounges and kitchens, and manual pull stations connected to a fire department radio signal call box.

An occupant had placed some cooking oil on an electric stove burner, then left the kitchen for 10 or 15 minutes. When he smelled something burning, he returned to the kitchen, saw the fire spreading to the cabinets, and activated the manual pull station just as the heat detector activated. The residents evacuated safely, and firefighters were able to extinguish the fire quickly, limiting damage to the room of origin. Areas of the building where smoke doors were closed were not damaged.

The building, valued at $1.5 million, and its contents, valued at $500,000, sustained losses of $100,000 and $30,000, respectively.

Kenneth J. Tremblay, 2006, “Firewatch”, *NFPA Journal*, March/April, 28.

Vermont, 2005

A pan of oil left cooking unattended in the first-floor kitchen of a university dormitory ignited, and the resulting fire spread to the kitchen cabinets. An occupant had placed the pan on an electric stove burner on high heat, and then left the kitchen for 10 or 15 minutes. When he smelled something burning, he returned to the kitchen, saw the fire spreading to the cabinets, and activated the manual pull station just as the heat detector activated. The residents evacuated safely, and fire fighters were able to extinguish the fire quickly, limiting damage to the room of origin. Areas of the building where smoke doors were closed were not damaged. The building and its contents, valued at $2 million, suffered an estimated combined loss of $130,000.

Source: NFPA's Fire Incident Data Organization.

Three Die in Unsprinklered Fraternity House, Mississippi

An early-morning fire in a first-floor bedroom of a fraternity house killed three young men and destroyed the building. A passerby reported the fire at 4:30 a.m.

The exterior walls of the three-story, wood-frame structure, which covered 7,600 square feet (706 square meters), were made of wood and brick, and the roof was covered with asphalt shingles. Smoke alarms were present in the unsprinklered structure, but investigators found that they were not working properly.

Investigators could not determine the exact origin of the fire. The building and its contents, each valued at $125,000, were destroyed.

The three victims, a 20-year-old and two 19-year-olds, all died of smoke inhalation.

Kenneth J. Tremblay, 2005, “Firewatch,” *NFPA Journal*, September/October, 32.

Dorm Smoke Alarm Alerts Occupants, Connecticut
Smoke from a bedroom fire at a college dormitory room activated the smoke detection system ha the dorm's hallway and common areas, alerting the fire department and the occupants, all of whom evacuated without incident.

The four-story building had concrete floors and walls, and a brick exterior. A fire detection system with smoke detectors in the corridors and common areas was monitored by a central station alarm company. There were no sprinklers.

The 8:30 p.m. fire began when an electric appliance cord that was touching a metal bed frame failed and ignited the bedding in one of the bedrooms of a first-floor suite.

There was no estimate of the damage. Although the fire, which was initially limited to the bedroom, spread when an investigating campus police officer left a bedroom door open, damage was limited to the suite where the fire started.

Kenneth J. Tremblay, 2005, "Firewatch," *NFPA Journal*, November/December, 18.

Connecticut, 2004
A fire began in a college dormitory, at 8:30 p.m., when an electric appliance cord touching a metal bed frame failed and ignited the bedding in a first-floor suite. Although the bedroom did not have any smoke alarms, the smoke detection system in the dorm's hallway and common areas activated, alerting the fire department and the occupants, all of whom evacuated without incident.

Source: NFPA's Fire Incident Data Organization.

Large-Loss Fire in College Dormitory, Wyoming
Dollar Loss**:** $8,000,000
Month: March
Time**:** 3:33 p.m.

Property Characteristics and Operating Status
This two-story college dormitory was of protected noncombustible construction. The ground floor area was not reported. The dorm was occupied.

Fire Protection Systems
There was a system of automatic smoke detection equipment present. The co verge was not reported but the system did operate. There was no suppression system present.

Fire Development
An overheated power-strip (relocateable power tap) on a wall heated the wall fastenings to a point of failure. The relocateable power tap fell to the floor at the end of the bed and continued to heat and ignited nearby combustibles. The fire was contained to the upper floor.

Contributing Factors and Other Details
Four students were treated at the hospital for smoke related injuries.

Stephen G. Badger, 2005, "Large Loss Fires for 2004", *NFPA Journal*, November/December 45.

Fire Damages Dorm, North Carolina

Around 1:30 a.m., two students were discovered burning books outside their dormitory. When told to extinguish the blaze, the two dumped snow on the partially burned books, then put the books and ashes in a recycling bin next to the building. During the evening, winds gusting from 30 to 40 miles (48 to 64 kilometers) per hour fanned the ashes, which ignited the bin. The fire then spread to the building's wooden exterior.

The two-story, wood-frame dormitory was one of four buildings laid out around a 100-foot (30-meter) by 100- foot (30-meter) courtyard and connected by walkways and a common roof. Its fire-alarm system consisted of smoke and heat detectors and manual pull stations monitored by a central station alarm company. There were no fire sprinklers. The buildings, which had some concrete-block walls, were only partially occupied because the residents had just begun returning from their semester break.

The central station company notified the fire department of the blaze at 4:27 a.m., while several of the building's residents called 911. When firefighters arrived, high winds were fanning the flames, which were spreading from the building of origin to another wing and to the trees in the courtyard.

The incident commander entered the courtyard through an unaffected building and placed hose lines and a portable monitor in the courtyard to keep the fire from spreading further. Additional resources were called in, including two more ladder companies that used defensive hose streams on the burning buildings. Firefighters contained the fire, but not before it heavily damaged two of the other buildings in the quadrangle.

High winds contributed to the fire's rapid spread along the buildings' covered walkways and through their common attic.

Residents escaped unharmed, having been alerted by the fire alarm and by other students banging on doors. However, a 19-year-old woman was injured when she jumped from a second-floor window.

The buildings, valued at $2 million, and their contents, valued at approximately $1 million, were destroyed.

Kenneth J. Tremblay, 2004, “Firewatch” *NFPA Journal*, January/February, 15-16.

Halogen Light Ignites Fraternity House Curtains, Ohio

Operating smoke alarms alerted the sleeping occupants of an off-campus fraternity house to a fire that began when heat from a halogen light bulb ignited the drapery in a common room. About 30 people were in the house at the time, and all managed to escape from the unsprinklered building before firefighters arrived.

The two-story structure was 150 feet (46 meters) long and 60 feet (18 meters) wide. Details about the type of smoke alarms weren't provided. The fire department received a call reporting the fire at 6:59 a.m. Because it came in during a shift change, the fire department responded with six firefighters, twice the number normally sent. When they arrived three minutes later, firefighters saw heavy fire from the left side of the front of the house spreading from the first floor to the second floor and roof.

Using a 1 1/2-inch hose line, crews from the first engine knocked down the exterior fire and advanced into the first-floor hallway towards the room of origin. A second engine tied into a hydrant and laid a 5-inch water supply line to the first pump, then pulled a second 1 l/2-inch hose line for backup. Firefighters managed to control the fire, which had spread to a second- floor bedroom, in 10 minutes.

One occupant suffered shoulder and arm injuries while escaping from a second-floor window. She was taken to the hospital. The $1 million building had damage estimated at $250,000 and its contents, valued at $150,000, had damage estimated at $100.000. None of the firefighters were injured.

Kenneth J. Tremblay, 2003, "Firewatch," *NFPA Journal*, November/December, 14.

Fire Sprinkler Extinguishes Frat House Fire, Maine

A shirt carelessly thrown over a reading lamp in a college fraternity house study room ignited, and the resulting fire spread to other combustibles in the room until the heat activated a fire sprinkler, which extinguished the blaze. The room's occupants and most other students evacuated the fraternity house when the fire alarm went off.

The three-story, wood-framed fraternity house, which was 52 feet (16 meters) long and 59 feet (18 meters) wide, had an asphalt roof. Over the years, it had been renovated, and a complete-coverage smoke and fire detection system had been installed, along with a complete- coverage automatic dry-pipe sprinkler system.

The fire began in a third floor suite made up of a bedroom and a study room, on the floor of which was a mattress. At about 1 a.m., a student who lived in the suite decided to sleep in the study room and tossed off his shirt, which landed on a desk lamp on the floor next to the mattress. About two hours later, the shirt caught fire.

As the fire spread, it activated the single fire sprinkler and woke the student in the study room and his roommate in the bedroom. The two quickly left the suite and alerted other third-floor residents.

The water flow and smoke detectors on the third floor tripped the fire alarm, alerting the fire department at 3:17 a.m. Firefighters arrived within five minutes, and one crew advanced a single hose line into the house, where they discovered that the sprinkler had extinguished the fire. Other crews conducted a primary search and evacuated a few students still sleeping on the second floor.

The property, valued at $100,600, sustained $20,000 in damage. Its contents, valued at $100,000, sustained a $3,000 loss. There were no injuries.

Kenneth J. Tremblay, 2003, "Firewatch," *NFPA Journal*, September/November, 16.

Heat Detectors Delay Response to Dorm Fire, Illinois

The discovery of a fire intentionally set in an unsprinklered, ninth-floor lounge in a high-rise university dormitory was delayed by the room's configuration and a lack of smoke detectors in the building's common areas.

Although automatic heat detectors in the lounge alerted occupants, open doors and voids around vertical piping allowed flames and smoke to spread to the upper floors.

The 20-story, steel-frame building had poured concrete floors, concrete block walls, and a flat, built-up roof, covering 9,505 square feet (883 square meters) of floor space. The fire detection system, which was monitored, consisted of rate-of-rise heat detectors in the hallways and lounges, and smoke detectors in the students' rooms. Although there were no sprinklers, the stairwells contained a standpipe system supported by the fire department using an exterior connection.

The dorm's central station alarm company reported a fire alarm in the building at 4:15 a.m., and fire crews arrived shortly afterward to find fire on the ninth floor. The arriving units were split into three operational sectors. A fire-suppression sector was assigned to the fire floor to extinguish the blaze with 1 3/4-inch hose lines from the standpipe. A second sector was assigned to perform search-and- rescue operations above the fire floor. The third sector, working with the university's public-safety officers, was responsible for evacuation.

Investigators believe the fire started when the foam rubber cushions of the lounge's sofa were intentionally ignited with an unknown source. Flames and smoke spread from the burning couch to the upper floors through a pipe chase and throughout the floor of origin through an open door. Although fire damage was primarily confined to the ninth floor, some smoke and fire damaged the upper floors.

Two 19-year-old men suffered smoke-inhalation injuries. Property loss is estimated at more than $1 million.

Kenneth J. Tremblay, 2002, “Firewatch,” *NFPA Journal*, November/December, 21.

Students Hurt in Incendiary Dorm Fire, Maine

Six students were injured in an early-morning incendiary fire that heavily damaged the dorm's first floor. Compartmentation limited smoke and fire spread, but combustible interior finish led to flash over in two hallways before firefighters arrived.

The four-story, steel-frame building contains 138 rooms and has concrete block walls with a metal deck roof and built-up roofing material. Each floor of the H-shaped building is more than 16,000 square feet (1,486 square meters) and has fire walls and fire doors that close automatically. Fire detection equipment includes smoke detectors in the hallways, manual pull stations, and some heat detectors in other areas, all of which are connected to a supervised fire alarm system monitored by campus security. The building, which was occupied by 240 students at the time of the blaze, is unsprinklered.

The fire department was called one minute after the smoke alarm was received by campus security at 3:40 a.m. Two minutes later, the fire alarm system suffered a catastrophic failure when the ll0v wiring short circuited, causing the main panel to fail.

First-in firefighters, who arrived within six minutes of the first alarm to campus security, reported smoke on the first floor and called for additional companies. As one crew attacked the fire, three teams did search and rescue operations, assisting at least six students in escaping.

The fire was confined to the first-floor hallways near a study hall, knocked down by two fire extinguishers, and a single 1 3/4- inch hose line. Fire doors held flame and smoke spread to the floor of origin.

Investigators determined that the blaze was started intentionally by someone who jammed trash into a gap in the ceiling created when the removal of the track for a folding partition exposed the ceiling/floor void near the electrical and fire alarm wires. The fire spread until the hallway finish became involved. Although the alarm system was silenced early on, due to fire damage to the wiring, nearly all students evacuated safely within a few minutes of the alarm.

Two students jumped from ground floor windows, and at least three were injured when they became lost in the smoky building. Two students were intoxicated, which may have contributed to their confusion. In all, six students suffered smoke inhalation. Damage to the building, valued at $7.76 million, was estimated at $60,000. Contents loss was estimated at $20,000, with no total value reported. There were no firefighter injuries.

Kenneth J. Tremblay, 2001, “Firewatch,” *NFPA Journal*, May/June, 31-32.

New Jersey, 2002

A dormitory fire started when an unattended candle ignited window curtains. The student lit the candle and placed it in the window sill and headed to the bathroom. Upon returning to the room, the student found the curtains on fire. The resident’s assistant for the hall extinguished the fire with a hand held fire extinguisher. The fire was confined to the curtains, window shade, wood trim around the window and the back of a computer monitor.

Source: NFPA's Fire Incident Data Organization

Massachusetts, 2001

Heat from the power connection of a plugged in laptop computer started a fire on the desk in a dormitory bedroom The student was off campus at the time of the fire and the fire department was alerted by a direct fire alarm connection. The high heat in the bedroom melted a television and other plastics in the room. Heat and flame damage was confined to the room of origin, but smoke damage spread to the hall.

Source: NFPA's Fire Incident Data Organization.

Fire Ignites an Upholstered Recliner, Michigan

An early morning fire in a college dorm heavily damaged the suite of origin and spread smoke into the common hallway before firefighters extinguished it. The building had no sprinklers, an interconnected smoke detection system, and only two working battery-powered smoke alarms on a 40-suite floor.

The three-story building had masonry walls, concrete floors, and a roof with a composition covering of asphalt and rubber coating. The L-shaped layout of the suites was similar on each 22,500-square-foot (2,090-square-meter) floor. The only fire detection system on each floor consisted of the battery-powered, single-station smoke alarms.

A 19-year-old resident awoke shortly before 6:00 a.m. and discovered a fire in the living area of his dorm suite. He immediately evacuated the unit and activated a manual fire pull station, sounding an internal alarm and notifying the fire department.

Firefighters arrived shortly after receiving the alarm and stretched a 2 1/2-inch hose line to the third floor. The hose line was then layered off to two 1 1/2-inch high-rise packs, which firefighters used to attack the fire.

Flames heavily damaged the suite's bathroom and living area before spreading to the bedrooms. Smoke spread into the hallway and damaged other rooms on the floor when fleeing students left their doors open.

Investigators determined that the blaze was started either by an improperly discarded cigarette or by a candle left burning near an upholstered recliner. Apparently, the suite's occupants had hosted a party the evening before, and this may have delayed their awaking.

Several students suffered smoke inhalation injuries, and one 20-year-old student seriously injured her back when she jumped from a third-floor window. The student who activated the alarm cut his hand when he broke the glass encasing the alarm. None of the firefighters were injured.

The building, valued at $2,655,580, sustained damages estimated at $2,000,000. Its contents, valued at $487,779, sustained $250,000 in losses.

Kenneth J. Tremblay, 2001, "Firewatch", *NFPA Journal*, March/April, 20.

Sprinkler Controls Dorm Fire, Illinois

Discarded smoking materials ignited a couch in the basement of a dorm, and a sprinkler above the couch controlled it.

The five-story building of ordinary construction housed 240 students. A smoke detection system covered the corridors, and a wet-pipe sprinkler system covered the basement. Both systems were supervised and provided alarm to campus security. The dorm was occupied at the time of the fire but had been evacuated before the fire department arrived.

Firefighters responding to the 1:45 a.m. alarm were notified enroute of smoke in the building. A campus security officer led firefighters to a basement lounge where smoke had banked down about 1 to 2 feet (0.3 to 0.6 meters) from the ceiling and water was discharging from the fused sprinkler. They confirmed that the fire had been extinguished and ordered a fan to remove the smoke. They also shut off the sprinkler valve to limit water damage.

Investigators determined that discarded smoking materials led to the fire, which resulted in a loss estimated at $2,000, compared to a building and its contents value of $11 million.

Fire officials were quoted as saying, "If it weren't for the sprinkler system, we would've had a very serious fire."

Kenneth J. Tremblay, 2000, *NFPA Journal*, November/December, 16-17.

Fraternity House Fire Kills Student, Ohio

A fire started by someone smoking carelessly was thought to have been extinguished, but it reignited during the night, damaging a fraternity house and killing a 19-year-old resident.

The three-story fraternity house was of fire-resistive construction with concrete bearing walls, concrete block interior partitions, and precast concrete floors and ceiling slabs. All the stairways were enclosed with fire-rated doors equipped with self-closing devices. The first floor contained meeting, study, and other rooms. The second floor housed 12 to 15 bedrooms. And the third-floor attic consisted of a large recreation room. Smoke detectors and manual pull stations were connected to a building fire alarm system. There were no sprinklers.

A campus security officer responding to a disturbance call at a nearby fraternity house noticed smoke coming from a second-floor window. He reported the fire to his dispatch center, which called the fire department at 1:52 a.m. He then entered the building and heard the fire alarm operating. The dwelling's occupants hadn't left the building, so the security officer made sure they did.

Firefighters arrived three minutes after notification and found smoke and flames coming from the rear of the building. Assured by the fraternity staff that all the occupants had safely evacuated, firefighters stretched a 1 3/4-inch hose line to the second floor. The attack crew reported severe heat and smoke as low as 6 inches from the floor as they advanced to the room of origin. They quickly knocked down the blaze, and two teams conducted a primary search of the fire floor. They found the victim in a bathroom a few feet from an enclosed exit stairwell.

The room of fire origin contained a couch, love seat, loft bed, coffee table, end table, and mini refrigerator. Earlier that night, residents had extinguished a small fire at one end of the couch, which investigators believe was caused by careless smoking or abandoned smoking materials. Approximately 1 1/2 hours later, the room's resident woke to find that the fire had re-ignited. He left his room and returned with a fire extinguisher, which didn't work. He then left his room again, leaving the door open.

The room of origin was located in the middle of the second floor, two rooms away from the one in which the occupant who died was sleeping. He had evidently tried to escape to the nearby stairwell, but he succumbed to the smoke and was found in a bathroom a few feet from the stairs. Investigators believe that his elevated blood alcohol level, which was 0.15, might have played a role in his death.

Fire officials reported that most of the fire protection features in the building performed well. The corridor's noncombustible interior finish didn't provide an avenue of rapid flame spread from the room of origin. The self-closing doors to the stairwells and dosed bedroom doors kept most of the smoke in the second-floor corridor. And the alarms operated, although most of the residents didn't evacuate until told to do so.

Damage to the building and its contents, valued at just over $1 million, was estimated at $165,000 and $10,000, respectively.

Kenneth J. Tremblay, 1997, *NFPA Journal*, November/December, 23.

Location, Date, Time of Alarm, Number of Deaths	**Occupancy Type and Use, Construction Type, and Number of Stories**	**Detection Systems**	**Suppression Systems**	**Fire Origin and Path**	**Contributing Factors and Victim Locations**
North Carolina; May 12; 1996; 6:06 am; Five	Fraternity house; unprotected, ordinary construction; three stories	There were single-station, battery-operated smoke detectors in a central stairway, in the basement, and in the corridors of the upper floors. A single-station heat detector was also installed in a basement mechanical room.	There were portable. dry-chemical fire extinguishers on the second and third floors and in the basement kitchen. A fixed, dry-chemical system protected cooking equipment in the kitchen.	Smoking materials that were improperly used or disposed of ignited combustibles in a bar in the basement. The fire then spread to the combustible interior finishes and furnishings, and through an open stairway, igniting combustibles on all levels.	All of the victims were found in second-floor sleeping areas. Each of them died of smoke inhalation. Four victims-two men and two women-had blood alcohol levels of 0.14 or higher. The fifth victim, a woman, was found in the doorway to the bedroom in which she was sleeping. She had no detectable alcohol in her blood. All the victims were either 20 or 21 years old. The building had no fire-rated construction separating the assembly areas from the residential areas of the building.

Kenneth J. Tremblay, 1997," Catastrophic Fires", *NFPA Journal*, September/October, 50.

Arson Fire in Fraternity House Strains Department's Resources, Rhode Island
A fire that was intentionally set in a large fraternity house initially strained the fire department's resources and overwhelmed the water supply. However, fire fighters were able to protect some areas of the building and prevent extension to similar properties nearby.

The fraternity house, which was of unprotected, wood-frame construction, ranged from two to three stories. Each floor covered 6,600 square feet. Over the years, additions had been made to the original building, which, at the time of the fire, included heavy truss construction, creating a common cockloft area. The structure included a full kitchen, dining hall, meeting rooms, and a three-story section that contained sleeping rooms. A partial wet-pipe sprinkler system covered all the sleeping areas, the dining room, and the main entrance. The building also contained smoke and rate-of-rise heat detectors, as required by the state's code. The sprinkler system and the smoke and heat detectors, which were connected to a municipal fire alarm system, were all operating at the time of the fire. Normally, the fraternity house lodged 50 students, but it was empty at the time of the fire because the school year had ended.

Firefighters received a fire alarm activation at 2:42 a.m., but because there had been a high number of false alarms at the structure, only a single engine company responded. Before fire fighters arrived, however, college police officers detected the fire and informed the fire department. The response was upgraded to include two additional engines, a ladder, a chief, and a special services truck with additional personnel.

On arrival, the engine company noticed a glow coming from the house and a column of smoke rising 300 feet. The fire fighters, following a prepared plan, immediately stretched a feeder line from a designated hydrant to the house and advanced a 2½- inch handline to attack the fire. Once the handline was set up, they noticed that flames were spreading out the front first-floor windows and into the second-floor windows.

Firefighters had trouble with the feeder line, which was kinked and supplying only limited water to the engine pumping the handline. Once the problem was corrected, the fire fighters were forced to alternate water application between the first and second floors. The hydrant could not support the water flow needed to fight the fire at the size it had reached. Other engines arrived 1½ to 2 minutes after the first engine's water ran out and laid more feeder lines from other hydrants to support additional handlines.

After 16 to 20 minutes of interior attack, there were signs that the house was going to collapse, forcing fire fighters to retreat to a defensive, exterior operation. Fire fighters concentrated on protecting the sleeping section of the building, the only part considered potentially salvageable, by supporting the sprinkler system operating in that area.

Firefighters eventually controlled the blaze using a combination of multiple handlines and master streams. Although more than 90 percent of the sprinklers operated, the greatest damage occurred in the area of origin, which was not protected by sprinklers.

Firefighters had responded to a fire alarm activation at the same fraternity house just the night before. Only two or three people were still in the building at the time, and most of the students' personal belongings and furniture were gone. The fire fighters did not detect anything unusual. Investigators determined that the fire had been set intentionally on the first and second floors of the unprotected section of the building using an undetermined accelerant.
There were no injuries. Damage was estimated at $680,000, making the building a total loss.

Kenneth J. Tremblay, 1995, *NFPA Journal*, May/June, 37-38.

State, Date, Time of Alarm, Dollar Loss	Property Characteristics and Operating Status	Fire Protection Systems	Fire Development	Contributing Factors
Pennsylvania; April 17, 1994; 5:30 p.m. $10,000,000	This private school dormitory, which contained areas built in 1875 and in 1904, was four stories high and had a ground-floor area of 67,500 square feet. It was of unprotected, ordinary construction, with walls of brick and wood. The students who lived in the dormitory were in another part of the building at the time of the fire.	The building was equipped with a system of smoke detectors throughout the hallways, student rooms and faculty apartments. This system was connected to a central station. When alarms sounded, the central station notified the fire department. There was no sprinkler system. Portable extinguishers of an unreported type were present and were used unsuccessfully.	This fire, which was caused by an electrical problem in a third-floor exhaust fan or a cable serving it, was intense and spread rapidly throughout the top two floors. Twelve fire fighters were injured.	The wood was very dry. There were cubbyholes and crawl spaces in the building.

Kenneth J. Tremblay, 1995, "Large-Loss Fires", *NFPA Journal*, November/December, 99.

Location, Date, Time of Alarm, Number of Deaths	Occupancy Type, Construction Type and Number of Stories	Detection Systems	Suppression Systems	Fire Origin and Path	Contributing Factors and Victim Locations
Texas; April 19; 1993; 12:15 p.m.; 47 Deaths	Dormitory; unprotected wood-frame construction; 2 stories	Not reported	Not reported	A fire of undetermined origin began during a raid on the complex by law enforcement officers. The fire completely consumed all structures. The exact location, cause, and path of spread of the fire have not been released.	Seventy-seven people died. The fire killed 47 and 30 others died for reasons not related to the fire. The structure was of simple wood-frame construction. There were no interior wall coverings, and the exposed wall studs contributed to fire spread.

Kenneth J. Tremblay, 1994, "Catastrophic Fires" *NFPA Journal*, September/October, 95.

Man Dies in Frat House Fire When Occupants Ignore Smoke Detectors, Pennsylvania

A 21-year-old man died in an accidental fire in a fraternity house, despite the operation of smoke detectors. Because the detectors in the house had frequently sounded in the absence of fire, residents reportedly ignored the alarms until they smelled smoke and discovered the fire.

Incense-burning, ironically by the student who died in this incident, often activated the smoke detectors in the 8-unit, three-story building of unprotected, wood-frame construction. For that reason, occupants initially believed that the alarm was false. They disregarded it for about 1 hour, until they smelled smoke at 3:30 a.m. Another 22 minutes elapsed before residents called the fire department, as they tried unsuccessfully to extinguish the fire, using five 10-pound extinguishers. There were no sprinklers in the building.

Officials believe that a short circuit in fixed wiring in a second-floor wall space caused the fire, which then spread to wood structural members, into ceiling and floor spaces, and across the roof.

Fire fighters found the victim in his third-floor bedroom. Officials believe that the student was intoxicated from a party that was still in progress at the time of the fire. His bedroom door was locked with a dead bolt.

The combined loss to the building and its contents, valued at $95,000, was estimated at $65,000.

Kenneth J. Tremblay, 1993, *NFPA Journal*, January/February, 27.

Fire Forces Evacuation of College Dormitory, Washington, D.C.
A room and contents fire on the third floor of an occupied dormitory forced the evacuation of the building when clothing that had been placed on an electric lamp ignited.

The reinforced-concrete, five-story university dormitory had concrete and plaster interior walls and was equipped with a dry standpipe system and at least three portable fire extinguishers on each floor, but no sprinklers.

A resident woke to find a small fire in the bedroom. (A smoke detector in the room operated, but the reports do not indicate whether the detector alerted the occupant.) Another occupant, who was studying in the hallway just outside the room, was alerted and activated a manual pull station, sounding the internal alarm system. The two residents, along with other dormitory occupants, evacuated the building as the resident assistant notified campus security.
The municipal fire department received a 911 call reporting an alarm activation at 2:21 a.m. Fire fighters arrived on the scene within 4 minutes and quickly extinguished the fire, which had been ignited when a pair of wet sweat pants were placed on an electric lamp to dry.

Although students were given semi-annual instruction on safety procedures, the university's administration was reevaluating its program after this incident. Investigators believe the fire might have been extinguished in its incipient stages if portable extinguishers had been used.

Damage in the room of origin and smoke and water damage in the common corridor totaled $95,000.

Kenneth J. Tremblay, 1991, *NFPA Journal*, July/August, 25-26.

Dormitory Fire Controlled by Sprinkler, Arizona
Fifteen floors of a university dormitory were evacuated when a fire on the second floor tripped the fire alarm system and brought apparatus to the scene at 9:20 p.m.

The high-rise dormitory was equipped with smoke detectors in the common hallways, and the building was fully sprinklered. Portable extinguishers were available on all levels of the building.

At the time of the fire, the dormitory was experiencing a power failure, and students were using alternative means of lighting in their rooms. The occupants of one second floor room had lit a candle and placed it on top of a small dresser in a closet so that they could see as they removed articles of clothing.

When they left the room, they forgot to snuff out the candle, which burned until there was a pool of molten wax. Because the dresser was not quite level, the still-burning wick, floating in the liquefied wax, drifted toward several articles of clothing lying on the dresser. The open flame ignited the apparel, and, as the fire grew, it spread to other clothes in the closet.

Fortunately, the single sprinkler in the closet activated and extinguished the fire. The fire alarm system tripped when the sprinkler system activated and sent a signal to the campus central station, which contacted the fire department.

Damages amounted to $158,500. Only $3,500 of this was due to fire damage in the room of origin. The remainder resulted from water damage on the first and second floors, as water passed between floors through the light fixtures, and the expense of removing asbestos from the first-floor ceiling. Fire officials attributed the extensive water damage to a delay in turning off the sprinkler system.
Neil Courtney, 1991, *NFPA Journal*, March/April, 29.

Reckless Fireworks Use Causes Fire, Illinois
Nearly 2,000 students were rousted from their university dormitory early one morning when a fire erupted in a third-floor room.

The dorm was part of a complex that consisted of four 13-story concrete-and steel towers. The buildings were equipped with a detection system that covered all areas except individual sleeping rooms; it was connected to the campus police department. There was a standpipe system for fire department use in the stairwells, but there were no automatic sprinklers.

The fire began when someone discharged a Roman candle beneath a bedroom door shortly after 2:00 am. The firework ignited some newspapers, and the flames spread to a mattress on a bed, the carpet, and some paper wall decorations. The detectors in the hallway activated at 2:21 am, sending the alarm to the police station.

Arriving firefighters connected a single hoseline to the standpipe and extinguished the flames in the room. Everyone was allowed back into the dorm after the fire had been extinguished and salvage operations completed.

An 18-year-old freshman was reportedly arrested on a felony charge of criminal property damage and illegal consumption of alcohol and was suspended from the university. Property damage was estimated at $4,000.

Neil Courtney, 1990, *NFPA Journal*, March/April, 21.

Arsonist Strikes as Students Sleep, Kansas
An occupant noticed smoke in this men's dormitory and sounded the alarm, routing 96 students from their beds in the early hours of the morning.

The 104-room, two- and three-story building was 292 feet long. Because it was T-shaped, its width varied from 38 and 55 feet on either end to 130 feet in the middle. The masonry dorm had a local fire alarm system with manual pull stations, but it was not sprinklered.

Someone called the fire department at 4:00 am, and the student who first noticed smoke in the corridor used a pull station to alert the residents, who evacuated the building without incident. Firefighters managed to confine the fire to the basement recreation room in which it began.

A post-fire investigation revealed that the blaze was incendiary in nature. The perpetrator had evidently doused a divan with an accelerant and ignited it. Interviews with potential suspects turned up an 18-year-old male student who admitted to the crime. He also confessed to having set another fire in a mattress in the same building just four days before. He was charged with two counts of aggravated arson to which he pled guilty.
Damage to the building and its contents was set at $122,500.

Neil Courtney, 1990, *NFPA Journal*, January/February, 15.