INTENTIONAL FIRES

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April 2014

National Fire Protection Association
Fire Analysis and Research Division

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Abstract
During 2007-2011, an estimated 282,600 intentional fires were reported to U.S. fire departments per year, with associated annual losses of 420 civilian deaths, 1,360 civilian injuries, and $1.3 billion in direct property damage. Outside or unclassified fires accounted for three-quarters (75%) of these incidents, while 18% involved structures, and 7% were vehicle fires.

The fire estimates are based on data from the National Fire Incident Reporting System (NFIRS) conducted by the U.S. Fire Administration (USFA) and the annual fire department experience survey conducted by the National Fire Protection Association (NFPA).

Keywords: fire statistics, fire setting, intentional fires, arson

Acknowledgements
The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System 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 grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

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During 2007-2011, an estimated 282,600 intentional fires were reported to U.S. fire departments each year, with associated annual losses of 420 civilian deaths, 1,360 civilian injuries, and $1.3 billion in direct property damage. Outside or unclassified fires accounted for three-quarters (75%) of these incidents, while 18% involved structures, and 7% were vehicle fires.

Despite representing one-fifth (18%) of all intentional fires, structure fires accounted for 92% of civilian deaths, 84% of civilian injuries, and 86% of direct property damage caused by intentional fires. Sixty-three percent of intentional structure fires occurred in residential properties, 6% occurred in storage facilities, 4% occurred in educational properties, 4% occurred in mercantile or business properties, and 3% occurred in public assembly properties.

Nearly two-thirds (64%) of intentional structure fires occurred in structures that are occupied and operating, and these fires account for most of the associated losses. Fourteen percent occurred in vacant, unsecured properties, and 8% in vacant, secured properties. The most common item first ignited in intentional structure fires was rubbish, trash or waste, but a disproportionate share of the property damage resulted from fires beginning with flammable or combustible liquids or gases, (possibly accelerants).

Half (51%) of intentionally set home structure fires occurred between 3:00 p.m. and midnight. Lighters (27%) and matches (23%) were the most common heat source in intentional home fires. The most common area of origin in intentional home structure fires was the bedroom (12% of these fires). In educational properties, more than half (56%) of intentionally set structure fires began in the bathroom. In storage properties, the garage was the most common specified area of origin (24% of fires), and in mercantile or business properties the most common specified area of origin was the bathroom (8% of fires).

Outside or unclassified fires accounted for 75% of intentionally set fires. In this report, outside trash or rubbish fires are often listed separately from other outside and unclassified fires. This is because outside trash and rubbish fires have limited reporting requirements. Nearly one-third (30%) of outside or unclassified fires began in a lawn, field or other open area. Matches were the heat source in two out of five (38%) of these fires, and a lighter was the heat source in 22%. Light vegetation, including grass, was the item first ignited in half (28%) of the fires.

In intentionally set vehicle fires, the most common items first ignited were flammable or combustible liquids or gases, piping or filter (29%) and vehicle seats (28%). The most common heat sources were matches (24% of fires), lighters (16%) and incendiary devices (13%).

According to the FBI's *Crime in the United States*, one in five (19%) of arson cases were cleared by arrest or exceptional means, and two out of five of the individuals arrested for arson were under 18 years of age.

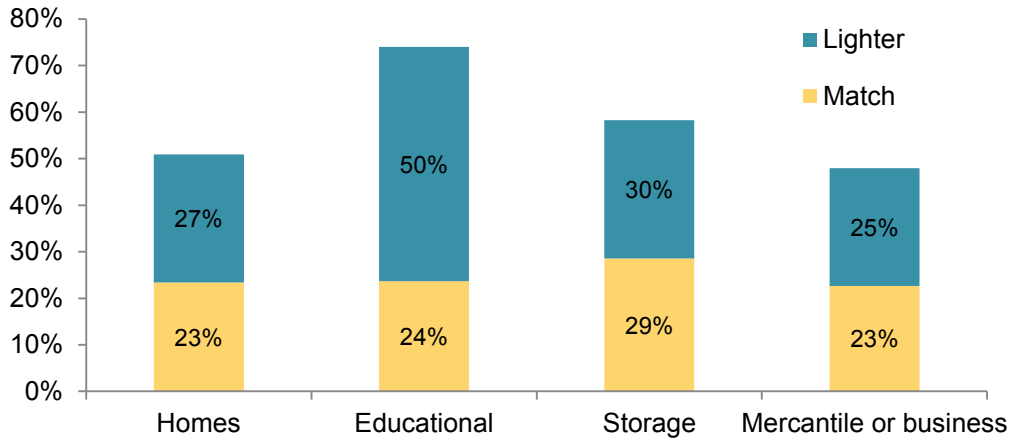
Additional resources, including a free downloadable presentation on preventing arson can be found at www.nfpa.org/arson.

Intentional Fires Fact Sheet

During 2007-2011, an estimated 282,600 intentional fires were reported to U.S. fire departments each year, with associated annual losses of 420 civilian deaths, 1,360 civilian injuries, and $1.3 billion in direct property damage: These fires included:

- 211,500 outside or unclassified fires
- 50,800 structure fires
- 20,400 vehicle fires

Percent of Intentional Structure Fires Started by Matches or Lighters 2007-2011 By Property Use



- Despite representing 18% of all intentional fires, intentional structure fires account for 92% of civilian deaths
- Intentionally set home structure fires are more likely to be set in the afternoon and evening hours, between 3 p.m. and midnight
- Three-fifths (60%) of outside or unclassified intentional fires began with a match or lighter

IDENTIFYING INTENTIONAL FIRES

What is an "intentional" fire?
The fire statistics in this analyses use detailed data from the U.S. Fire Administration's National Fire Incident Reporting Systems (NFIRS). The definition of "intentional" in NFIRS 5.0 specifically includes "deliberate misuse of heat source or a fire of an incendiary nature."

Additional resources, including a free downloadable presentation on preventing arson can be found at www.nfpa.org/arson

NFPA's Fire Safety Resources

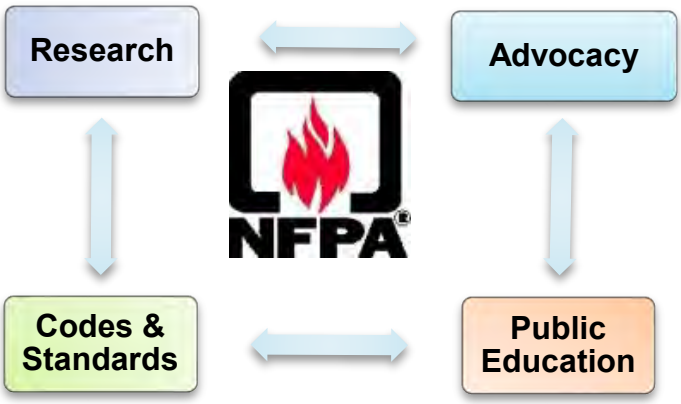
NFPA´s wealth of fire-related research includes investigations of technically significant fire incidents, fire data analysis, and the Charles S. Morgan Technical Library, one of the most comprehensive fire literature collections in the world. In addition, NFPA´s Fire Protection Research Foundation is a source of independent fire test data. Find out more at:

www.nfpa.org/research

Properly installed and maintained smoke alarms are necessary to provide a warning of any fire to all occupants. You can find out more information about smoke alarms here: NFPA Smoke Alarm Information

Home fire sprinkler systems provide even greater protection. These systems respond quickly to reduce the heat, flames, and smoke from a fire until help arrives. More information about home fire sprinklers may be found at www.firesprinklerinitiative.org

Simply put, smoke alarms and fire sprinklers



NFPA also develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks. Fire and explosion investigations begin with:

NFPA 921: Guide for Fire and Explosion Investigations:

For consumers: NFPA has consumer safety information regarding causes, escape planning, fire & safety equipment, and many other topics.

For kids: Sparky.org has important information for kids delivered via fun games, activities, and cartoons.

For public educators: Resources on fire safety education programs, educational messaging, grants & awards, and many other topics.

IDENTIFYING INTENTIONAL FIRES

What is an "intentional" fire?
The fire statistics in this analyses use detailed data from the U.S. Fire Administration's National Fire Incident Reporting Systems (NFIRS). The definition of "intentional" in NFIRS 5.0 specifically includes "deliberate misuse of heat source or a fire of an incendiary nature."

What is "arson"?
The Uniform Crime Reporting Program defines arson as "any willful or malicious burning or attempt to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another, etc." Here, "willful" is essentially the same as "intentional," and the rest of the definition consists of examples of types of harm that are included.

What is the difference between "intentional" and "arson"?
Both terms refer to a fire that was started deliberately. For "intentional," that is the whole of the definition. For "arson," there are two other elements: (a) to some extent, the firesetter intended not only the fire but the harm caused by the fire, and (b) by applicable legal standards, the firesetter was capable of forming a criminal intent. In many jurisdictions, for example, there is a minimum age below which an individual cannot be charged with arson. In some jurisdictions, a person can legally destroy his or her own property, including a house.

What data sources are used in this report?
Several data sources are used in this analysis. National estimates for this analysis are derived from the National Fire Incident Reporting Systems (NFIRS) and the NFPA's annual fire department experience survey. In NFIRS Version 5.0, intentional fires are identified by cause of ignition code 1. Only fires reported to municipal fire departments are included in these statistics. Details on the methodology used may be found in Appendix A.

"Intentional" is a code entry unique to NFIRS Version 5.0. Prior to 1999, the field ignition factor included a choice between "incendiary," "suspicious" "child playing," and many other fire causes. This is important to keep in mind when looking at trend analysis. More information on the coding history is in Appendix B. NFIRS Version 5.0 has 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 information is not required for these incidents, it is provided in some cases. Confined fires are analyzed separately from non-confined fires; estimates are based on the share with causal data. Causal data is not required but is sometimes provided for outside trash fires. The same analysis approach is used for outside trash and non-trash as was used for non-confined and confined structure fires.

Another source of arson estimates used in this report is the Federal Bureau of Investigation's Uniform Crime Reports. This source does not take into account gaps in reporting in its published numbers of arson crimes, but does in estimating arson offense rates relative to population.

Overview: Intentional Fires

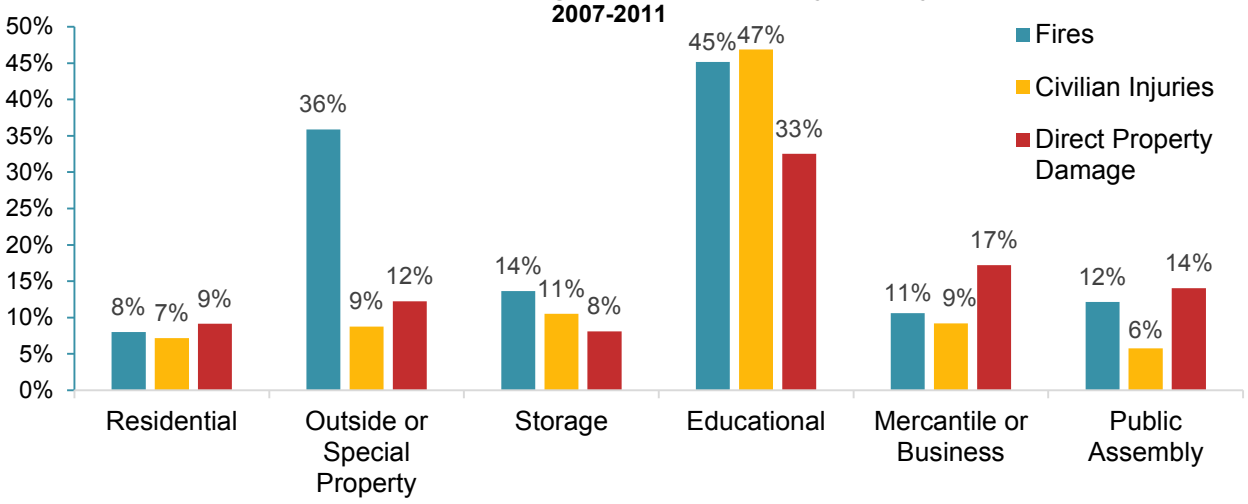
More than 280,000 intentionally set fires per year were reported to local fire departments in the U.S. between 2007 and 2011. During 2007-2011, an estimated 282,600 intentional fires were reported to U.S. fire departments each year, with associated annual losses of 420 civilian deaths, 1,360 civilian injuries, and $1.3 billion in direct property damage. Three-quarters (75%) of these fires occurred outside, 18% occurred in structures and 7% in vehicles. The majority of intentional fire losses resulted from structure fires – 92% of civilian deaths, 84% of civilian injuries, and 86% of direct property damage. Despite comprising the vast majority of fires, outside or unclassified fires were responsible for 4% of civilian deaths, 11% of civilian injuries, and 5% of direct property damage. Vehicle fires accounted for 7% of intentional fires and 14% of the direct property damage caused by intentional fires. (See Table A below)

Table A.
Intentional Fires, by Incident Type: 2007-2011 Annual Averages

Incident Type	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Outside or unclassified fires	211,500	(75%)	20	(4%)	150	(11%)	$60	(5%)
Outside trash or rubbish fires	126,300	(45%)	0	(1%)	40	(3%)	$10	(0%)
Outside or unclassified fires (excluding trash or rubbish fires)	85,200	(30%)	10	(4%)	110	(8%)	$50	(4%)
Structure fires	50,800	(18%)	370	(92%)	1,150	(84%)	$1,050	(86%)
Vehicle fires	20,400	(7%)	30	(8%)	70	(5%)	$180	(14%)
Total	282,600	(100%)	420	(100%)	1,360	(100%)	$1,290	(100%)

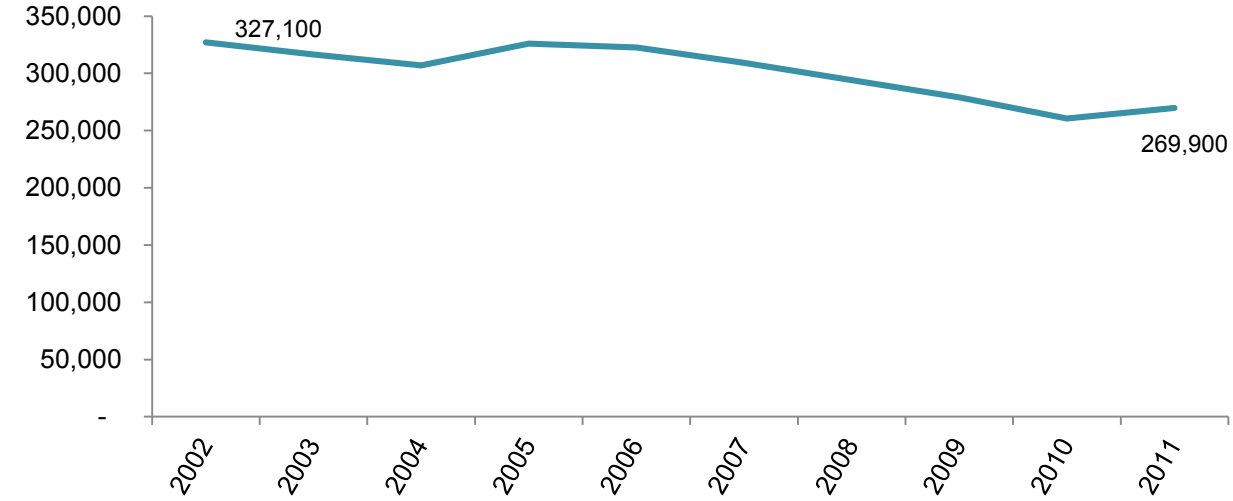
Nearly half of fires (45%) and fire injuries (47%) in educational properties were intentional in 2007-2011, and these fires accounted for 33% of direct property damage in educational properties. More than one-third (36%) of structure fires involving outside or special properties were intentional fires, causing 9% of civilian fire injuries and 12% of direct property damage in outside or special properties. Residential properties accounted for the lowest share of intentional fires as a percentage of total structure fires. The 8% of residential fires that were intentionally set caused 7% of the civilian injuries, and 9% of the direct property damages. (See Figure 1 below.)

Figure 1.
Intentional Fires As Percentage of Structure Fires, by Property Use, 2007-2011



Intentionally set fires have fallen significantly since 1980. Total intentional fires have declined from a high of 859,800 in 1980 to 269,900 in 2011, a decrease of 69%. Within this overall figure, intentional structure fires have decreased by 76%, vehicle fires by 77%, and outside and unclassified fires by 65%. Part of this decline can be attributed to a change in reporting systems, from NFIRS 4.1 to NFIRS 5.0, in 1999. In the new system, "suspicious" was removed as a coding option, and these fires may accordingly no longer be reflected in estimates of intentional fires. Since 2002, intentionally set fires have continued to drop, but less dramatically, with a 17% decrease in overall intentional fires between 2002 and 2011. See Table 1 and Figure 2 below.

Figure 2.
Intentional Fires, by Year 2002-2011



In two of five fires (41%) reported to NFIRS that have the arson module filled out, the investigation is coded as being open. The arson module is optional in NFIRS, and it can be filled out when the cause of ignition is intentional, or cause under investigation. It may also be used when the fire is coded as "cause undetermined after investigation," and to document juvenile-set

fires. Note that "investigation open" is broad and that not every incident for which the arson module is completed is necessarily "arson" in the traditional criminal definition. The investigation is closed in 48% of cases, inactive in 6%, closed with an arrest in 3%, and closed with exceptional clearance in 2%. (See Table 2)

Most intentional fires are set on private property. Nine out of 10 (90%) intentionally set fires occur on privately owned property (based on incidents where the NFIRS arson module was filled out). Six percent began on property owned by a city or town. (See Table 3)

Nearly one-quarter of intentional fires (23%) where a motivation is identified are motivated by curiosity. Based on fires where the arson module of NFIRS 5.0 was filled out, only a minority of arson incidents are suspected to be motivated by financial reasons, including insurance fraud (6%), burglary (2%), auto theft concealment or burglary concealment (9%), and void contract or lease (1%). Table B shows that these patterns differ by investigation status.

Table B.
Intentional Fires, by Investigation Status and Suspected Motive:
2007-2011 Annual Averages

	Investigation:					
Suspected Motive	**Open**	**Closed**	**Inactive**	**Closed with Arrest**	**Exceptional Clearance**	**All Fires with Completed Arson Module**
Fireplay or curiosity	16%	34%	25%	21%	55%	23%
Personal	25%	17%	13%	26%	17%	22%
Thrills	14%	14%	17%	16%	13%	15%
Unclassified	10%	15%	14%	14%	13%	12%
Intimidation	12%	8%	5%	9%	3%	10%
Auto theft concealment or burglary concealment	12%	5%	21%	3%	0%	9%
Domestic violence	7%	6%	4%	13%	0%	7%
Insurance fraud	8%	5%	9%	1%	0%	6%
Attention or sympathy	2%	5%	2%	6%	4%	2%
Burglary	3%	1%	3%	2%	1%	2%
Suicide	2%	1%	2%	2%	3%	2%
Destroy records or evidence	2%	1%	4%	2%	0%	2%
Institutional	1%	3%	0%	1%	1%	1%
Hate crime	2%	0%	1%	1%	0%	1%
Vanity or recognition	1%	1%	2%	2%	1%	1%
Protest	1%	1%	1%	1%	1%	1%
Societal	1%	1%	3%	0%	3%	1%
Homicide or homicide concealment	1%	0%	0%	2%	3%	1%
Void contract or lease	1%	1%	0%	1%	0%	1%
Other known	1%	0%	0%	0%	0%	1%

*Note: multiple motives are allowed Source: NFIRS 5.0

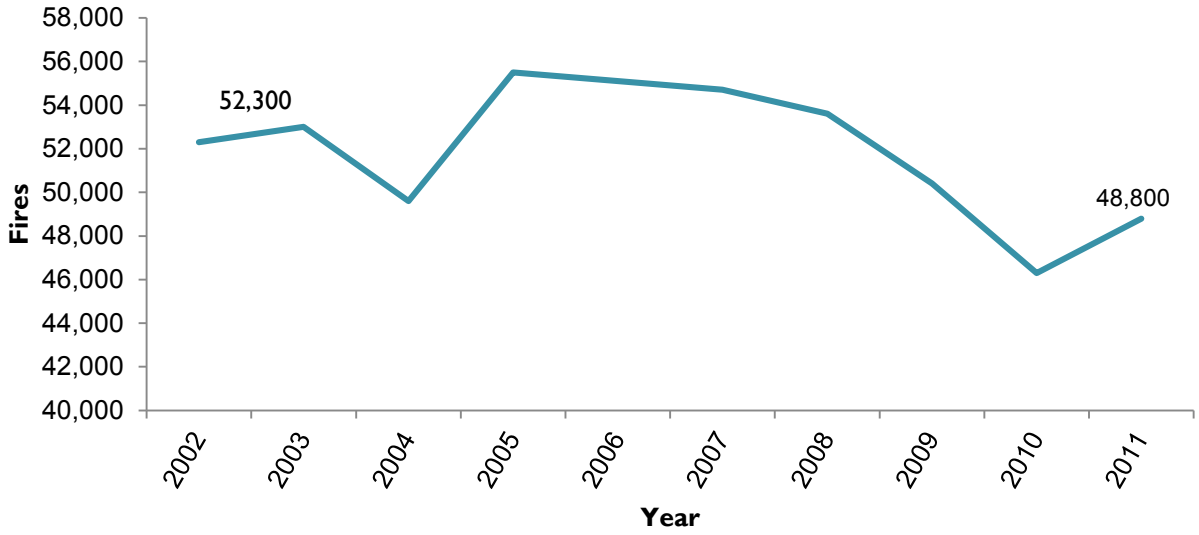
Curiosity is more likely to be a suspected motivation in intentional fires that have been closed with exceptional clearance, or closed in general. Overall, 23% of intentional fires are suspected to have been motivated by curiosity. However, this is much more likely to be the case (55% of incidents) when the investigation has been closed by exceptional clearance (an exceptional clearance is made when an investigation has established an offender, there is enough information to support an arrest charge, and the location of the offender is known, but there is a reason outside police control that prevents arresting, charging and prosecuting the offender[1]). Suspected financial motivations are generally more common when an investigation is open or inactive than when it has been closed with an arrest. For instance, 21% of arsons motivated by auto theft concealment or burglary concealment were inactive cases and 5% were closed, compared to 3% of these cases closed with an arrest. For insurance fraud, 9% of cases were inactive and 5% were closed, while 1% were closed with an arrest. Burglary cases showed 3% inactive, 1% closed, and 2% closed with an arrest. Additional information about arson (from a criminal justice perspective) can be found in Section 4.

[1] "MI State Police - Uniform Crime Report - Glossary." *Michigan State Police*, 1997. 29 Nov 2011. <http://www.state.mi.us/msp/cjic/ucr/ucr_m.htm>

Section 1:
Intentional Structure Fires

Between 2007 and 2011, 50,800 intentional structure fires were reported to local fire departments each year. These fires caused 370 deaths, 1,150 injuries, and $1 billion in property damage annually. In 2011, there were an estimated 48,800 intentionally set structure fires, an increase from 46,300 estimated fires in 2010, which was the lowest since 1980, when data collection using the current methodology began. As Figure 3 below shows, these fires fell dramatically from 1980 to 1999, and have remained relatively stable since. Part of the drop in fires after 1998 may be due to changes in NFIRS.

Figure 3.
Intentional Structure Fires
By Year 2007-2011



Most intentionally set structure fires occur in structures that are occupied and operating. Approximately two-thirds (64%) of intentional structure fires occurred in properties that were normally occupied and operating, as did 94% of the associated civilian deaths, 94% of civilian injuries, and 64% of property damage. Vacant and unsecured properties accounted for 14% of the fires, while vacant and secured properties accounted for 8% of intentional structure fires. (See Table 4)

Most intentional structure fires and associated losses occurred in residential properties. Approximately two-thirds of these fires (63%) occurred in residential properties (57% in one- or two-family homes or apartments). Fires in residential properties also account for 95% of associated civilian deaths, 86% of civilian injuries, and 67% of property damage caused by intentional structure fires. Sixteen percent of intentional structure fires occurred in outside or special properties, 6% in storage, and 4% in educational properties. Four percent of intentional structure fires occurred in mercantile or business properties, but these fires caused 15% of the associated property damage. (See Table C.).

Intentional structure fires occurred in a wide variety of property types. Two-thirds (63%) of the structure fires, 95% of the civilian fatalities, and 86% of the civilian injuries occurred in residential properties. Outside and special properties (such as bridges and vacant lots), educational, and storage properties were also common occupancies for these fires, as shown in Table C.

Table C.
Intentional Structure Fires, by Property Use: 2007-2011 Annual Averages

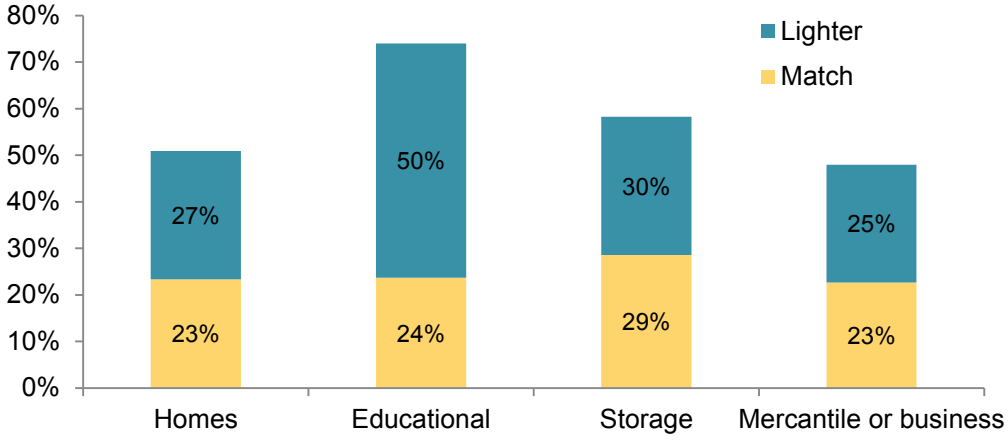
Property Use	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Residential	31,200	(63%)	350	(95%)	990	(86%)	$700	(67%)
Homes	28,900	(57%)	330	(89%)	940	(82%)	$623	(59%)
Outside or special property	8,190	(16%)	0	(0%)	7	(1%)	$8	(1%)
Storage	3,060	(6%)	6	(2%)	32	(3%)	$54	(5%)
Educational	2,275	(4%)	0	(0%)	31	(3%)	$29	(3%)
Mercantile or business	1,890	(4%)	6	(2%)	27	(2%)	$155	(15%)
Public assembly	1,700	(3%)	2	(1%)	13	(1%)	$60	(6%)
Other known property use	980	(2%)	3	(1%)	32	(3%)	$57	(5%)
Total	50,800	(100%)	370	(100%)	1,150	(100%)	$1,050	(100%)

Area of origin in intentional fires varies by occupancy type. Intentional fires in homes were most likely to start in the bedroom (12%), and these fires caused 22% of the civilian deaths in intentional home fires. Intentional fires in educational properties were most likely to start in a bathroom (56%) and in storage properties in a garage or vehicle storage area (24% of fires). In mercantile or business properties, intentional fires were most likely to originate in an unclassified outside area (9%), but there was no dominant area of origin (See Table 5).

Rubbish, trash, or waste is the most common item first ignited in intentionally set fires in all analyzed property types (home, educational property, storage property, and mercantile property structures). Educational properties had the highest proportion of fires that began with rubbish, trash, or waste, (37% of fires). One fifth of intentional mercantile or business property (20%) and storage property (18%) fires begin with trash, as well as 12% of intentional structure fires in homes. Property damage tended to be higher in fires beginning with flammable or combustible liquids (possibly accelerants) or gases, piping or filter (possibly accelerants) (See Table 6).

In combination, matches or lighters were the heat source in half or more of the intentionally set fires in each property type analyzed. Figure 4 below shows that educational properties had the highest proportion of lighters (50%) and lighters and matches combined (74%). Either matches or lighters acted as the heat source in 59% of intentional fires in storage properties, 51% of intentional home structure fires, and 48% of intentional mercantile or business property structure fires. In mercantile or business properties, 8% of intentional fires were set with some sort of incendiary device, and these fires caused 43% of the property damage (See Table 7).

Figure 4.
Intentional Structure Fires
By Heat Source and Property Use 2007-2011



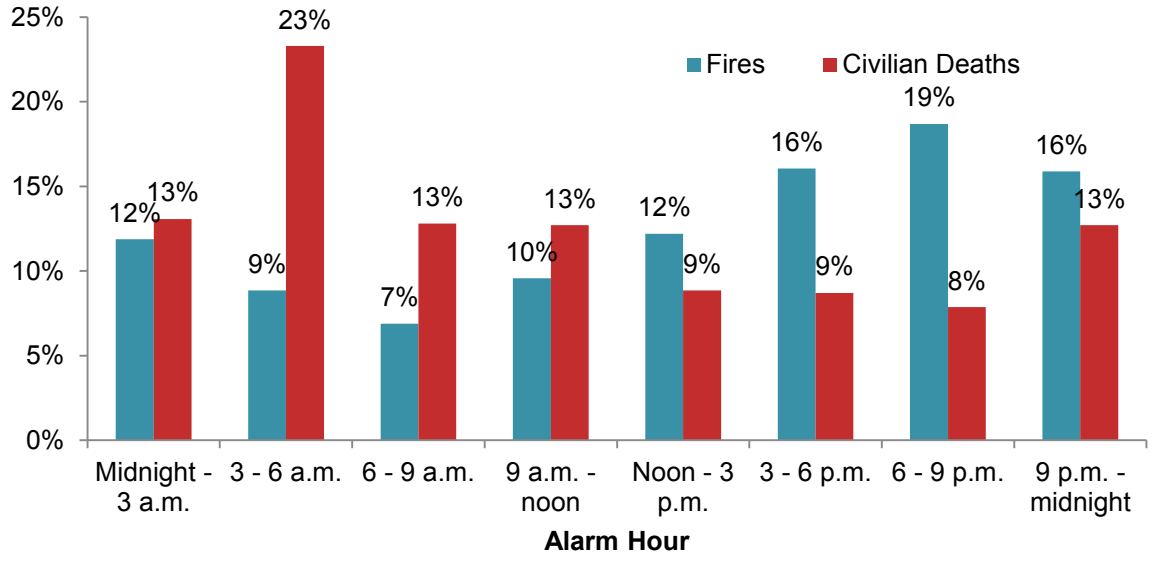
Intentional structure fires are more common on weekdays in educational properties, but patterns are less pronounced among the remaining property types. Table 8 shows that these fires are slightly more common on the weekends than on weekdays in homes and storage properties. Only 9% of intentional structure fires in educational properties occur on weekends (if they were evenly distributed, they would account for 29% of fires) because these properties are less likely to be occupied on these days.

In educational properties, intentional fires are less common during the summer months. Table 9 shows that intentionally set fires are more common during the school year in educational properties, and more common from April through July in storage properties. There are no major differences in fires by month in the other property types.

Intentional structure fires are more common in the late afternoon or nighttime hours in all analyzed property uses except for educational occupancies. In educational properties, 35% of intentionally set structure fires occur between noon and 3:00 p.m. In mercantile and business properties, 31% of these fires occur between 9:00 p.m. and 3:00 a.m. In storage properties, these fires peak from 3:00 p.m. to 9:00 p.m. (See Table 10).

Intentional home fires are more common during the evening hours, but deaths and are more common late at night or early in the morning. Table 10 and Figure 5 below show that intentional home structure fires peak between 6:00 and 9:00 p.m. However, one-quarter of civilian deaths from intentional home structure fires occurred in fires between 3 a.m. and 6 a.m.

Figure 5.
Intentional Home Structure Fires
By Time of Day 2007-2011



Section 2:
Intentional Outside or Unclassified Fires

An average of 211,500 outside and unclassified fires per year between 2007 and 2011 were set intentionally. Outside and unclassified fires account for 75% of intentionally set fires, 4% of associated civilian deaths, 11% of civilian injuries, and 5% of direct property damage. In this report, because outside trash and rubbish fires have limited reporting requirements, they are often listed separately from other outside and unclassified fires. Forty-five percent of intentionally set fires were outside trash fires, while 30 percent were other outside fires, such as vegetation, or outside fires involving property of value and fires with an unclassified incident type.

The most common areas of origin for intentionally set outside fires are an unclassified area and a lawn, field, or open area. One-third (34%) of these fires begin in an unclassified outside area, and 30% begin in a lawn, field, or open area. Trash or rubbish fires are more likely to begin on or near a highway, public way, or street than other kinds of outside or unclassified fires (7% vs. 2%). Non-trash outside fires are more likely to begin in a vegetation or wildland or woods area than outside trash or rubbish fires. (See Table 11).

Matches and lighters are the heat source in three-fifths (60%) of intentionally set outside or unclassified fires. Two-fifths (38%) of intentional outside fires begin with a match, and more than one-fifth (22%) begin with a lighter. Twelve percent of these fires began with an unclassified heat source, and 7% begin with a flame or torch used for lighting. (See Table 12).

Light vegetation, including grass, was the leading item first ignited in intentionally set non-trash outside fires, and rubbish, trash or waste was the leading item first ignited in outside trash or rubbish fires. Overall, light vegetation, including grass was the item first ignited in 28% of outside and unclassified fires, and rubbish, trash, or waste was the item first ignited in 24% of fires. When only looking at intentionally set outside trash or rubbish fires, Rubbish trash or waste was the item first ignited in 22% of the outside trash or rubbish fires, and light vegetation in 8% of these fires. In all other (non-trash) outside or unclassified fires, light vegetation was the item first ignited 20% of the time, and rubbish, trash or waste 2%. (See Table 13).

Intentionally set outside and unclassified fires are more common on weekends than weekdays, and during the afternoon and evening hours. Table 14 shows that there is Saturday is a peak day for these fires, with Sunday ranking second. Table 15 shows that these fires peaked between 3:00 p.m. and 9:00 p.m., with 44% of the fires occurring during this time period. If all fires were distributed evenly during the course of the day, only 25% of fires would over this six-hour period.

Outside trash and rubbish fires are spread evenly through the year, but non-trash outside or unclassified fires show spikes in March and April. Table 16 shows that outside or unclassified fires were highest in March and April. This is almost exclusively due to differences in intentionally set non-trash outside or unclassified fires during these months. The third highest monthly total came in July, which may be due to the prevalence of fireworks around the July 4th holiday.

Section 3:
Intentional Vehicle Fires

Between 2007 and 2011, an average of 20,400 intentionally set vehicle fires were reported to local fire departments in the U.S. each year. These fires were responsible for annual averages of 30 civilian deaths, 70 civilian injuries and $180 million in direct property damage. Intentional vehicle fires accounted for 7% of all intentional fires, 8% of associated civilian deaths, 5% of civilian injuries and 14% of direct property damage.

Matches are the most common heat source in intentional vehicle fires.
One-quarter of intentional vehicle fires (24%) began with a match, and 16% began with a lighter, while another 13% began with some form of incendiary device. Collectively, fires begun with matches or lighters were responsible for half of the civilian deaths (49%) and 57% of civilian injuries that occurred as a result of intentional vehicle fires. (See Table 17).

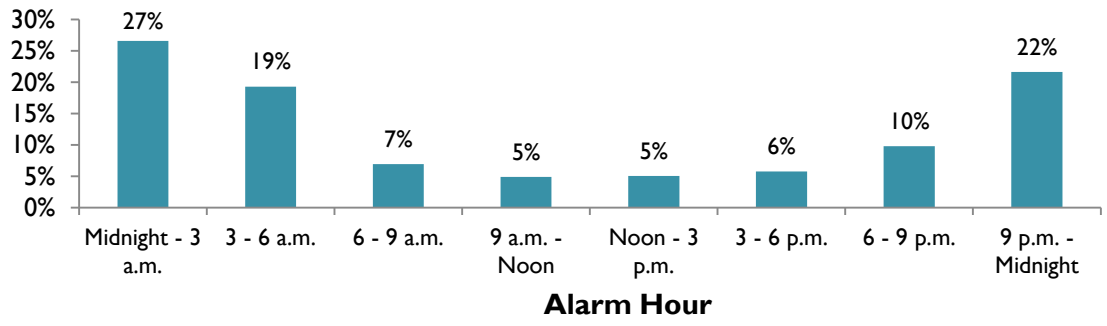
The two most common items first ignited in intentional vehicle fires are vehicle seat, and flammable or combustible liquid or gas, piping or filter. Table 18 shows that 29% of these fires began when a flammable or combustible liquid or gas, piping or filter was ignited and that 28% began when a vehicle seat was ignited. The cases where a flammable liquid or gas was first ignited caused 59% of the civilian injuries and 57% of the civilian deaths.

Half of intentional vehicle fires began in the passenger area of the vehicle.
Intentional vehicle fires that began in the passenger area accounted for 49% of intentional vehicle fires and 57% of civilian deaths resulting from intentional vehicle fires. Other leading areas of origin for intentional vehicle fires included unclassified vehicle area (14%), engine area running gear or wheel area (10%) and exterior surface (8%). (See Table 19).

These fires were more common on the weekend and between the months of July and August.
Table 20 shows that 17% of intentional vehicle fires occur on Sunday and 16% occur on Saturday (compared to a daily average of 14%). These fires also show a slight increase during the warmer months, peaking in July (10% of fires). (See Table 21).

Intentional vehicle fires are more likely to be set late at night and early in the morning.
Table 22 and Figure 6 below show that intentionally set vehicle fires peak between midnight and 3:00 a.m. and are at their lowest level during the daytime (between 9:00 a.m. and 3:00 p.m.).

Figure 6. Intentional Vehicle Fires, By Time of Day 2007-2011



Section 4:
Firesetters and Criminal Justice

In the U.S., nearly one of every five arson offenses (19% in 2011) is cleared by arrest or "exceptional means." "Clearance" indicates that law enforcement officials are satisfied that they have identified the perpetrator, even if no arrest has been made for that particular offense. (It is not unusual for an individual who is suspected of many offenses to be charged with only a few of them for which the evidence is the strongest. The officials will regard all the offenses as cleared.) A single clearance can mean several arrests if a fire was set by several persons. A single arrest can mean several clearances if one suspect is reliably associated with several arson offenses. From 2010 to 2011, there was a 4% drop in arson offenses according to FBI statistics. In 2011, according to the FBI, 46% of arson offenses involved structures[2].

Clearance by "exceptional means" involves the following criteria: (1) identification of offender, (2) sufficient evidence to support an arrest, make a charge, and turn over the offender for prosecution, (3) identification of the offender's exact location so that an arrest can be made, and (4) circumstances outside the control of law enforcement that prohibit arrest, such as death of the offender, denial of extradition because of simultaneous prosecution for another offense elsewhere, or refusal of victim to cooperate with prosecution after identifying the offender.

Table 23 indicates that the regional clearance percentages have also been fairly stable, except for a sustained improvement in the Northeast, which had the highest clearance rate in 2001 to 2011. The South had had the highest clearance rate in every year prior to 2001 and now ranks second, behind the Northeast.

In 2011, 19% of arson offenses were cleared by arrest or "exceptional means. According to the Bureau of Justice Statistics, 45.7% of suspects in arson and explosives cases that took place between October 1, 2005 and September 30, 2006 were prosecuted. Of the cases that commenced during the same time period, 57.3% of defendants were released.[3]

Juveniles accounted for less than half of arson arrestees in 2011. Table 24 shows the 2011 age breakdown of arrestees, when 41% of arrestees were under age 18. As indicated, more than half (54%) of arrestees are under age 21.

Table 24 shows that 2% of people arrested for arson were under 10 years of age. Interestingly, the percentage under age 10 was higher in the 1980s, when the total percentage of arrestees under age 18 was lower than it has been in recent years. From 1992 to 2006, at least 49% of arrestees were under age 18 in every year. Before 1992 and after 2006, the arson arrest percentage for people under age 18 was never as high as 49% (See Table 25).

Small towns have smaller intentional structure fire rates and lower overall arson offense rates relative to population than large cities and rural communities. Rates of intentional structure

[2] Crime in the United States 2011, Federal Bureau of Investigation, Table 15
http://www2.fbi.gov/ucr/cius2011/data/table_15.html
[3] Bureau of Justice Statistics, *Federal Justice Statistics, 2009*, December 2011.

fires or arson offenses, relative to population, are highest in large cities but also tend to be higher in rural communities (under 2,500 population) than in small towns (say, 10,000 to 24,999 population). Table 26 makes this point, while also showing that the differences by size of community vary from year to year and from measure to measure.

There is some diversity of opinion as to how to describe different types of young firesetters. As our understanding has grown regarding the many different circumstances that can lead to firestarting by children, there has also been a growing discomfort with the rigidity of the two traditional choices – "intentional" (formerly incendiary), with its close association with arson or other acts intended to cause harm to people or property, and "playing," with its implications of both innocence and recklessness.

In NFIRS 5.0, it is possible to code a fire as intentional or playing (not limited to children) or both, to indicate age of the firestarter was a factor or not, and to indicate the age of the firestarter if age was cited as a factor. This could permit the reckless fireplay of older youths to be distinguished from traditional curiosity firestarting by young children. The former could be coded as intentional and playing, the latter could be coded as unintentional and playing, and both could be coded with age as a factor.

However, it is not clear what should be done about so-called "crisis" firesetters – children whose firesetting behavior is a cry for help but may or may not represent a deliberate, intentional choice, this behavior does not fit well with either intentional or playing. Juvenile firesetters have diverse motives, including curiosity fireplay, anger and cries for help, fire as a form of juvenile delinquency, and severe emotional disturbance.

Table D.
Intentional or Playing Fires by Age
2007-2011

Age	Intentional, but not Playing	Intentional and Playing	Playing, but not Intentional
Under 5 Years	4%	9%	19%
Under 10 Years	22%	45%	58%
Under 18 Years	81%	99%	99%
18 Years and Older	19%	1%	1%
65 Years and Older	7%	0%	0%
Total	76%	16%	8%

Source: NFIRS 5.0

In 2007-2011, structure fires reported as either intentional or playing were distributed as follows, as shown in Table D:[4]

- 16% were both intentional and playing:
  - Of these fires, those indicating that the age of involved person was a factor showed 45% with the involved person under age 10, 99% with the involved person under age 18, 9% with the involved person under age 5, and 0% with the involved person age 65 or over;

- 8% were playing but not intentional:
  - Of these fires, those indicating that the age of involved person was a factor showed 58% with the involved person under age 10, 99% with the involved person under age 18, 19% with the involved person under age 5, and 0% with the involved person age 65 or over;

- 76% were intentional but not playing:
  - Of these fires, those indicating that the age of involved person was a factor showed 22% with the involved person under age 10, 81% with the involved person under age 18, 4% with the involved person under age 5, and 7% with the involved person age 65 or over.

With these figures, some tentative conclusions are suggested regarding the relationship between age, playing with fire, and intentional fire-setting:

- Two-thirds (65%) of all playing fires are also coded as intentional. However, only 13% of intentional fires are also coded as playing. The overlap is large from the perspective of playing fires, but much smaller from the perspective of intentional fires.

- The fire service and development psychology experts use different thresholds for when a child is capable of forming an intention, with awareness of the likely consequences of the intended act. Fully 5% of the people (where age was a factor) involved in an intentional, non-playing fire were under age 5. This would seem to suggest that there is no real minimum age for setting a fire with intention or that the intention cited in fire incident reports is not the same as legal intention.

- The statistics show little or no evidence of playing being reported for fires involving reckless horseplay by young adults or involving senile dementia in older adults. It is possible that the former are not considered examples of age being a factor and the latter are not considered examples of playing.

- There is evidence that age is coded as a factor for children and older adults only. There is no way to tell what fraction of fires overall involve children or older adults or to tell what fraction of total fires involving children or older adults are being coded as age was a factor. Most fires are not coded as age was a factor.

More information about juvenile fire setting can be found in NFPA's report. Playing With Fire.

[4] Richard Campbell, *Playing with Fire*, NFPA Fire Analysis and Research Division, April 2014.

Table 1.
Intentional Fires, by Incident Type and Year, 2002-2011

A. Fires

Year	Structure		Vehicle	Outside or Unclassified	Total Fires
2002	52,300	(33,100)	28,900	246,000	327,100
2003	53,000	(28,500)	24,800	238,500	316,400
2004	49,600	(29,200)	23,000	234,400	307,000
2005	55,500	(29,100)	25,800	244,500	325,900
2006	55,100	(29,100)	24,100	243,300	322,500
2007	54,700	(30,400)	24,200	230,200	309,100
2008	53,600	(29,400)	22,500	218,000	294,200
2009	50,400	(26,500)	20,300	208,200	278,900
2010	46,300	(25,500)	17,800	196,600	260,600
2011	48,800	(26,100)	17,000	204,000	269,900

B. Deaths

Year	Structure		Vehicle	Outside or Unclassified	Total Civilian Deaths	Firefighters fatally injured at scene or during response
2002	330	(330)	90	10	420	12
2003	440	(440)	50	30	520	5
2004	310	(310)	30	20	350	3
2005	430	(430)	40	20	490	3
2006	330	(330)	40	10	380	10
2007	420	(420)	40	10	480	3
2008	400	(400)	10	20	430	4
2009	350	(350)	40	10	400	7
2010	330	(330)	30	20	380	1
2011	340	(340)	40	20	400	4

Numbers in parentheses exclude fires reported as a “confined fire” incident type.

Source: NFIRS and NFPA survey

Table 1. (continued)
Intentional Fires, by Incident Type and Year, 2002-2011

C. Injuries

Year	Structure		Vehicle	Outside or Unclassified	Total Civilian Injuries	Firefighters injured at scene or during response
2002	1,390	(1,320)	50	170	1,610	5,200
2003	1,190	(1,110)	80	230	1,500	5,300
2004	1,090	(1,060)	70	260	1,420	6,300
2005	1,200	(1,140)	90	220	1,510	7,600
2006	980	(940)	50	170	1,200	7,700
2007	1,240	(1,210)	70	130	1,450	6,100
2008	1,080	(1,030)	70	160	1,310	5,600
2009	1,080	(1,030)	80	160	1,310	5,800
2010	1,094	(1,010)	80	160	1,330	4,400
2011	1,237	(1,160)	40	110	1,390	4,200

D. Direct Property Damage (in Millions)

Year	Structure		Vehicle	Outside or Unclassified	Direct Property Damage	Total in 2011 Dollars
2002	$908	($906)	$161	$6	$1,074	$1,342
2003	$860	($857)	$142	$27	$1,029	$1,258
2004	$818	($817)	$128	$41	$986	$1,175
2005	$915	($911)	$171	$13	$1,099	$1,264
2006	$991	($988)	$165	$27	$1,182	$1,318
2007	$1,027	($1,024)	$250	$44	$1,321	$1,431
2008	$1,263	($1,262)	$215	$181	$1,659	$1,733
2009	$1,148	($1,147)	$170	$58	$1,376	$1,441
2010	$1,001	($1,000)	$133	$23	$1,158	$1,195
2011	$797	($796)	$122	$14	$934	$934

Numbers in parentheses exclude fires reported as a "confined fire" incident type

Source: NFIRS and NFPA survey

Table 2. Intentional Fires with Arson Modules, by Case Status
2007-2011

Case Status	Percent of Incidents
Investigation open	41%
Investigation closed	48%
Investigation inactive	6%
Investigation closed with arrest	3%
Closed with exceptional clearance	2%
Total	100%

Table 3. Intentional Fires with Arson Modules, by Property Ownership
2007-2011

Property Ownership	Percent of Incidents
Private	90%
City, town, village, or local	6%
Unclassified	2%
County or parish	1%
Other known owner	1%
Total	100%

Note: These are not projections, but are estimates based on raw incidents reported to U.S. municipal departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades.

This variable was collected in the Arson Module of NFIRS; it is not required that this module be completed and the variable "suspected motive" is also not required. Only 24% of completed arson modules had a value for this field; all others were unknown and are not shown.

Source: NFIRS Arson Module raw data

Table 4. Intentional Structure Fires by Structure Status
2007-2011 Annual Averages

Structure Status	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Occupied and operating	32,400	(64%)	350	(94%)	1,080	(94%)	$670	(64%)
Vacant and unsecured	7,000	(14%)	10	(2%)	20	(2%)	$120	(11%)
Vacant and secured	4,000	(8%)	10	(2%)	20	(2%)	$160	(16%)
Unclassified	3,900	(8%)	0	(0%)	0	(0%)	$10	(1%)
Idle, not routinely used	1,500	(3%)	0	(1%)	10	(1%)	$30	(3%)
Being demolished	1,000	(2%)	0	(0%)	0	(0%)	$0	(0%)
Under construction	600	(1%)	0	(0%)	10	(1%)	$40	(4%)
Under major renovation	400	(1%)	0	(0%)	0	(0%)	$20	(2%)
Total	50,800	(100%)	370	(100%)	1,150	(100%)	$1,050	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 5.
Intentional Structure Fires by Area of Origin
2007-2011 Annual Averages

A. Home Structure Fires

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Bedroom	3,500	(12%)	70	(22%)	280	(30%)	$115	(19%)
Kitchen or cooking area	3,400	(12%)	20	(7%)	90	(10%)	$60	(10%)
Unclassified outside area	2,900	(10%)	0	(1%)	10	(1%)	$8	(1%)
Living room, family room, or den	1,900	(7%)	50	(16%)	100	(11%)	$63	(10%)
Confined chimney or flue fire	1,600	(5%)	0	(0%)	0	(0%)	$0	(0%)
Lawn, field or open area	1,400	(5%)	0	(0%)	0	(0%)	$1	(0%)
Multiple areas of origin	1,200	(4%)	40	(11%)	50	(5%)	$63	(10%)
Unclassified function area	1,000	(4%)	30	(9%)	50	(5%)	$44	(7%)
Exterior wall surface	1,000	(3%)	0	(0%)	10	(1%)	$14	(2%)
Unclassified area of origin	800	(3%)	0	(1%)	10	(1%)	$7	1%
Other known area of origin	10,000	(35%)	110	(33%)	320	(34%)	$246	(40%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Lavatory, bathroom, locker room or check room	1,270	(56%)	0	(NA)	12	(40%)	$1	(4%)
Hallway, corridor, mall	125	(6%)	0	(NA)	0	(1%)	$4	(15%)
Unclassified outside area	90	(4%)	0	(NA)	0	(0%)	$0	(1%)
Trash or rubbish chute, area or container	80	(4%)	0	(NA)	0	(0%)	$0	(0%)
Small assembly area, less than 100 person capacity	60	(3%)	0	(NA)	0	(0%)	$0	(1%)
				(NA)				
Other known area of origin	640	(28%)	0	(NA)	18	(58%)	$21	(73%)
Total	2,275	(100%)	0	(NA)	31	(100%)	$29	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 5. (continued)
Intentional Structure Fires by Area of Origin
2007-2011 Annual Averages

C. Storage Property Structure Fires

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Garage or vehicle storage area	740	(24%)	2	(31%)	9	(27%)	$11	(20%)
Unclassified storage area	420	(14%)	2	(32%)	7	(21%)	$14	(25%)
Exterior wall surface	250	(8%)	0	(0%)	1	(4%)	$2	(3%)
Unclassified outside area	250	(8%)	0	(0%)	2	(5%)	$2	(4%)
Storage of supplies or tools or dead storage	220	(7%)	1	(19%)	2	(7%)	$3	(6%)
Other known area of origin	1,190	(39%)	1	(18%)	11	(35%)	$23	(42%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structure Fires

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified outside area	170	(9%)	0	(0%)	1	(5%)	$2	(1%)
Lavatory, bathroom, locker room or check room	160	(8%)	1	(13%)	2	(9%)	$1	(0%)
Sales or showroom area	130	(7%)	1	(20%)	4	(13%)	$59	(38%)
Office	110	(6%)	1	(13%)	2	(6%)	$13	(8%)
Trash or rubbish chute, area or container	90	(5%)	0	(0%)	0	(0%)	$0	(0%)
Lobby or entrance way	90	(5%)	0	(0%)	1	(4%)	$4	(3%)
Exterior wall surface	90	(5%)	0	(0%)	0	(0%)	$3	(2%)
Kitchen or cooking area	70	(3%)	0	(0%)	0	(0%)	$1	(1%)
Unclassified storage area	60	(3%)	0	(0%)	1	(2%)	$7	(5%)
Unclassified means of egress	60	(3%)	0	(0%)	0	(0%)	$1	(1%)
Other known area of origin	860	(46%)	3	(54%)	17	(61%)	$63	(41%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 6.
Intentional Structure Fires by Item First Ignited
2007-2011 Annual Averages

A. Home Structure Fires

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Rubbish, trash, or waste	3,500	(12%)	0	(0%)	30	(4%)	$20	(3%)
Flammable or combustible liquids or gases, piping or filter	2,400	(8%)	120	(36%)	150	(16%)	$120	(19%)
Magazine, newspaper, writing paper	2,200	(8%)	20	(7%)	70	(7%)	$25	(4%)
Unclassified item first ignited	1,900	(7%)	10	(4%)	20	(2%)	$33	(5%)
Multiple items first ignited	1,700	(6%)	30	(10%)	50	(6%)	$90	(14%)
Mattress or bedding material	1,700	(6%)	10	(4%)	180	(19%)	$58	(9%)
Cooking materials, including food	1,700	(6%)	0	(0%)	30	(3%)	$3	(1%)
Clothing	1,300	(4%)	20	(6%)	90	(9%)	$27	(4%)
Floor covering rug, carpet, or mat	1,200	(4%)	20	(5%)	40	(4%)	$32	(5%)
Exterior wall covering or finish	1,000	(4%)	10	(2%)	10	(1%)	$21	(3%)
Other known item first ignited	10,300	(36%)	80	(23%)	260	(28%)	$194	(31%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Rubbish, trash, or waste	840	(37%)	0	(NA)	6	(21%)	$2	(6%)
Magazine, newspaper, writing paper	440	(19%)	0	(NA)	2	(7%)	$4	(14%)
Rolled, or wound material	250	(11%)	0	(NA)	5	(15%)	$0	(1%)
Unclassified Item First Ignited	190	(8%)	0	(NA)	0	(0%)	$4	(15%)
Multiple items first ignited	70	(3%)	0	(NA)	0	(1%)	$9	(31%)
Other known item first ignited	480	(21%)	0	(NA)	17	(56%)	$10	(33%)
Total	2,275	(100%)	0	(NA)	31	(100%)	$29	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 6. (continued)
Intentional Structure Fires by Item First Ignited
2007-2011 Annual Averages

C. Storage Property Structure Fires

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Rubbish, trash, or waste	540	(18%)	0	(0%)	1	(2%)	$3	(6%)
Exterior wall covering or finish	260	(9%)	0	(0%)	1	(2%)	$3	(5%)
Flammable or combustible liquids or gases, piping or filter	260	(8%)	5	(82%)	16	(52%)	$15	(28%)
Structural member or framing	220	(7%)	0	(0%)	1	(2%)	$2	(4%)
Light vegetation including grass	190	(6%)	0	(0%)	3	(9%)	$2	(4%)
Other known item first ignited	1,590	(52%)	1	(18%)	11	(33%)	$29	(53%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structures

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Rubbish, trash, or waste	370	(20%)	0	(0%)	1	(3%)	$4	(2%)
Flammable or combustible liquids or gases, piping or filter	190	(10%)	3	(45%)	11	(40%)	$23	(15%)
Magazine, newspaper, writing paper	170	(9%)	1	(15%)	1	(4%)	$4	(3%)
Multiple items first ignited	130	(7%)	0	(0%)	3	(13%)	$63	(41%)
Unclassified item first ignited	130	(7%)	0	(0%)	0	(0%)	$9	(6%)
Box, carton, bag, basket, barrel	120	(6%)	0	(0%)	0	(0%)	$5	(3%)
Other known item first ignited	790	(42%)	2	(40%)	11	(41%)	$48	(31%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Source: NFIRS and NFPA survey.

Sums may not equal totals due to rounding errors.

Table 7.
Intentional Structure Fires by Heat Source
2007-2011 Annual Averages

A. Home Structure Fires

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Lighter	7,900	(27%)	110	(34%)	470	(50%)	$225	(36%)
Match	6,800	(23%)	60	(19%)	140	(15%)	$109	(18%)
Unclassified heat source	2,300	(8%)	30	(8%)	30	(4%)	$35	(6%)
Incendiary device	1,600	(5%)	20	(7%)	20	(2%)	$37	(6%)
Hot ember or ash	1,300	(4%)	0	(1%)	10	(1%)	$6	(1%)
Radiated or conducted heat from operating equipment	1,200	(4%)	0	(0%)	30	(4%)	$7	(1%)
Unclassified hot or smoldering object	1,200	(4%)	10	(3%)	10	(1%)	$10	(2%)
Multiple heat sources	1,100	(4%)	30	(11%)	30	(3%)	$29	(5%)
Flame or torch used for lighting	1,100	(4%)	30	(9%)	30	(3%)	$85	(14%)
Smoking materials	800	(3%)	0	(1%)	20	(2%)	$18	(3%)
Other known heat source	3,700	(13%)	30	(28%)	130	(24%)	$62	(10%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Lighter	1,150	(50%)	0	(NA)	20	(65%)	$14	(47%)
Match	540	(24%)	0	(NA)	4	(12%)	$7	(25%)
Smoking materials	110	(5%)	0	(NA)	6	(19%)	$0	(1%)
Unclassified heat source	80	(4%)	0	(NA)	0	(0%)	$1	(3%)
Flame or torch used for lighting	60	(3%)	0	(NA)	0	(0%)	$3	(11%)
Incendiary device	60	(3%)	0	(NA)	0	(0%)	$1	(4%)
Other known heat source	270	(12%)	0	(NA)	1	(3%)	$3	(9%)
Total	2,275	(100%)	0	(NA)	31	(100%)	$29	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 7. (continued)
Intentional Structure Fires by Heat Source
2007-2011 Annual Averages

C. Storage Property Structure Fires

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Lighter	910	(30%)	3	(46%)	10	(33%)	$25	(46%)
Match	870	(29%)	2	(33%)	3	(11%)	$8	(14%)
Unclassified heat source	210	(7%)	0	(0%)	4	(14%)	$6	(12%)
Flame or torch used for lighting	210	(7%)	0	(0%)	2	(6%)	$2	(4%)
Hot ember or ash	130	(4%)	0	(0%)	1	(3%)	$1	(2%)
Multiple heat sources including multiple ignitions	110	(4%)	0	(0%)	1	(3%)	$4	(7%)
Unclassified hot or smoldering object	110	(3%)	1	(21%)	1	(2%)	$1	(2%)
Incendiary device	100	(3%)	0	(0%)	2	(6%)	$3	(5%)
Smoking materials	90	(3%)	0	(0%)	2	(7%)	$2	(3%)
Other known heat source	320	(10%)	0	(0%)	5	(15%)	$3	(5%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structure Fires

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Lighter	480	(25%)	3	(54%)	9	(33%)	$32	(20%)
Match	430	(23%)	0	(0%)	5	(19%)	$10	(6%)
Incendiary device	150	(8%)	1	(18%)	6	(23%)	$67	(43%)
Unclassified heat source	140	(8%)	0	(0%)	0	(0%)	$11	(7%)
Smoking materials	120	(7%)	0	(0%)	2	(6%)	$3	(2%)
Flame or torch used for lighting	90	(5%)	0	(0%)	1	(3%)	$6	(4%)
	0							
Other known heat source	470	(25%)	2	(28%)	4	(15%)	$26	(17%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 8.
Intentional Structure Fires by Day of Week
2007-2011 Annual Averages

A. Home Structure Fires

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	4,500	(15%)	60	(18%)	150	(16%)	$111	(18%)
Monday	4,200	(14%)	50	(14%)	120	(13%)	$105	(17%)
Tuesday	4,000	(14%)	50	(14%)	130	(14%)	$77	(12%)
Wednesday	3,900	(14%)	50	(14%)	140	(15%)	$79	(13%)
Thursday	3,900	(14%)	30	(10%)	110	(12%)	$77	(12%)
Friday	4,000	(14%)	40	(12%)	120	(13%)	$83	(13%)
Saturday	4,500	(15%)	60	(18%)	160	(18%)	$91	(15%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	100	(4%)	0	(NA)	1	(2%)	$2	(6%)
Monday	390	(17%)	0	(NA)	7	(22%)	$2	(7%)
Tuesday	440	(19%)	0	(NA)	4	(12%)	$2	(8%)
Wednesday	420	(19%)	0	(NA)	3	(10%)	$2	(6%)
Thursday	440	(19%)	0	(NA)	15	(51%)	$4	(15%)
Friday	370	(16%)	0	(NA)	1	(4%)	$13	(46%)
Saturday	110	(5%)	0	(NA)	0	(0%)	$3	(12%)
Total	2,275	(100%)	0	(NA)	31	(100%)	$29	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 8. (continued)
Intentional Structure Fires by Day of Week
2007-2011 Annual Averages

C. Storage Property Fires

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	480	(16%)	1	(11%)	6	(19%)	$10	(18%)
Monday	460	(15%)	0	(0%)	5	(15%)	$7	(12%)
Tuesday	420	(14%)	3	(50%)	3	(10%)	$5	(9%)
Wednesday	420	(14%)	1	(15%)	8	(24%)	$10	(19%)
Thursday	420	(14%)	1	(12%)	3	(9%)	$7	(13%)
Friday	400	(13%)	1	(12%)	2	(8%)	$6	(12%)
Saturday	480	(16%)	0	(0%)	5	(16%)	$10	(18%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structure Fires

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	250	(13%)	1	(12%)	2	(6%)	$21	(13%)
Monday	270	(14%)	1	(13%)	1	(4%)	$23	(15%)
Tuesday	300	(16%)	0	(8%)	4	(14%)	$19	(12%)
Wednesday	270	(14%)	1	(13%)	5	(17%)	$13	(8%)
Thursday	270	(14%)	1	(18%)	4	(16%)	$52	(34%)
Friday	260	(14%)	1	(12%)	7	(26%)	$12	(8%)
Saturday	280	(15%)	1	(24%)	5	(17%)	$16	(10%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 9.
Intentional Structure Fires by Month
2007-2011 Annual Averages

A. Home Structure Fires

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	2,400	(8%)	40	(12%)	90	(10%)	$53	(9%)
February	2,100	(7%)	20	(7%)	90	(10%)	$46	(7%)
March	2,500	(9%)	30	(10%)	80	(8%)	$53	(9%)
April	2,500	(9%)	30	(8%)	80	(9%)	$50	(8%)
May	2,400	(8%)	30	(8%)	70	(8%)	$49	(8%)
June	2,400	(8%)	30	(10%)	90	(10%)	$47	(8%)
July	2,600	(9%)	30	(9%)	90	(9%)	$54	(9%)
August	2,500	(9%)	30	(8%)	70	(8%)	$67	(11%)
September	2,400	(8%)	30	(8%)	70	(7%)	$47	(8%)
October	2,400	(8%)	20	(7%)	60	(6%)	$51	(8%)
November	2,300	(8%)	20	(5%)	80	(8%)	$44	(7%)
December	2,200	(8%)	20	(8%)	70	(8%)	$59	(10%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	200	(9%)	0	(NA)	4	(13%)	$1	(2%)
February	230	(10%)	0	(NA)	2	(5%)	$3	(9%)
March	250	(11%)	0	(NA)	4	(14%)	$1	(4%)
April	230	(10%)	0	(NA)	0	(1%)	$1	(5%)
May	270	(12%)	0	(NA)	4	(14%)	$4	(13%)
June	140	(6%)	0	(NA)	2	(7%)	$5	(17%)
July	80	(3%)	0	(NA)	0	(0%)	$3	(12%)
August	70	(3%)	0	(NA)	0	(1%)	$1	(3%)
September	170	(7%)	0	(NA)	0	(0%)	$3	(9%)
October	230	(10%)	0	(NA)	1	(2%)	$7	(23%)
November	200	(9%)	0	(NA)	0	(1%)	$0	(2%)
December	190	(8%)	0	(NA)	12	(40%)	$1	(3%)
Total	2,275	(100%)	0	(NA)	31	(100%)	$29	(100%)

Sums may not equal totals due to rounding errors.
Source: NFIRS and NFPA survey.

Table 9. (continued)
Intentional Structure Fires by Month
2007-2011 Annual Averages

C. Storage Property Structure Fires

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	210	(7%)	0	(0%)	1	(4%)	$3	(6%)
February	190	(6%)	0	(0%)	1	(2%)	$3	(5%)
March	270	(9%)	0	(0%)	8	(25%)	$7	(12%)
April	320	(11%)	0	(7%)	3	(8%)	$3	(5%)
May	320	(10%)	0	(0%)	3	(11%)	$5	(10%)
June	310	(10%)	1	(20%)	3	(8%)	$4	(8%)
July	320	(10%)	0	(0%)	2	(7%)	$9	(17%)
August	260	(9%)	0	(7%)	5	(16%)	$4	(7%)
September	250	(8%)	2	(24%)	0	(1%)	$5	(9%)
October	240	(8%)	0	(0%)	2	(8%)	$3	(5%)
November	210	(7%)	3	(42%)	2	(6%)	$2	(5%)
December	160	(5%)	0	(0%)	2	(5%)	$7	(12%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structure Fires

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	170	(9%)	0	(0%)	4	(13%)	$8	(5%)
February	140	(7%)	1	(18%)	2	(9%)	$12	(8%)
March	150	(8%)	0	(0%)	3	(10%)	$9	(6%)
April	180	(9%)	0	(0%)	2	(9%)	$9	(5%)
May	180	(10%)	0	(0%)	2	(6%)	$13	(8%)
June	150	(8%)	0	(0%)	1	(5%)	$14	(9%)
July	190	(10%)	1	(12%)	2	(6%)	$8	(5%)
August	130	(7%)	2	(32%)	0	(0%)	$11	(7%)
September	150	(8%)	1	(13%)	1	(5%)	$9	(6%)
October	160	(8%)	1	(12%)	4	(14%)	$44	(28%)
November	130	(7%)	0	(0%)	1	(5%)	$12	(8%)
December	160	(9%)	1	(13%)	5	(17%)	$7	(5%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Sums may not equal totals due to rounding errors.
Source: NFIRS and NFPA survey.

Table 10.
Intentional Structure Fires by Alarm Hour
2007-2011 Annual Averages

A. Home Structure Fires

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	3,400	(12%)	40	(13%)	120	(13%)	$119	(19%)
3 a.m. - 6 a.m.	2,500	(9%)	80	(23%)	100	(11%)	$94	(15%)
6 a.m. - 9 a.m.	2,000	(7%)	40	(13%)	70	(8%)	$81	(13%)
9 a.m. - Noon	2,800	(10%)	40	(13%)	140	(15%)	$47	(8%)
Noon - 3 p.m.	3,500	(12%)	30	(9%)	110	(12%)	$52	(8%)
3 p.m. - 6 p.m.	4,600	(16%)	30	(9%)	140	(15%)	$72	(12%)
6 p.m. - 9 p.m.	5,400	(19%)	30	(8%)	130	(13%)	$66	(11%)
9 p.m. - Midnight	4,600	(16%)	40	(13%)	130	(14%)	$91	(15%)
Total	28,900	(100%)	330	(100%)	940	(100%)	$623	(100%)

B. Educational Property Structure Fires

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	70	(3%)	0	(0%)	0	(0%)	$3	(9%)
3 a.m. - 6 a.m.	50	(2%)	0	(0%)	0	(0%)	$8	(27%)
6 a.m. - 9 a.m.	160	(7%)	0	(0%)	3	(8%)	$3	(11%)
9 a.m. - Noon	660	(29%)	0	(0%)	20	(64%)	$2	(6%)
Noon - 3 p.m.	790	(35%)	0	(0%)	6	(21%)	$4	(14%)
3 p.m. - 6 p.m.	300	(13%)	0	(0%)	1	(4%)	$2	(6%)
6 p.m. - 9 p.m.	140	(6%)	0	(0%)	0	(0%)	$7	(23%)
9 p.m. - Midnight	100	(4%)	0	(0%)	1	(2%)	$1	(4%)
Total	2,275	(100%)	0	(0%)	31	(100%)	$29	(100%)

Source: NFIRS and NFPA survey.

Sums may not equal totals due to rounding errors.

Table 10. (continued)
Intentional Structure Fires by Alarm Hour
2007-2011 Annual Averages

C. Storage Property Structure Fires

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	410	(13%)	1	(12%)	2	(5%)	$10	(19%)
3 a.m. - 6 a.m.	270	(9%)	0	(0%)	1	(5%)	$9	(16%)
6 a.m. - 9 a.m.	170	(5%)	0	(7%)	0	(1%)	$3	(6%)
9 a.m. - Noon	250	(8%)	1	(19%)	6	(19%)	$7	(13%)
Noon - 3 p.m.	360	(12%)	0	(0%)	7	(22%)	$4	(8%)
3 p.m. - 6 p.m.	570	(19%)	2	(35%)	9	(27%)	$7	(12%)
6 p.m. - 9 p.m.	590	(19%)	0	(7%)	5	(15%)	$6	(10%)
9 p.m. - Midnight	430	(14%)	1	(20%)	2	(6%)	$8	(15%)
Total	3,060	(100%)	6	(100%)	32	(100%)	$54	(100%)

D. Mercantile or Business Property Structures

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	300	(16%)	3	(49%)	3	(11%)	$34	(22%)
3 a.m. - 6 a.m.	240	(13%)	1	(21%)	0	(0%)	$20	(13%)
6 a.m. - 9 a.m.	160	(9%)	0	(0%)	2	(8%)	$7	(5%)
9 a.m. - Noon	190	(10%)	2	(30%)	6	(23%)	$45	(29%)
Noon - 3 p.m.	210	(11%)	0	(0%)	5	(17%)	$4	(3%)
3 p.m. - 6 p.m.	230	(12%)	0	(0%)	4	(13%)	$10	(6%)
6 p.m. - 9 p.m.	280	(15%)	0	(0%)	4	(15%)	$15	(9%)
9 p.m. - Midnight	290	(15%)	0	(0%)	4	(14%)	$19	(12%)
Total	1,890	(100%)	6	(100%)	27	(100%)	$155	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 11.
Intentional Outside or Unclassified Fires, by Area of Origin
2007-2011 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unclassified outside area	72,300	(34%)	5	(30%)	40	(27%)	$0	(7%)
Outside trash or rubbish	47,200	(22%)	1	(8%)	20	(11%)	$0	(2%)
Outside or unclassified non-trash	25,100	(12%)	4	(23%)	20	(15%)	$0	(6%)
Lawn, field or open area	63,500	(30%)	5	(26%)	45	(31%)	$6	(10%)
Outside trash or rubbish	35,400	(17%)	1	(5%)	14	(10%)	$2	(4%)
Outside or unclassified non-trash	28,100	(13%)	4	(21%)	31	(21%)	$3	(6%)
On or near highway, public way or street	19,900	(9%)	1	(6%)	6	(4%)	$1	(3%)
Outside trash or rubbish	15,200	(7%)	0	(0%)	2	(1%)	$0	(1%)
Outside or unclassified non-trash	4,800	(2%)	1	(6%)	4	(3%)	$1	(2%)
Wildland area or woods	11,500	(5%)	1	(5%)	8	(5%)	$1	(2%)
Outside trash or rubbish	3,000	(1%)	0	(0%)	1	(0%)	$0	(0%)
Outside or unclassified non-trash	8,500	(4%)	1	(5%)	7	(5%)	$1	(2%)
Unclassified area of origin	8,000	(4%)	1	(4%)	7	(5%)	$2	(3%)
Outside trash or rubbish	4,200	(2%)	0	(0%)	1	(1%)	$0	(0%)
Outside or unclassified non-trash	3,700	(2%)	1	(4%)	6	(4%)	$2	(3%)
Trash or rubbish chute, area or container	7,800	(4%)	0	(2%)	2	(2%)	$1	(1%)
Outside trash or rubbish	7,600	(4%)	0	(2%)	2	(1%)	$1	(1%)
Outside or unclassified non-trash	200	(0%)	0	(0%)	0	(0%)	$0	(0%)
Vegetation area - wildland module	7,300	(3%)	1	(8%)	5	(3%)	$28	(50%)
Outside trash or rubbish	0	(0%)	0	(0%)	0	(0%)	$0	(0%)
Outside or unclassified non-trash	7,300	(3%)	1	(8%)	5	(3%)	$28	(50%)
Courtyard, terrace or patio	7,200	(3%)	0	(1%)	10	(7%)	$1	(2%)
Outside trash or rubbish	5,300	(2%)	0	(0%)	2	(1%)	$0	(1%)
Outside or unclassified non-trash	1,900	(1%)	0	(1%)	8	(5%)	$0	(1%)
Other known area of origin	14,100	(7%)	3	(17%)	24	(17%)	$12	(21%)
Outside trash or rubbish	8,400	(4%)	0	(3%)	1	(0%)	$1	(2%)
Outside or unclassified non-trash	5,700	(3%)	3	(14%)	23	(16%)	$11	(20%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)
Outside trash or rubbish	126,300	(60%)	0	(17%)	40	(27%)	$10	(10%)
Outside or unclassified non-trash	85,200	(40%)	10	(83%)	110	(73%)	$50	(90%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 12.
Intentional Outside or Unclassified Fires, by Heat Source
2007-2011 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Match	79,900	(38%)	5	(30%)	29	(20%)	$18	(32%)
Outside trash or rubbish	53,200	(25%)	2	(9%)	5	(3%)	$2	(4%)
Outside or unclassified non-trash	26,700	(13%)	4	(21%)	24	(17%)	$16	(28%)
Lighter	46,500	(22%)	7	(42%)	66	(46%)	$12	(22%)
Outside trash or rubbish	30,300	(14%)	1	(8%)	25	(17%)	$1	(2%)
Outside or unclassified non-trash	16,200	(8%)	6	(34%)	41	(28%)	$11	(20%)
Unclassified	24,700	(12%)	1	(5%)	6	(4%)	$7	(13%)
Outside trash or rubbish	13,800	(7%)	0	(0%)	2	(1%)	$0	(1%)
Outside or unclassified non-trash	10,900	(5%)	1	(5%)	4	(3%)	$7	(13%)
Flame or torch used for lighting	14,800	(7%)	2	(12%)	9	(6%)	$2	(4%)
Outside trash or rubbish	7,500	(4%)	0	(0%)	2	(1%)	$0	(0%)
Outside or unclassified non-trash	7,300	(3%)	2	(12%)	7	(5%)	$2	(4%)
Hot ember or ash	10,100	(5%)	0	(2%)	7	(5%)	$2	(3%)
Outside trash or rubbish	4,700	(2%)	0	(0%)	2	(2%)	$0	(0%)
Outside or unclassified non-trash	5,400	(3%)	0	(2%)	4	(3%)	$1	(2%)
Unclassified hot or smoldering object	8,300	(4%)	0	(0%)	2	(1%)	$1	(3%)
Outside trash or rubbish	5,000	(2%)	0	(0%)	0	(0%)	$0	(1%)
Outside or unclassified non-trash	3,400	(2%)	0	(0%)	2	(1%)	$1	(1%)
Smoking materials	5,600	(3%)	0	(0%)	1	(1%)	$1	(2%)
Outside trash or rubbish	3,800	(2%)	0	(0%)	0	(0%)	$0	(0%)
Outside or unclassified non-trash	1,800	(1%)	0	(0%)	1	(1%)	$1	(2%)
Fireworks	4,300	(2%)	0	(2%)	3	(2%)	$2	(3%)
Outside trash or rubbish	1,000	(0%)	0	(0%)	0	(0%)	$0	(0%)
Outside or unclassified non-trash	3,300	(2%)	0	(2%)	3	(2%)	$2	(3%)

Table 12. (continued)
Intentional Outside or Unclassified Fires, by Heat Source
2007-2011 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known heat source	17,200	(8%)	1	(8%)	22	(15%)	$10	(18%)
Outside trash or rubbish	6,900	(3%)	0	(0%)	3	(2%)	$1	(2%)
Outside or unclassified non-trash	10,300	(5%)	1	(8%)	19	(13%)	$9	(16%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)
Outside trash or rubbish	126,300	(60%)	0	(17%)	40	(27%)	$10	(10%)
Outside or unclassified non-trash	85,200	(40%)	10	(83%)	110	(73%)	$50	(90%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 13.
Intentional Outside or Unclassified Fires, by Item First Ignited
2007-2011 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Light vegetation, including grass	58,800	(28%)	3	(16%)	24	(16%)	$7	(13%)
Outside trash or rubbish	17,100	(8%)	0	(0%)	1	(1%)	$0	(1%)
Outside or unclassified non-trash	41,700	(20%)	3	(16%)	23	(16%)	$7	(12%)
Rubbish, trash, or waste	51,300	(24%)	2	(9%)	18	(13%)	$3	(5%)
Outside trash or rubbish	47,400	(22%)	1	(6%)	16	(11%)	$1	(3%)
Outside or unclassified non-trash	3,800	(2%)	1	(3%)	2	(1%)	$1	(2%)
Heavy vegetation, including trees	17,400	(8%)	1	(4%)	9	(6%)	$3	(5%)
Outside trash or rubbish	6,200	(3%)	0	(0%)	4	(3%)	$0	(0%)
Outside or unclassified non-trash	11,100	(5%)	1	(4%)	5	(4%)	$3	(5%)
Unclassified organic materials	15,100	(7%)	0	(1%)	4	(3%)	$2	(4%)
Outside trash or rubbish	7,200	(3%)	0	(0%)	1	(1%)	$1	(2%)
Outside or unclassified non-trash	8,000	(4%)	0	(1%)	3	(2%)	$1	(2%)
Unclassified item first ignited	14,400	(7%)	0	(2%)	9	(6%)	$6	(11%)
Outside trash or rubbish	7,900	(4%)	0	(0%)	1	(1%)	$0	(0%)
Outside or unclassified non-trash	6,500	(3%)	0	(2%)	8	(5%)	$6	(10%)
Magazine, newspaper, writing paper	10,300	(5%)	0	(0%)	5	(4%)	$1	(2%)
Outside trash or rubbish	8,100	(4%)	0	(0%)	2	(2%)	$0	(0%)
Outside or unclassified non-trash	2,200	(1%)	0	(0%)	3	(2%)	$1	(2%)
Multiple items first ignited	7,400	(3%)	1	(4%)	3	(2%)	$3	(6%)
Outside trash or rubbish	6,400	(3%)	1	(4%)	1	(0%)	$2	(3%)
Outside or unclassified non-trash	1,000	(0%)	0	(0%)	3	(2%)	$2	(3%)
Upholstered furniture	4,400	(2%)	0	(0%)	1	(0%)	$1	(1%)
Outside trash or rubbish	4,100	(2%)	0	(0%)	0	(0%)	$0	(0%)
Outside or unclassified non-trash	300	(0%)	0	(0%)	1	(0%)	$1	(1%)
Flammable or combustible liquids or gases, piping or filter	4,400	(2%)	6	(35%)	50	(34%)	$7	(13%)
Outside trash or rubbish	2,100	(1%)	1	(8%)	10	(7%)	$0	(0%)
Outside or unclassified non-trash	2,300	(1%)	5	(27%)	40	(27%)	$7	(13%)

Table 13. (continued)
Intentional Outside or Unclassified Fires, by Item First Ignited
2007-2011 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Other known item first ignited	28,100	(13%)	5	(30%)	23	(16%)	$23	(40%)
Outside trash or rubbish	19,800	(9%)	0	(0%)	4	(3%)	$0	(1%)
Outside or unclassified non-trash	8,300	(4%)	5	(30%)	19	(13%)	$22	(39%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)
Outside trash or rubbish	126,300	(60%)	0	(17%)	40	(27%)	$10	(10%)
Outside or unclassified non-trash	85,200	(40%)	10	(83%)	110	(73%)	$50	(90%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 14.
Intentional Outside or Unclassified Fires, by Day of Week
2007-2011 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	33,000	(16%)	2	(9%)	24	(17%)	$17	(30%)
Monday	29,500	(14%)	3	(16%)	19	(13%)	$7	(12%)
Tuesday	27,800	(13%)	2	(13%)	19	(13%)	$3	(5%)
Wednesday	27,300	(13%)	3	(20%)	18	(12%)	$16	(29%)
Thursday	27,400	(13%)	2	(13%)	22	(15%)	$3	(6%)
Friday	29,400	(14%)	2	(13%)	18	(13%)	$4	(7%)
Saturday	37,100	(18%)	3	(17%)	25	(17%)	$6	(11%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)

Table 15.
Intentional Outside or Unclassified Fires, by Alarm Hour
2007-2011 Annual Averages

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight - 3 a.m.	15,300	(7%)	1	(6%)	10	(7%)	$5	(9%)
3 a.m. - 6 a.m.	8,100	(4%)	2	(10%)	5	(3%)	$3	(6%)
6 a.m. - 9 a.m.	9,300	(4%)	2	(12%)	4	(3%)	$1	(2%)
9 a.m. - Noon	19,900	(9%)	2	(11%)	18	(12%)	$2	(3%)
Noon - 3 p.m.	34,500	(16%)	4	(23%)	32	(22%)	$30	(53%)
3 p.m. - 6 p.m.	45,200	(21%)	4	(21%)	36	(25%)	$5	(10%)
6 p.m. - 9 p.m.	47,900	(23%)	1	(9%)	31	(21%)	$4	(7%)
9 p.m. - Midnight	31,300	(15%)	1	(8%)	11	(8%)	$6	(11%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 16.
Intentional Outside or Unclassified Fires, by Month
2007-2011 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	15,500	(7%)	1	(6%)	12	(8%)	$2	(3%)
February	14,400	(7%)	1	(6%)	11	(8%)	$2	(3%)
March	23,200	(11%)	2	(10%)	16	(11%)	$4	(7%)
April	22,200	(11%)	4	(24%)	13	(9%)	$2	(3%)
May	19,100	(9%)	1	(6%)	12	(8%)	$3	(5%)
June	17,900	(8%)	2	(11%)	13	(9%)	$16	(28%)
July	19,900	(9%)	0	(3%)	15	(11%)	$3	(6%)
August	16,500	(8%)	1	(3%)	10	(7%)	$13	(23%)
September	16,200	(8%)	1	(8%)	14	(10%)	$6	(10%)
October	17,400	(8%)	1	(6%)	11	(8%)	$3	(5%)
November	16,900	(8%)	2	(9%)	12	(8%)	$2	(3%)
December	12,400	(6%)	2	(9%)	5	(4%)	$3	(5%)
Total	211,500	(100%)	20	(100%)	150	(100%)	$60	(100%)

Table 17. Intentional Vehicle Fires, by Heat Source
2007-2011 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Match	5,000	(24%)	6	(20%)	12	(17%)	$38	(21%)
Cigarette lighter	3,300	(16%)	9	(29%)	27	(40%)	$23	(13%)
Incendiary device	2,700	(13%)	1	(3%)	2	(2%)	$21	(12%)
Unclassified heat source	2,200	(11%)	4	(12%)	3	(4%)	$19	(11%)
Flame or torch used for lighting	1,500	(7%)	1	(3%)	4	(6%)	$13	(7%)
Smoking materials	800	(4%)	1	(3%)	2	(2%)	$7	(4%)
Multiple heat sources including multiple ignitions	800	(4%)	1	(3%)	0	(0%)	$12	(7%)
Unclassified hot or smoldering object	800	(4%)	1	(2%)	3	(4%)	$5	(3%)
Unclassified heat from powered equipment	500	(2%)	2	(7%)	2	(4%)	$2	(1%)
Radiated, conducted heat from operating equipment	400	(2%)	1	(2%)	1	(1%)	$2	(1%)
Spark, ember or flame from operating equipment	400	(2%)	1	(3%)	3	(4%)	$1	(1%)
Other known heat source	1,900	(10%)	4	(11%)	10	(15%)	$33	(19%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Sums may not equal totals due to rounding errors.
Source: NFIRS and NFPA survey.

Table 18.
Intentional Vehicle Fires, by Item First Ignited
2007-2011 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Flammable or combustible liquids or gas, piping or filter	5,900	(29%)	18	(57%)	40	(59%)	$47	(27%)
Upholstered furniture or vehicle seat	5,700	(28%)	0	(4%)	0	(6%)	$50	(28%)
Unclassified item first ignited	2,500	(12%)	5	(16%)	5	(8%)	$21	(12%)
Multiple items first ignited	2,200	(11%)	3	(10%)	7	(10%)	$21	(12%)
Magazine, newspaper, writing paper	700	(3%)	0	(0%)	3	(4%)	$2	(1%)
Electrical wire or cable insulation	500	(3%)	1	(2%)	0	(0%)	$2	(1%)
Rubbish, trash, or waste	400	(2%)	0	(0%)	2	(2%)	$1	(1%)
Clothing	300	(2%)	2	(6%)	2	(3%)	$1	(1%)
Tire	300	(1%)	0	(0%)	0	(0%)	$3	(2%)
Other known item first ignited	1,800	(9%)	2	(6%)	6	(9%)	$27	(15%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Table 19. Intentional Vehicle Fires, by Area of Origin
2007-2011 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Passenger area of vehicle	10,000	(49%)	18	(57%)	36	(52%)	$88	(50%)
Unclassified vehicle area	2,800	(14%)	2	(7%)	4	(6%)	$24	(14%)
Engine area, running gear or wheel area vehicle	2,000	(10%)	4	(13%)	8	(11%)	$13	(7%)
Exterior surface of vehicle	1,600	(8%)	1	(3%)	6	(8%)	$9	(5%)
Cargo or trunk area of vehicle	1,100	(5%)	2	(6%)	6	(9%)	$10	(5%)
Fuel tank or fuel line of vehicle	700	(3%)	2	(5%)	4	(6%)	$3	(2%)
Other	400	(2%)	1	(4%)	0	(0%)	$4	(2%)
Unclassified outside area	400	(2%)	0	(1%)	1	(1%)	$2	(1%)
Other known area of origin	1,200	(6%)	1	(4%)	5	(7%)	$23	(13%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 20.
Intentional Vehicle Fires, by Day of Week
2007-2011 Annual Averages

Day of Week	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Sunday	3,600	(17%)	3	(8%)	9	(13%)	$30	(17%)
Monday	2,900	(14%)	6	(19%)	7	(10%)	$34	(19%)
Tuesday	2,800	(14%)	5	(15%)	4	(6%)	$22	(12%)
Wednesday	2,600	(13%)	5	(15%)	11	(16%)	$19	(11%)
Thursday	2,600	(13%)	3	(11%)	8	(12%)	$21	(12%)
Friday	2,700	(13%)	5	(16%)	15	(22%)	$23	(13%)
Saturday	3,300	(16%)	5	(15%)	14	(21%)	$27	(15%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Table 21. Intentional Vehicle Fires, by Month
2007-2011 Annual Averages

Month	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
January	1,700	(8%)	4	(13%)	3	(4%)	$16	(9%)
February	1,400	(7%)	2	(6%)	3	(5%)	$13	(7%)
March	1,700	(8%)	3	(11%)	3	(4%)	$16	(9%)
April	1,700	(8%)	2	(7%)	7	(11%)	$13	(7%)
May	1,800	(9%)	3	(9%)	9	(13%)	$14	(8%)
June	1,800	(9%)	1	(3%)	8	(11%)	$15	(8%)
July	2,100	(10%)	2	(6%)	12	(17%)	$25	(14%)
August	1,900	(9%)	4	(12%)	6	(9%)	$14	(8%)
September	1,700	(8%)	3	(10%)	4	(6%)	$13	(8%)
October	1,700	(8%)	3	(10%)	4	(6%)	$13	(7%)
November	1,500	(8%)	3	(9%)	5	(8%)	$11	(7%)
December	1,400	(7%)	1	(2%)	4	(7%)	$12	(7%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 22.
Intentional Vehicle Fires, by Alarm Hour
2007-2011

Alarm Hour	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Midnight – 3 a.m.	5,400	(27%)	6	(20%)	10	(14%)	$50	(28%)
3 a.m. – 6 a.m.	3,900	(19%)	4	(13%)	13	(19%)	$4	(19%)
6 a.m. – 9 a.m.	1,400	(7%)	2	(5%)	4	(6%)	$40	(6%)
9 a.m. – Noon	1,000	(5%)	4	(12%)	6	(8%)	$6	(3%)
Noon – 3 p.m.	1,000	(5%)	2	(7%)	7	(10%)	$6	(3%)
3 p.m. – 6 p.m.	1,200	(6%)	6	(20%)	10	(14%)	$17	(10%)
6 p.m. – 9 p.m.	2,000	(10%)	3	(8%)	7	(11%)	$15	(9%)
9 p.m. – Midnight	4,400	(22%)	5	(15%)	12	(18%)	$39	(22%)
Total	20,400	(100%)	30	(100%)	70	(100%)	$180	(100%)

Sums may not equal totals due to rounding errors.

Source: NFIRS and NFPA survey.

Table 23.
Percent of Arson Offenses Cleared by Arrest or Exceptional Means, by Region
By Year 1984-2011

Year	Nation	Northeast	Midwest	South	West
1984	17	15	13	22	16
1985	17	13	16	22	15
1986	15	12	13	20	15
1987	16	13	13	20	15
1988	15	12	12	21	14
1989	15	11	14	20	14
1990	15	11	11	21	15
1991	16	12	13	21	16
1992	15	13	11	21	13
1993	15	13	12	20	15
1994	15	10	14	21	15
1995	16	11	16	20	15
1996	16	14	16	20	15
1997	18	16	16	22	15
1998	16	17	15	20	13
1999	17	17	18	19	14
2000	16	17	15	18	14
2001	16	20	15	18	14
2002	17	20	15	19	14
2003	17	21	16	19	14
2004	17	22	15	19	15
2005	18	22	17	19	16
2006	18	23	16	21	15
2007	18	24	16	20	16
2008	18	24	16	19	16
2009	19	25	16	20	16
2010	19	24	16	21	17
2011	19	23	16	19	18

*Source: FBI *Crime in the United States Series*, Table 26

Table 24.
Percent of Arson Arrests by Age, 2011

Age	Fires
Under 10	2%
10 to 12	8%
13 to 14	14%
15	7%
16	6%
17	5%
18	4%
19	4%
20	4%
21	3%
22	2%
23	2%
24	2%
25-29	9%
30-34	7%
35-39	5%
40-44	5%
45-49	5%
50-54	4%
55-59	2%
60-64	1%
65 and over	1%
Ages under 15	24%
Ages under 18	41%
Ages 18 and over	59%
Total	100%

*Source: FBI *Crime in the United States Series*, Table 38

Table 25.
Percent of Arson Arrests, by Age
1980-2011

Year	Under 10	10 to 12	13 to 14	15	16	17	All Under 18
1980	7	7	11	7	6	6	44
1981	7	8	11	5	5	6	42
1982	6	7	9	5	5	5	37
1983	7	7	10	5	4	4	37
1984	8	8	12	6	5	4	43
1985	7	7	12	6	5	4	41
1986	7	7	11	6	5	4	40
1987	7	8	11	6	5	4	41
1988	8	9	12	6	4	4	43
1989	8	9	13	5	4	4	43
1990	7	10	12	6	5	4	44
1991	7	11	14	6	5	4	47
1992	6	11	15	7	5	5	49
1993	6	10	16	7	5	5	49
1994	7	12	18	7	6	5	55
1995	6	12	17	7	5	5	52
1996	7	12	17	7	6	5	53
1997	6	11	16	7	6	5	50
1998	6	12	17	7	6	5	52
1999	7	12	17	8	5	5	54
2000	6	13	16	7	6	5	53
2001	5	11	15	7	6	5	49
2002	5	11	15	7	6	5	49
2003	3	10	18	9	6	5	51
2004	3	10	17	8	7	5	50
2005	3	9	17	8	6	5	49
2006	3	9	16	8	7	5	49
2007	3	9	16	8	6	5	47
2008	3	8	15	8	6	6	47
2009	2	8	16	7	5	6	44
2010	3	8	13	7	5	5	41
2011	2	8	14	7	6	5	41

Source: *FBI Crime in the United States Series*

Table 26.
U.S. Intentional Structure Fire and Arson Offense Rates
by Size of Community

A. Intentional Structure Fires per 100,000 Population

Year	Under 2,500	2,500 to 4,999	5,000 to 9,999	10,000 to 24,999	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more
1993	18	16	11	11	15	20	27	36
1994	16	14	12	13	14	20	29	32
1995	24	19	15	12	14	17	31	34
1996	23	12	13	11	14	16	29	30
1997	18	16	11	14	12	15	25	31
1998	15	15	10	11	11	18	24	26
1999	20	13	14	10	8	12	16	26
2000	18	17	10	9	10	15	19	26
2001	15	7	8	10	11	14	20	28
2002	10	8	11	13	12	15	20	27
2003	14	9	8	8	9	13	15	21
2004	11	8	7	8	9	11	15	21
2005	11	6	7	7	10	11	11	16
2006	7	7	7	7	9	9	15	15
2007	15	9	8	6	9	9	13	15
2008	10	8	7	6	9	10	13	14
2009	9	7	7	5	8	7	11	13
2010	8	9	6	5	8	6	13	12
2011	9	8	6	5	7	6	11	12

Source for Part A: NFPA survey and U.S. Census Bureau resident population statistics.

Table 26.
U.S. Intentional Structure Fire and Arson Offense Rates
by Size of Community

B. Arson Offense Rates

Year	Cities under 10,000	10,000 to 24,999	25,000 to 49,999	50,000 to 99,999	100,000 to 249,999	250,000 or more
1993	28	26	34	41	63	86
1994	31	28	37	43	66	84
1995	35	29	36	42	60	83
1996	30	27	36	41	50	84
1997	28	24	31	36	52	78
1998	28	22	28	34	43	75
1999	26	21	27	33	43	71
2000	24	19	26	31	40	67
2001	27	21	25	32	38	62
2002	25	20	24	29	39	59
2003	22	20	23	28	35	53
2004	22	19	23	26	30	49
2005	21	18	23	24	30	46
2006	22	19	22	26	30	45
2007	21	18	21	24	29	41
2008	21	18	20	23	26	39
2009	19	14	17	20	22	32
2010	21	14	16	19	22	32
2011	20	13	15	17	21	33

Note: FBI rates include non-structure fires (i.e., vehicles, outdoor fires) as well as structures. The FBI uses cities and other communities; the NFPA uses population coverage areas of fire departments. The FBI figures for cities under 10,000 population and rural counties may not correspond exactly to rates for communities of 2,500 to 9,999 and under 2,500 population, the definitions used in the NFPA survey. The FBI also reports rates for suburban counties and areas. As of 2003, FBI statistics replace rural counties with non-metropolitan counties. NFPA statistics are for incendiary fires through 2000 and for intentional fires from 2001 on.

Source for Part B: FBI and U.S. Census Bureau resident population statistics.

Appendix A.
How National Estimates Statistics are Calculated

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

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

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

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

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

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

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

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

Projecting NFIRS to National Estimates

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

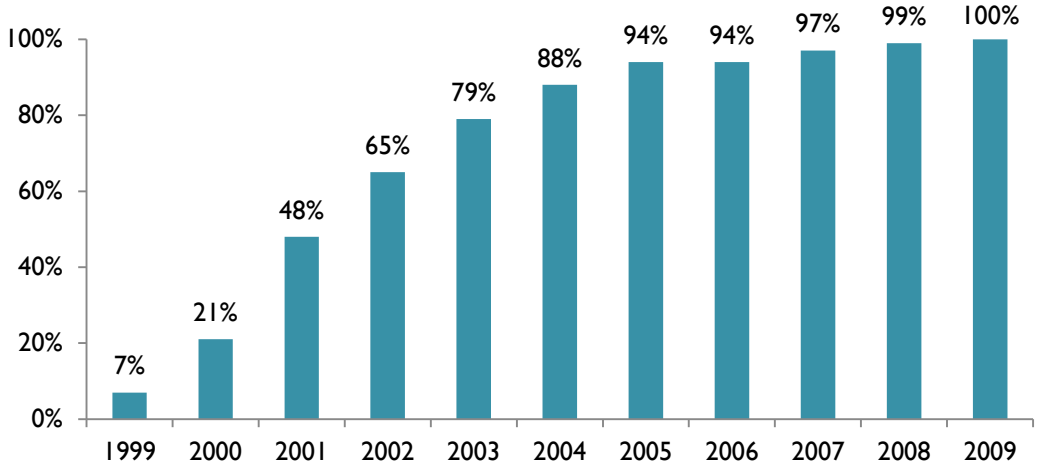
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific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

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

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

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

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



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

NFPA survey projections
NFIRS totals (Version 5.0)

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

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

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

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

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

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

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

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

Cause of Ignition: This field is used chiefly to identify intentional fires. "Unintentional" in this field is a specific entry and does not include other fires that were not intentionally set: failure of equipment or heat source, act of nature, or "other" (unclassified)." The last should be used for exposures but has been used for other situations as well. Fires that were coded as under investigation and those that were coded as undetermined after investigation were treated as unknown.

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

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

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

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

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

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

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 has the same

downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

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

Code Grouping	EII Code	NFIRS definitions
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	120	Fireplace or chimney
	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Fixed wiring and related equipment	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	213	Electric meter or meter box
	214	Wiring from meter box to circuit breaker
	215	Panel board, switch board or circuit breaker board
	216	Electrical branch circuit
	217	Outlet or receptacle
	218	Wall switch
	219	Ground fault interrupter
Transformers and power supplies	221	Distribution-type transformer
	222	Overcurrent, disconnect equipment
	223	Low-voltage transformer
	224	Generator
	225	Inverter
	226	Uninterrupted power supply (UPS)
	227	Surge protector
	228	Battery charger or rectifier
	229	Battery (all types)

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

Equipment was not analyzed separately for confined fires. Instead, each confined fire incident type was listed with the equipment or as other known equipment.

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

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply "bedroom." Chimney is no longer a valid area of origin code for non-confined fires.

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.

Appendix B.
NFIRS Coding Changes from 4.1 to 5.0

Prior to 1999, fire fighters had several choices for coding intentionally set fires. These codes included "incendiary," "suspicious" "child playing," and many other fire causes. A fire could be "incendiary or suspicious" or "child playing" (or neither) but not both. There was also an Ignition Factor code to use if mental impairment or drug or alcohol impairment led to misuse of the heat of ignition.

In NFIRS Version 5.0, the data element cause of ignition: intentional, is used to identify intentionally set fires. Now, "intentional" is identified on a different data element from the one used to identify playing, drug or alcohol impairment, or mental impairment. The second data element can accept multiple values as possible reasons for not being able to form legal intent. Also, a fire coded in Version 5.0 can ascribe "playing" as a factor but choose not to ascribe age as a factor (e.g., reckless fireplay by college students) or cite age as a factor for an older child – or even an older adult (e.g., a person with senile dementia whose condition leads to reckless fireplay without intention to harm).

This analysis includes all fires coded as Cause of Ignition: 1-Intentional in Version 5.0 for all years including and after 1999. Any estimates for years prior to 1999 are not for intentional fires, but rather for fires considered incendiary or suspicious.

Trend Analysis and the Disappearance of "Suspicious" as a Cause

Tables B-1 to B-3 show 1980-1998 statistics for structure, vehicle, and outside and other properties for incendiary and suspicious fires.

It is reasonable to estimate that some fires that would have been coded as suspicious are now being coded as intentional, and the rest are being coded as unknown. The various trend analyses suggest that most are being coded as intentional and that this practice has a more dramatic and visible effect on property damage estimates where the suspicious share of incendiary and suspicious had been growing from 1980 to 1998.

Table B-1.
Intentional Fires, by Incident Type and Year, 1980-1998

A. Fires

Year	Structure	Vehicle	Outside or Unclassified	Total Fires
1980	201,200	74,800	583,800	859,800
1981	190,900	65,500	568,200	824,600
1982	159,800	56,000	450,900	666,700
1983	138,800	55,300	381,100	575,200
1984	136,000	64,500	370,500	571,100
1985	143,600	72,900	381,000	597,500
1986	140,500	78,600	373,500	592,600
1987	129,100	76,500	368,900	574,500
1988	125,100	72,500	385,800	583,400
1989	117,000	70,000	332,600	519,600
1990	111,900	76,200	351,400	539,500
1991	113,900	76,800	367,400	558,100
1992	116,600	73,500	355,100	545,200
1993	104,400	68,200	347,200	519,800
1994	107,900	66,600	376,500	551,000
1995	99,300	66,300	368,300	533,900
1996	98,800	74,400	351,500	524,800
1997	85,000	64,500	293,300	442,800
1998	86,000	66,300	294,900	447,200

Notes: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. These estimates include a proportional share of unknown Ignition Factor. Fires are rounded to the nearest hundred. Property damage has not been adjusted for inflation for these tables.

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

Table B-2.
Intentional Fires, by Incident Type and Year, 1980-1998

B. Deaths

Year	Structure	Vehicle	Outside or Unclassified	Total Civilian Deaths	Firefighters fatally injured at scene or during response
1980	930	30	20	980	24
1981	810	20	20	850	21
1982	930	30	10	970	20
1983	860	190	10	1,070	16
1984	660	30	20	710	15
1985	720	40	30	800	29
1986	800	40	10	850	24
1987	730	60	30	820	27
1988	870	40	10	930	25
1989	840	50	10	910	16
1990	810	30	10	850	15
1991	690	30	10	740	17
1992	720	30	10	760	13
1993	840	40	10	890	9
1994	500	50	10	560	14
1995	740	70	10	820	13
1996	680	60	10	760	5
1997	660	40	10	710	6
1998	640	40	10	680	10

Notes: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. These estimates include a proportional share of unknown Ignition Factor. Fires are rounded to the nearest hundred. Property damage has not been adjusted for inflation for these tables.

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

Table B-3.
Intentional Fires, by Incident Type and Year, 1980-1998

C. Injuries

Year	Structure	Vehicle	Outside or Unclassified	Total Civilian Injuries	Firefighters injured at scene or during response
1980	3,010	180	150	3,340	
1981	3,790	190	170	4,150	
1982	3,420	100	120	3,640	
1983	3,160	130	120	3,410	
1984	2,640	120	170	2,930	
1985	2,840	140	140	3,120	11,300
1986	2,930	170	110	3,200	10,600
1987	2,700	180	130	3,010	8,300
1988	3,140	140	140	3,420	9,900
1989	2,990	150	110	3,250	9,600
1990	3,190	170	110	3,480	10,500
1991	3,390	130	170	3,700	10,800
1992	3,170	160	170	3,500	10,200
1993	3,330	100	150	3,580	8,900
1994	3,070	160	220	3,450	9,300
1995	2,550	130	180	2,860	7,900
1996	2,650	110	160	2,920	6,500
1997	2,090	120	120	2,330	6,100
1998	2,320	160	220	2,700	5,600

Notes: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. These estimates include a proportional share of unknown Ignition Factor. Fires are rounded to the nearest hundred. Property damage has not been adjusted for inflation for these tables.

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

Table B-4.
Intentional Fires, by Incident Type and Year, 1980-1998

D. Direct Property Damage

Year	Structure	Vehicle	Outside or Unclassified	Direct Property Damage	Total in 2011 Dollars
1980	$1,776	$143	$19	$1,938	$5,291
1981	$1,994	$108	$32	$2,135	$5,268
1982	$1,918	$115	$21	$2,054	$4,777
1983	$1,675	$166	$14	$1,854	$4,179
1984	$1,549	$176	$13	$1,738	$3,753
1985	$1,776	$142	$22	$2,084	$4,346
1986	$1,994	$179	$17	$1,983	$4,068
1987	$1,918	$185	$14	$2,002	$3,959
1988	$1,675	$215	$21	$2,114	$4,019
1989	$1,549	$222	$32	$1,838	$3,333
1990	$1,763	$244	$37	$2,044	$3,518
1991	$2,167	$268	$9	$2,444	$4,031
1992	$2,133	$235	$63	$2,431	$3,895
1993	$1,667	$207	$13	$1,886	$2,933
1994	$1,756	$238	$33	$2,027	$3,075
1995	$2,145	$267	$26	$2,438	$3,594
1996	$1,802	$263	$29	$2,094	$3,002
1997	$1,405	$293	$16	$1,758	$2,461
1998	$1,467	$324	$86	$1,877	$2,590

Notes: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. These estimates include a proportional share of unknown Ignition Factor. Fires are rounded to the nearest hundred. Property damage has not been adjusted for inflation for these tables.

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

Appendix C.
Selected Published Incidents

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

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

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

Sprinklers control intentionally set fires in discount store, Texas
A 33-year-old man as accused of using a water gun filled with lighter fluid to start seven separate fires in a discount store after telling store employees to leave the building before he "blew the place up."

The store, which was located in a single-story strip mall with other retailers on either side, had concrete and brick walls and a metal roof with a built-up surface. It was protected by a NFPA 13-compliant, monitored wet-pipe sprinkler system and an NFPA 72-compliant fire alarm system.

The fire department was notified of the water flow alarm at 1:32 p.m., and fighters arrived two minutes later to find smoke coming from the building and the suspect in police custody. When they entered the store, they found a few fires still burning, but six sprinklers had already brought the rest of them under control.

Investigators found that the man had set seven fires in the retail display area and two in a rear receiving area by spraying the lighter fluid and igniting it.

The building, valued at $180,000, were destroyed by fire, smoke, and water. No one was injured.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, November/December 24-25.

Sprinkler controls fire in school, Virginia
A student intentionally ignited paper towels and toilet paper in the boys' bathroom at his middle school, starting a fire that activated a single sprinkler, which limited fire damage to $1,000.

The two-story, steel-frame school had concrete block walls and a steel truss roof covered with a metal deck and a built-up roof surface. A monitored fire detection system and drypipe sprinkler system protected the entire property.

Smoke from the fire activated smoke detectors, and the waterflow alarm was tripped shortly after noon. Responding firefighters were met at the front door by the assistant principal, who reported

smoke in the building. Crews found a fire smoldering in the first-floor bathroom and used a water can to extinguish the still burning paper towel dispenser.
Investigators determined that the boy deliberately used smoking materials to set fire to the paper towels and toilet paper.

The school, valued at almost $24 million dollars, sustained less than $1,000 damage.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, May/June 29.

Suicide by fire, Ohio
A man suffering from mental illness committed suicide by scattering paper around his rented single-family house and setting it on fire.

The two-story, wood-frame house had a battery-operated smoke alarm in the basement but no sprinklers.

The victim, who had started a fire in the house on a previous occasion, had stopped taking his medication and was reported to be delusional. When police officers who had been asked to check on the man's welfare knocked on the door, he confronted them with a hedge trimmer and quickly slammed the door shut. However, the officers managed to see wads of toilet paper and unrolled toilet paper strewn about the floor. While police were still outside, the man set the paper on fire.

The officers kicked the door in when they smelled smoke and were met by flames. Fire crews called to the scene found the victim in the dining room,k overcome by smoke and heat.

The fire destroyed the house, which was valued at $95,000, and its contents, valued at $7,000.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, May/June 24.

Sprinkler douses school fire, Utah
A sprinkler extinguished a fire set by an elementary school student in a classroom recycling bin.

The two-story elementary school's fire alarm system, which included smoke detectors and water flow alarm, was monitored by a central station alarm company, and a wet-pope sprinkler system provided full coverage.

The student, who had just been reprimanded, was briefly left alone in a classroom. As he left the room he dropped a lighted match into the recycling bin, igniting the contents. Heat and flames spread to coats and backpacks hung above it, and smoke traveled from the class room to the hallway, activation a smoke detector that sounded an internal alarm and notified the fire department at 2:10 p.m.

Firefighters arrived to find smoke on the second floor and were investigating its source when the sprinkler activated and extinguished the fire. Investigators and the school staff spoke to the student, who confessed to starting the fire.

Neither the value of the building and its contents nor the amount of damage was reported.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, March/April, 23.

Sprinklers foil suicide attempt, Florida
A 49-year-old woman staying at a substance abuse treatment center slashed her wrists and started a fire in her bedroom in an attempt to take her own life. However, the fire activated a sprinkler, which controlled the fire until firefighters arrived to extinguish it.

The treatment center was located in a three-story building that had concrete block walls and poured concrete floors. An NFPA 13 automatic fire sprinkler system provided full coverage, and hardwired smoke detectors had been installed both in and outside every bedroom in the facility.

Firefighters responded to the water- flow alarm from the central station alarm company at 8:45 p.m. and used a single 1¾-inch hose line to extinguish the blaze.

Investigators determined that the woman used a cigarette to start the fire in a pile of bedding she dumped on the floor next to her bed. As the fire grew, it spread to the mattress, pillow, and other bedding before the sidewall sprinkler activated. Upon hearing the alarm, occupants entered the room and dragged the woman outside to a landing, where she was treated before she was taken to the hospital. She survived her self-inflicted injuries. The fire department noted that "the sprinkler system activated properly…greatly lessening the damage to the building and contents and possibly saving the victim's life."

The building, valued at $333,000, sustained damage estimated at $10,000. Its contents, valued at $1,332,000, sustained $30,000 in damage.

Kenneth J. Tremblay, 2013," Firewatch", *NFPA Journal*, January/February, 21-22.

Man burns down home, commits suicide, Washington
A man committed suicide after deliberately setting his home on fire, as he had told relatives he would.

The single-story, wood-frame house, which was 40 feet (12 meters) long and 24 feet (7 meters) wide, was unsprinklered, and investigators were unable to determine whether it had any smoke alarms.

The fire department received two 911 calls reporting an explosion and fire at 2:34 a.m., and firefighters arrived four minutes later to find heavy fire coming from the front and rear of the house. The incident commander ordered a defensive attack to prevent the fire from spreading, and firefighters used three large-diameter hose lines to knock the fire down.

During his size-up, the incident commander found the victim's body sitting in a chair on a patio at the rear of the house with a gasoline container by his feet. His head injuries were consistent with a self-inflicted gunshot wound, and a gun was found on the ground under the victim's chair. After the fire was extinguished, the area around the home and the house itself became a crime scene.

Based on the degree of damage and evidence collected at the scene, investigators determined that the victim had poured an accelerant throughout the house and introduced a competent ignition source in the kitchen, which was the point of origin. The sudden ignition of flammable vapors

caused a pressure wave that blew glass and building debris some 86 feet (26 meters) from the front of the house and 40 feet (12 meters) from the rear.
A family member told investigators that the man, whose age was not reported, had sent an e-mail stating he was going to burn down the house and take his life.

The house, valued at $75,000, and its contents, valued at $15,000, were completely destroyed.

Kenneth J. Tremblay, 2012," Firewatch", *NFPA Journal*, November/December, 24-25.

Child dies in house fire, Illinois
A five-year-old boy died and his 45-year-old mother was injured in a house fire that investigators believe was intentionally set.

The exterior walls of the three-story, wood-frame, single-family house, which was 40 feet (12 meters) long and 30 feet (9 meters) wide, were covered with vinyl siding. A smoke alarm had been installed in the basement near the stairway to the first floor. There were no sprinklers.

The home's occupants called 911 at 9:59 p.m. to report the fire, and firefighters arrived at the scene a minute later. By the time they extinguished the fire, it had done significant property damage. Although investigators could not determine the exact ignition scenario, they believe it was intentionally set on the rear porch and spread into the home from there.

The boy died of smoke inhalation, and his mother, who suffered from burns and smoke inhalation, sustained additional injuries when she fell or rolled off the front porch.

Damage to the house, valued at $75,000, was estimated at $60,000. Damage to its contents, valued at $40,000, was estimated at $30,000.

Kenneth J. Tremblay, 2012," Firewatch", *NFPA Journal*, November/December, 21-22.

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

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

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

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

second alarm. After firefighters extinguished the blaze, they shut down the sprinkler system and began their investigation.

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

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

Washington
Date, Time of Alarm, Number of Deaths
April, 1:39 a.m., 6

Number of Stories, Occupancy Type, Construction Type
This was a one-story, 1,925-square-foot (179-square-meter), single-family home of unprotected wood-frame construction, and it was occupied by one adult and five children.

Smoke Alarm and Other Protection Devices
There were no smoke alarms or automatic suppression system.

Fire Origin and Path
This incendiary fire was set in the living/dining area of this sparsely-furnished home as a murder/suicide. According to a Bureau of Alcohol, Tobacco and Firearms investigation report, gasoline and lighter fluid were spread on the floor throughout the dining/living area and on the walls. The floors in the area were non-absorbent wood laminate, which caused the liquids to pool, creating a large surface area of gasoline that produced vapors. Natural air currents and the functioning hot air furnace caused the vapors to disperse and mix, resulting in a fuel rich mixture at the floor. The introduction of an open flame resulted in a deflagration with an over-pressure event.

Contributing Factors and Victim Locations
When firefighters arrived, the house was 50 percent involved in fire, and a rear wall was pushed out. A primary search of the uninvolved area revealed no one. All six victims were found in the dining/living area, where they had been sleeping in a tent set up for the children.

Stephen G. Badger, 2012, “Catastrophic Multiple-Death Fires for 2011”, NFPA Fire Analysis and Research, Quincy, MA.

Sprinklers control incendiary fire in retail store, Tennessee
A retail store’s sprinklers helped contain a fire that started when someone used an open flame device to ignite combustibles in three separate areas, creating thick, black smoke that forced employees and customers to flee the building.

The single-story, steel-frame store, which sold general goods and clothing, had brick exterior walls. The building had a sprinkler system, but its type and coverage were not reported, nor was the presence or absence of fire detection or alarm equipment.

The fire department received a 911 call at 3:08 p.m., and arriving firefighters found staff and customers fleeing from the smoke coming from one of the store's entrances. They extinguished fires in three places.

Investigators determined that the fire was of incendiary origin and had been started in a fixed display of toilet paper, an end cap displaying paper napkins, and a fixed display of mops. They noted moderate to extensive heat damage to shelving and merchandise, and mild to moderate smoke and water damage to areas near the points of ignition.

Structural damage was estimated at $5,000, and damage to the store's contents was estimated at $10,000. There were no injuries.

Kenneth J. Tremblay, 2012, "Firewatch" *NFPA Journal*, July/August, 30.

Sprinklers prevent major loss at vacant property, Utah

A single sprinkler extinguished a fire started unintentionally by a homeless person who was using a loading dock at a vacant retail store as a living space.

The building, which had once housed an electronics store, had concrete block walls covered by brick veneer and a steel- and wood-framed roof. A wet-pipe sprinkler system protected the building, and a dry-pipe sprinkler covered the loading dock.

By the time firefighters responded to a 911 call from a passerby, the sprinkler had already brought the fire under control.

Upon investigation, they found that a transient had set up camp under the loading dock's stairs. Evidently, the mattress he was using ignited, and the fire spread to truck bumper pads installed around the loading dock door. Heat collecting under the canopy fused the dry-pipe sprinkler, which extinguished the fire in the bumper pads and confined the remainder to the area below the stairs

The building, valued at $500,000, sustained $500 in damage. There were no injuries.

Kenneth J. Tremblay, 2012, "Firewatch," *NFPA Journal,* March/April, 18-19.

Fire at vacant manufacturing plant blamed on arson, Wisconsin

Firefighters responding to a 911 call reporting a fire at a vacant manufacturing plant discovered that the building contained a number of empty plastic gasoline jugs, pointing to a possible arson fire.

The two-story building, which covered and area of 2,500 square feet (232 square meters), was constructed in the 1970s as a vinyl window manufacturer, with concrete block walls, lightweight steel parallel cord trusses, and wooden roof additions. Wooden mezzanines had been built inside under the 20-foot (6 meter) ceiling.

The plant originally had a wet-pipe sprinkler system, but it had been converted to a dry-pipe system supported by a portable air compressor due to lack of power and heat. A fire detection system

using smoke and heat detectors had also been installed, but it, too, had been deactivated due to lack of power. The building had a history of utility shut-offs due to nonpayment.

Although the plant was not occupied at the time of the fire, homeless people often used it for shelter.

A passerby called 911 at 6:18 p.m. to report smoke coming from the building. When firefighters arrived, they found a column of black smoke coming from the center of the structure. Walking around the plant, the operations officer discovered a burning rag near a service door that had been propped open and smoke about 3 feet (0.9 meters) off the floor. He also saw a gasoline can about 12 feet (4 meters) inside the building.

Because of the strong probability of arson, the large amount of smoke and heat, concerns about structural integrity or booby traps, and the threat to firefighter safety, defensive tactics were recommended, as were evidence preservation efforts. Companies were ordered to support the sprinkler system using the fire department connection, as engine and ladder companies began to advance hose lines.

When support of the sprinkler system had little effect on the fire, firefighters found that the outside screw and yoke valve was shut. When the valve was opened, at least 20 sprinklers operated.

Once the fire was brought under control, firefighters found 16 fuel containers and multiple points of origin. Investigators later found more points of origin, as well as the remains of bedding, furniture, and other evidence of vagrants.

The value of the building and its contents was not reported.

Kenneth J. Tremblay, 2012, "Firewatch," *NFPA Journal,* January/February 20-21.

Sprinkler controls incendiary fire in department store, California

A single dry-pipe sprinkler operated and controlled a fire at a large department store, limiting damage to the building, which was occupied by shoppers at the time.

The single-story department store covered an area of approximately 10,000 square feet (929 square meters). It was equipped with a monitored fire detection and suppression system.

The alarm company reported a water flow alarm to the fire department at 4:36 a.m. When firefighters arrived four minutes later, they found smoke coming from the store's garden center.

Fire crews forced open a door in the chain link fence along the perimeter and advanced a hose line into the area, where they encountered cold smoke and a single operating sprinkler. They quickly extinguished the blaze, which had burned shelving racks containing flower pots and packaged potting soil, and activated the in-store ventilation system to clear the area of smoke.

Investigators later determined that the fire was incendiary.

The loss was estimated at $1,000.

Kenneth J. Tremblay, 2012, "Firewatch," *NFPA Journal,* January/February 22.

Sprinkler extinguishes incendiary fire at school, New Jersey
A sprinkler controlled a fire that was intentionally set in a second-floor boy's bathroom at a high school, limiting damage to the room. The roof and floor of the two-story, steel-frame school were constructed of open web steel bar joists. The metal deck roof had a rolled rubber and asphalt surface. A fire detection system provided full coverage, and a wet-pipe sprinkler system protected the science wing, which was where the fire started.

Firefighters received the alarm at 2:30 p.m. and found that a sprinkler had already extinguished the blaze. The building's fire walls and doors and the fire-rated ceiling prevented the fire from spreading.

Investigators determined that an unknown student used either a match or a lighter to set fire to a plastic toilet paper holder and that the resulting fire spread along the bathroom wall to the ceiling. There was a delay in extinguishment because the sprinkler nearest the fire had been installed with its shipping cap still in place. However, a second sprinkler near the door to the corridor activated and extinguished the blaze.

The school, which was valued at $10 million dollars, sustained $50,000 in damage. Its contents, valued at $5 million, sustained a loss of $25,000. There were no injuries.

Kenneth J. Tremblay, 2012, "Firewatch," *NFPA Journal,* January/February 22-23.

Fire started to cover murder, Kansas
Firefighters responding to a fire in a 24-unit apartment discovered the body of a woman who had been killed before the fire began.

Two occupants on the second floor of the unsprinklered, three-story, wood-frame building discovered the fire, one person when her carbon monoxide detector woke her and the other when her smoke detector operated, and both called 911. The first alarm was received at 4:54 a.m.

Arriving firefighters found nothing showing outside the building but, after talking to one of the callers, discovered the fire in a neighboring unit.

When they entered the apartment, they saw fire and smoke and began to evacuate occupants from the units on the floor above.

Crews advancing a hose line into the unit of origin noted two fires, one in the living room and one in the bedroom, where they discovered the victim's body. When they'd extinguished the two fires, they found a gasoline can in the living room and sealed the apartment for investigators.

The investigators determined that the woman had suffered severe head trauma and died before the perpetrator poured a trail of gasoline from the bedroom to the living room and ignited it with a lighter.

Damage to the building, valued at $500,000, was estimated at $40,000; damage to its contents was estimated at $10,000. There were no injuries.

Kenneth J. Tremblay, 2011, "Firewatch," *NFPA Journal*, January/February, 21-22.

Sprinklers control fire in furniture warehouse, Virginia
Sprinklers controlled a fire in a furniture warehouse until firefighters arrived to extinguish it.

The single-story, steel-frame building, which was 1,500 feet (457 meters) long and 400 feet (122 meters) wide, had masonry walls and a steel-frame roof covered by metal decking topped with foam insulation and a rubber membrane. The building was protected by a wet-pipe sprinkler system with a monitored water flow alarm.

Firefighters received the alarm at 11:59 a.m. and had begun to respond when the warehouse manager canceled the alarm four minutes later. At 12:08 p.m., however, the manager called back to confirm that there was a fire, and firefighters once again responded. Despite the initial cancellation, the volunteers had continued to respond to fire department headquarters, so the cancellation did not cause a delay in response.

When fire crews arrived at the scene, they learned from employees that the fire was in the center of an aisle with stacked boxes of furniture. The employees had tried unsuccessfully to control the blaze using portable extinguishers, but the flames spread from the furniture to the roof, causing four sprinklers to operate and contain the fire. Because of the stacked storage, the seat of the fire was shielded from the sprinklers' discharge. Wearing SCBA, the firefighters used forklifts to remove furniture and extinguished the fire using hose lines.

Investigators suspect that the fire was intentionally set by someone who used an open-flame device to ignite the cardboard boxes.

Manual fire doors were closed during the fire, limiting fire damage to the immediate area. Estimates of property damage were not reported.

Kenneth J. Tremblay, 2011, "Firewatch," *NFPA Journal*, January/February, 27.

Sprinkler extinguishes intentional fire in hospital, Florida
A single sprinkler extinguished a fire that a 58-year-old man set by igniting a paper towel dispenser in a single-occupant restroom at a hospital.

The 10-story hospital was constructed of steel and concrete, and had concrete block walls. The structure was protected by a fire detection system and a wet-pipe sprinkler system.

Firefighters responding to the alarm at 6:10 a.m. arrived 8 minutes later. Security personnel directed them to the second floor, where they found that a sprinkler had already extinguished the blaze.

Security cameras caught the man smoking near the bathroom just before the fire started. Investigators determined that he used his lighter to ignite the paper towels and that the fire spread to the wall-mounted dispenser. The sprinkler extinguished the blaze before it could spread to anything else.

The building and its contents, which were valued at more than $25 million dollars, sustained $24,000 in damage. There were no injuries. Police arrested the perpetrator

Kenneth J. Tremblay, 2011, "Firewatch," *NFPA Journal*, March/April, 30.

Sprinklers confine warehouse fire to area of origin, Illinois
A warehouse that was subdivided into a number of different occupancies was spared significant damage when several sprinklers operated and confined to the area of origin a fire that had been set intentionally.

The single-story, steel-frame warehouse had a metal bar joist roof and steel decking covered by a tar and gravel roof 30 feet (9 meters) above grade. A wet-pipe sprinkler system provided full coverage, but the warehouse's fire and water flow alarms, though operational, were not monitored by a central station company.

The business in which the fire started was closed for the night, but another portion of the building was occupied, and the workers there called 911 at 3:54 a.m. to report that they saw smoke in the structure. Police arrived before the fire department and reported heavy smoke showing from the building, as did the first-in engine company. Advancing a hose line through a door on the side of the building, fire crews tried to establish a water supply using a private hydrant. However, the water pressure was poor.

Five to eight minutes after the first engine arrived, the building's exterior water motor gong sounded as the first sprinkler began operating. Firefighters made a trench cut in the roof to ventilate the warehouse as additional engine companies backed up the first engine, established a water supply, and supported the sprinkler system.

Investigators determined that a person or persons unknown intentionally set the fire in a section of the warehouse that was used by a company that sold palletized plastic bottles shrinkwrapped in plastic to food companies. The fire was started at the base of one pallet and spread to several others before the sprinklers operated and controlled the blaze.

Valued at $5 million, the warehouse sustained an estimated $500,000 in property damage. Its contents, valued at $3 million, sustained an estimated $1 million in damage. The fire department reported no injuries.

Kenneth J. Tremblay, 2011, "Firewatch", *NFPA Journal*, May/June, 48.

Sprinkler extinguishes incendiary school fire, Arizona
A single sprinkler extinguished an incendiary fire at an occupied school, limiting property damage in the $4.3 million structure to roughly $43,000.

The single-story school, built in 2008, was constructed of masonry walls on a concrete slab with a prefabricated wooden truss roof covered by wood decking and a built-up roof surface. The interior partitions of the building were wood-framed. The school's fire alarm system, which included smoke detectors, and its wet-pipe sprinkler system were monitored by an alarm company.

Someone started the fire in the men's bathroom by setting paper towels alight in a large plastic waste barrel. Smoke from the fire tripped the smoke detector and the sprinkler, which extinguished the fire before firefighters responded to the 8 a.m. alarm.

There were no injuries.

Kenneth J. Tremblay, 2011, "Firewatch," *NFPA Journal*, July/August, 19.

Sprinkler controls incendiary fire in college classroom, Pennsylvania
Sprinklers controlled an incendiary fire in a college classroom, and the building's fire alarm system alerted occupants, who safely evacuated. The building was open and classes were in session at the time of the fire.

The three-story, steel-frame building had concrete block walls and a wooden roof with a built-up surface. The building had an automatic detection system, but its type and coverage were not reported. A partial wet-pipe sprinkler system was monitored by a central station alarm company.

An unknown person deliberately ignited paper in a classroom in which teaching supplies were kept. The fire spread through the room until heat activated two sprinklers in the hallway, which confined the fire to the room of origin.

The building, valued at $5 million, sustained $100,000 in damage. Its contents, valued at $1 million, sustained damage estimated at $50,000. There were no injuries.

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

Sprinkler controls incendiary fire in shopping mall, Tennessee
A single sprinkler operated during an incendiary fire, sparing a multi-million-dollar shopping mall significant damage.

The two-story, steel-frame mall had concrete floors and walls and contained 1.3 million square feet (121,000 square meters) of floor space. It was protected by a wet-pipe sprinkler system and had a fire detection system that provided smoke detection, elevator recall, and occupant notification, as well as a water flow alarm.

A mall employee discovered the fire shortly after it began in a first-floor housekeeping break room. He notified mall security, which met firefighters responding to the 5:30 p.m. water flow alarm and directed them to the site of the blaze.

Investigators determined that the fire began when an unknown individual used a match or a lighter to ignite a plastic bag on a housekeeping cart in the break room, which was located under a wooden mezzanine. The fire consumed the bag and its contents and began to spread to the underside of the mezzanine before it was subdued by a sprinkler.

The fire did approximately $10,000 in damage to the building, which was valued at $120,000 million, and its contents, valued at $60 million. There were no injuries.

Ken Tremblay, 2010, "Firewatch", *NFPA Journal*, May/June, 42.

Four dead in apartment building fire, Michigan
An early morning fire spread from the second floor of a four-story apartment building, trapping and killing a 38-year-old woman and three men, ages 44, 53, and 63.

The unsprinklered building was constructed of heavy timber construction with a brick exterior and a flat roof covered by a rubber membrane. It had only local smoke alarms, which operated as designed, alerting the residents, most of whom were asleep at the time.

The fire began in a second-floor laundry room and spread throughout the building. The 44-year-old man was found on the third floor. The locations of the woman and the other two men were not reported.

The building, valued at $750,000, and its contents, valued at $60,000, were destroyed. A resident of the building has been charged with setting the fire and is awaiting trial.

Ken Tremblay, 2010, "Firewatch," *NFPA Journal*, July/August, 30.

Two intentional fires in foreclosed home, Arizona
An intentionally set fire substantially damaged the second floor of a large, single-family house. Although the house, which was under foreclosure, had a fire sprinkler system, it failed to operate because the water had been shut off due to nonpayment.

The two-story wood-frame home, which covered approximately 5,900 square feet (548 square meters), was vacant at the time of the fire. All it contained was some trash and an upholstered couch. Hardwired smoke detectors were located in the common areas and bedrooms, but they had been disabled by lack of electricity.

A neighbor noticed the fire and called 911 at 11:58 p.m. Firefighters arrived minutes later to find heavy smoke and flames coming from the second floor, and extinguished the blaze using a tower ladder and several monitor nozzles.

Investigators found evidence that a door had been forced open before the firefighters arrived. They also determined that an accelerant poured on the second floor and in the first floor hallway had been ignited by an unknown ignition source. The fire consumed some of the remaining contents before it spread through structural floor and ceiling voids to the attic.

The home, valued at $1 million, incurred $200,000 in damage.

Two nights later, the house was destroyed by a second fire. By the time firefighters were summoned to the property at 8:05 p.m., flames were visible on both floors of the structure, and they had to use more than 160,000 gallons (606,000 liters) of water to extinguish the blaze.

Investigators found that the lock on the natural gas supply valve had been broken and that valves on the gas line in the laundry room had been opened before an accelerant poured in a first-floor hallway was ignited. The fire spread up the open stairs and vented through the roof, which had been opened during the previous fire.

Ken Tremblay, 2009, "Firewatch," *NFPA Journal*, September/October, 24.

Incendiary fire destroys abandoned building, North Carolina
An intentionally set fire damaged a large abandoned manufacturing building that had been condemned and was slated for demolition. It was being used for storage, and its contents provided the fire's fuel.

The three-story building, which was 300 feet (91 meters) long and 150 feet (46 meters) wide, was constructed of heavy timber with dimensional structural wood framing and brick walls. Its flat roof was covered by tar roofing material. A sprinkler system had been installed, but previous freeze-ups and falling timbers had caused the piping to break, rendering it useless.

A passerby called 911 at 6:26 p.m., and fire companies arriving four minutes later fought the blaze defensively because of the existing structural problems. Investigators determined that someone had ignited plastics and rolls of paper stored on the first floor near the middle of the warehouse.

There were no injuries.

Ken Tremblay, 2009, "Firewatch," *NFPA Journal*, September/October, 27.

Intentionally set fire kills two, Louisiana

A 20-year-old man and an 8-month-old baby boy died of smoke inhalation when they were trapped by an intentionally set fire in their unsprinklered manufactured home. Three other occupants escaped.

The single-story, wood-frame home, which was 16 feet (5 meters) wide and 80 feet (24 meters) long, had a smoke alarm that failed to operate.

Investigators determined that someone intentionally ignited clothing and a mattress in a middle bedroom and that the fire spread out of the room into the hallway. Three of the occupants managed to escape and called 911 from a cell phone, but the man and the baby were in the master bathroom with the door closed. By the time he discovered the fire, it had blocked the door to the hallway; furniture partially blocked a bathroom window. Firefighters found the man lying in the doorway between the bedroom and bathroom and the baby lying up against the tub.

The home, which was valued at $25,000, and its contents, valued at $8,000, were destroyed.

Ken Tremblay, 2009, “Firewatch,” *NFPA Journal*, November/December, 20.