

Intentionally Set Fires

These short topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in USFA's National Fire Incident Reporting System (NFIRS). Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information. Also included are recent examples of fire incidents that demonstrate some of the issues addressed in the report or that put the report topic in context.

Findings

- Approximately 210,300 fires are intentionally set each year. These fires represent 13 percent of all fires reported to fire departments.
- Intentionally set fires result in approximately 375 deaths, 1,300 injuries, and \$1 billion in direct property loss annually.
- The incidence of intentionally set fires peak in the spring (March and April) and again in mid-summer (July).
- Matches (30 percent) and lighters (15 percent) are the leading heat sources of intentionally set fires.
- Fifty-seven percent of intentionally set fires occur in outside areas. Twenty-two percent of fires occur in open, outside areas including fields and farmland. Twenty percent of intentionally set fires occur in other, unspecified outside areas.
- Approximately 22 percent of intentionally set fires occur in structures.
- Light vegetation including grass (26 percent) and rubbish, trash, and waste (11 percent) are the items most often first ignited in intentionally set fires.

From 2004 to 2006, an estimated 210,300 intentionally set fires occurred each year in the United States. Intentionally set fires account for 13 percent of fires responded to by fire departments across the Nation. These fires resulted in an average of approximately 375 deaths; 1,300 injuries; and \$1.06 billion in property loss each year.¹

Intentional fires are those fires that are deliberately set and include fires that result from deliberate misuse of a heat source, fires of an incendiary nature (arson), as well as controlled burn fires, such as crop clearing, that required fire service intervention. This topical report addresses the characteristics of intentionally set fires reported to the National Fire Incident Reporting System (NFIRS) between 2004 and 2006. Subsets of the intentionally set fire problem—outside, vehicle, and residential building intentionally set fires—are further investigated in separate topical reports.² Each topical report addresses specific concerns related to these subsets of the intentional fire problem.

Table 1 presents losses, averaged over this 3-year period, of all reported fires and intentionally set fires.³

Table 1. Loss Measures for All Fires and Intentionally Set Fires (3-year average, 2004–2006)

Measure	All Fires	Intentionally Set Fires
Average Loss:		
Fatalities/1,000 Fires	2.0	1.7
Injuries/1,000 Fires	10.2	8.3
Dollar Loss/Fire	\$5,918	\$5,190

Source: NFIRS 5.0

Note: Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed *per fire*.

One of the challenges in the analyses of NFIRS intentional fire data is the large number of unknown, undetermined, or unavailable entries reported. For example, in the analyses of the heat source and items first ignited in intentionally set fires, these unknown, undetermined, or unavailable entries comprise 41 percent and 30 percent of the data respectively, making it difficult to establish any concrete conclusions.

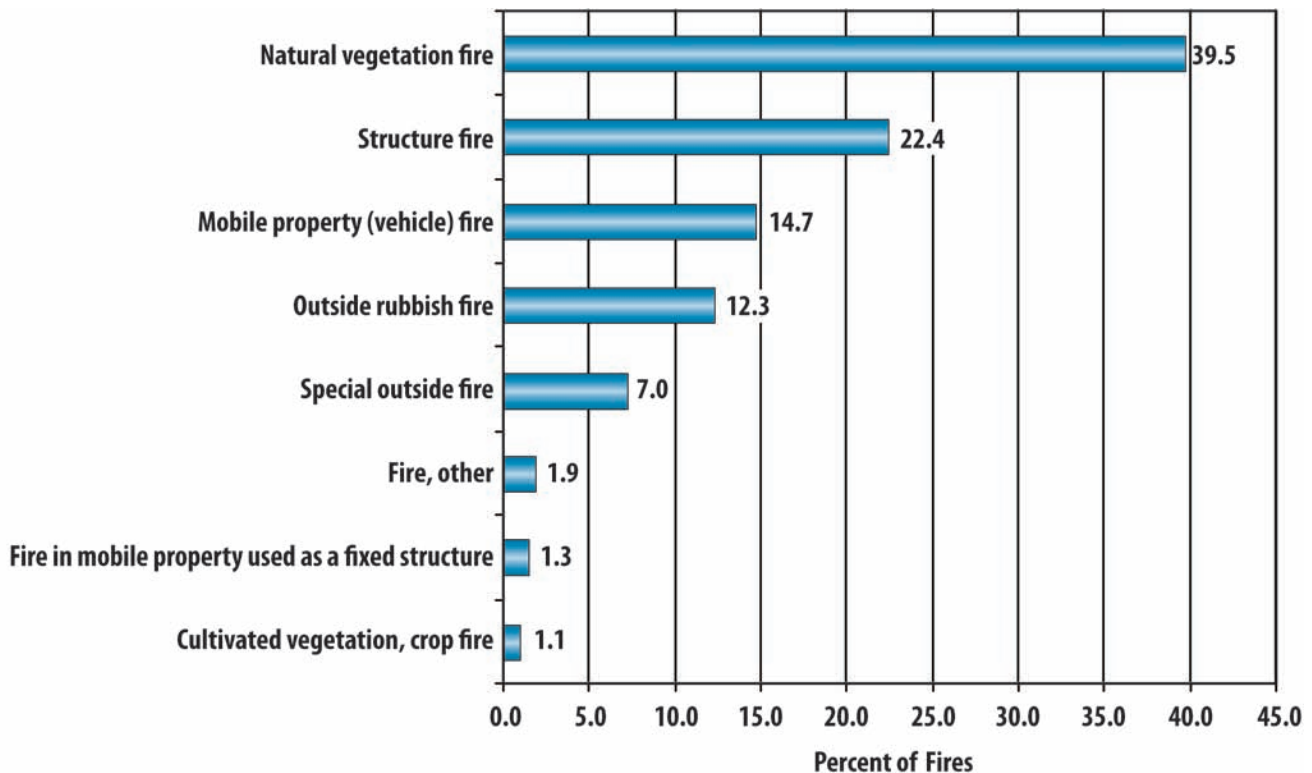
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Incident Types for Intentionally Set Fires

Approximately 40 percent of intentionally set fires are natural vegetation fires. Another 22 percent of intentionally set fires occur in structures, followed by 15 percent in vehicles,

and 12 percent in outside rubbish.⁴ The rest of intentionally set fires occur in smaller categories, 7 percent in special outside properties, 2 percent in other areas, 1 percent in mobile properties used as fixed structures, and 1 percent are cultivated vegetation or crop fires (Figure 1).

Figure 1. Intentional Fires by Type of Incident (2004–2006)



Source: NFIRS 5.0

Note: Total percents may not add to 100 percent due to rounding.

When Intentionally Set Fires Occur

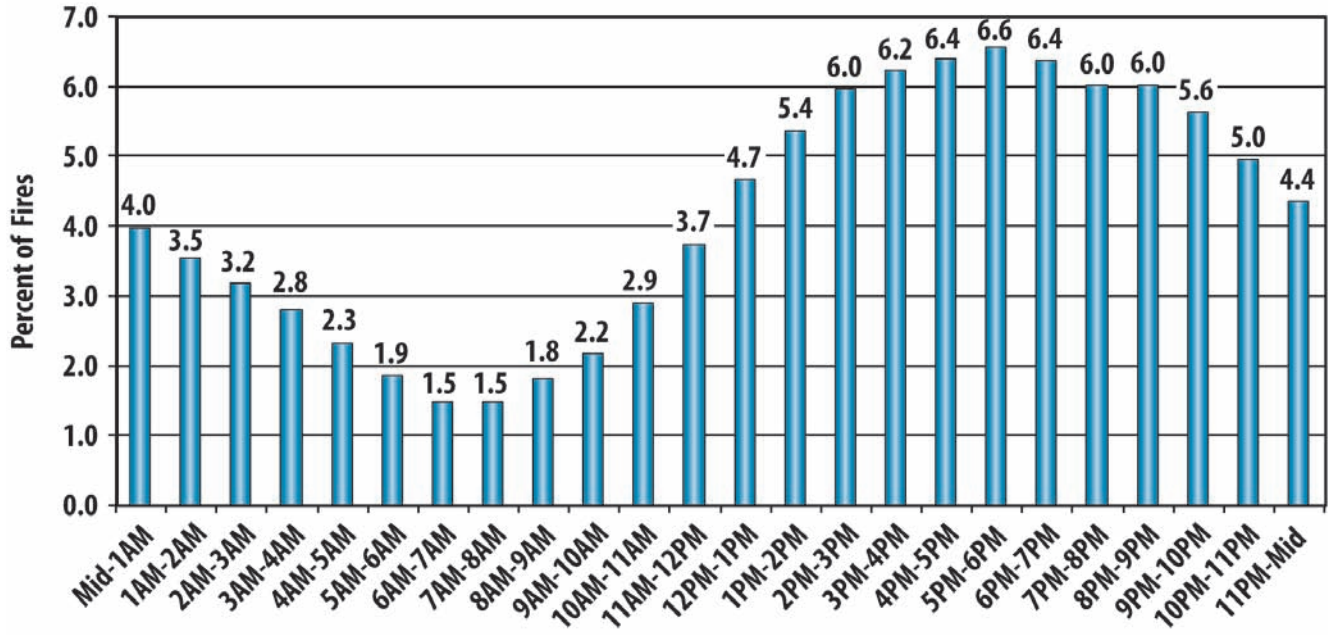
As shown in Figure 2, intentionally set fires occur mainly in the late afternoon and early evening, peaking from 4 p.m. to 7 p.m. This 3-hour period accounts for 19 percent of intentionally set fires. Fires occur the least often in the morning hours from 5 a.m. to 9 a.m.⁵

Figure 3 illustrates that intentionally set fires occur differently throughout the year. Intentionally set fires peak in the

spring during March and April (23 percent). March and April tend to have lower humidities, and the winds during these months tend to be higher.⁶ Outside areas are usually filled with easily ignited dry vegetation providing the fuel for fires. Another peak occurs in July (10 percent), due in part to lighters and matches igniting fires among light vegetation and trash. July also includes fireworks fires in the days around July 4 (July 3 – July 5), a period when fireworks account for 34 percent of intentional fires.

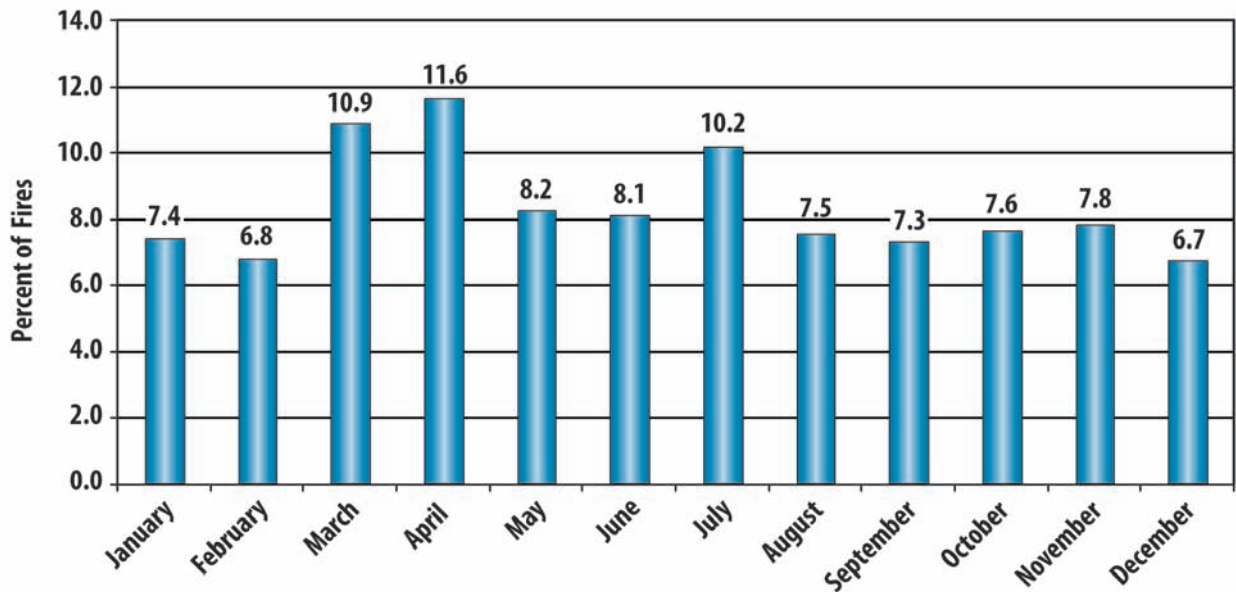
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Figure 2. Time of Alarm for Intentionally Set Fires (2004–2006)



Source: NFIRS 5.0

Figure 3. Intentionally Set Fires by Month (2004–2006)



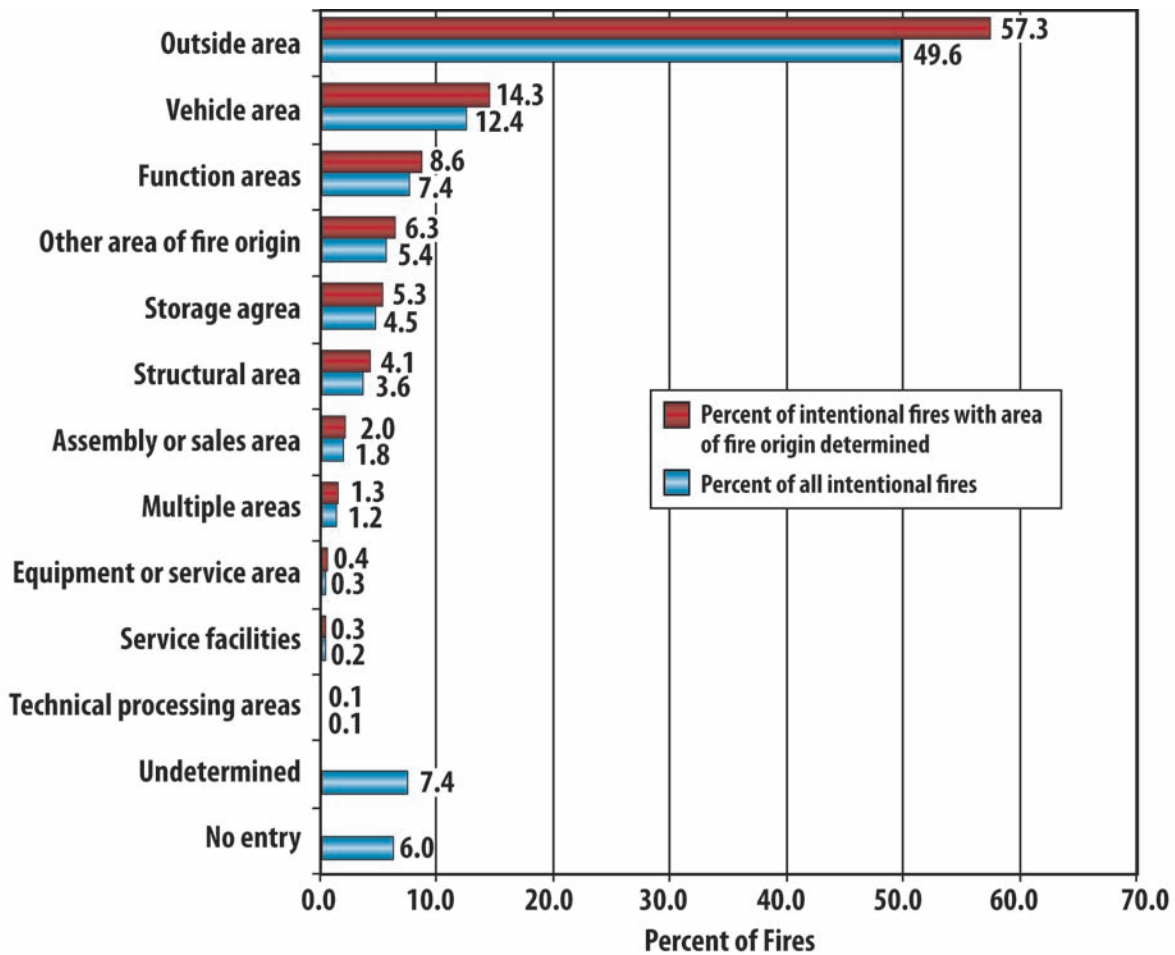
Source: NFIRS 5.0

Where Intentionally Set Fires Start (Area of Fire Origin)

Over half of all intentionally set fires, 57 percent, originate in outside areas. Of intentionally set fires in these outside areas, 39 percent occur in farmlands and fields (22 percent

of all intentional fires) and 35 percent occur in non-specific general outside areas (20 percent of all intentional fires). The second most common area of fire origin is in vehicles (14 percent). Fires in operator/passenger areas account for 56 percent of fires in vehicles (or 8 percent of all intentional fires). (Figure 4.)

Figure 4. Area of Fire Origin in Intentionally Set Fires (2004–2006)



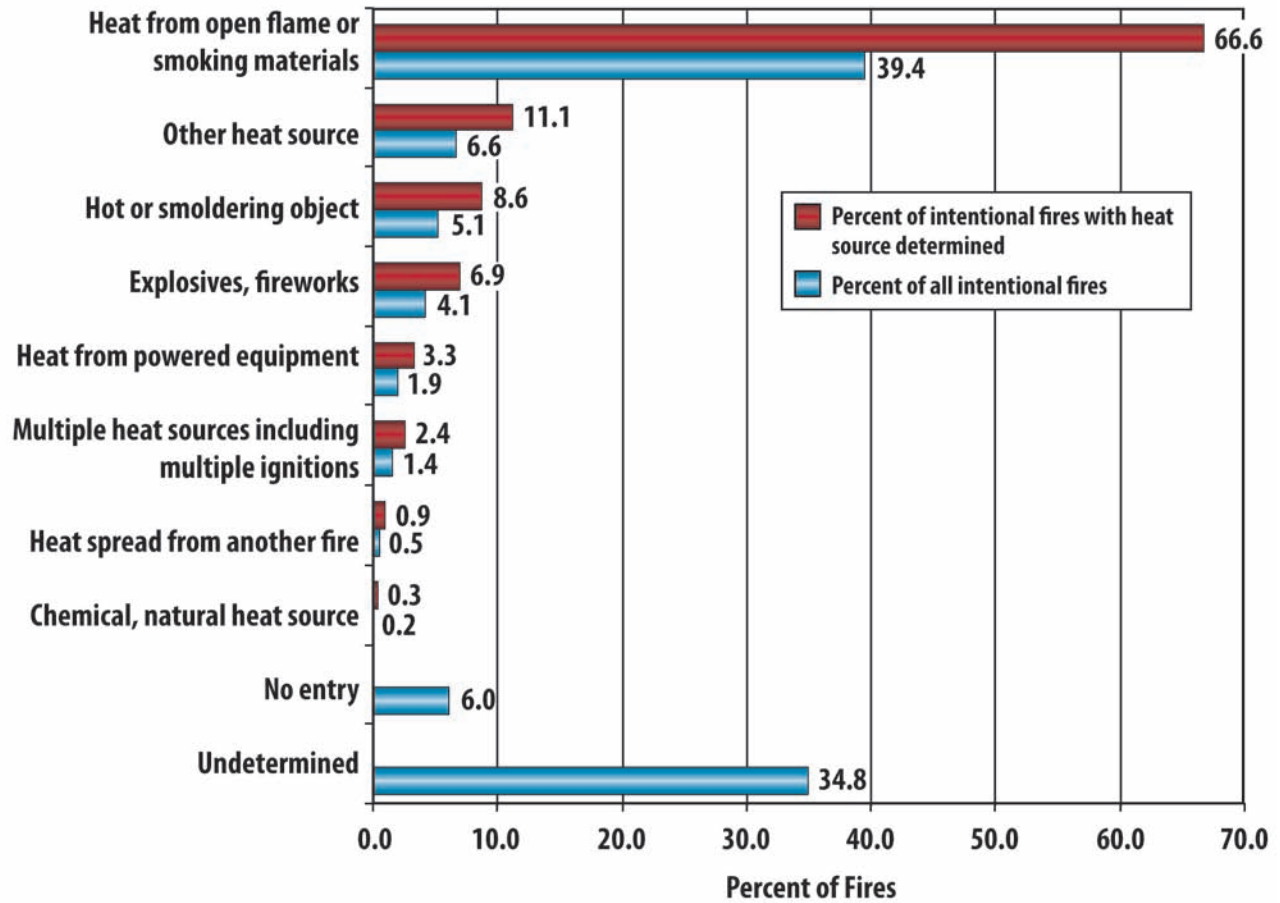
Source: NFIRS 5.0

How Intentionally Set Fires Start (Heat Source)

As might be expected, 67 percent of intentionally set fires are started from open flames or smoking materials (Figure 5). Not surprisingly, the subcomponents of this category comprise three of the top four leading sources of heat in all intentionally set fires—heat from matches (30 percent),

lighters for cigarettes or cigars (15 percent), and heat from other open flame or smoking materials (12 percent). Often fire investigators do not know whether a match, lighter, or cigarette was used to ignite gasoline poured to start a vehicle fire; the particular heat source is sometimes less important to discern than knowing that the fire was intentionally set.

Figure 5. Sources of Heat in Intentionally Set Fires (2004–2006)



Source: NFIRS 5.0

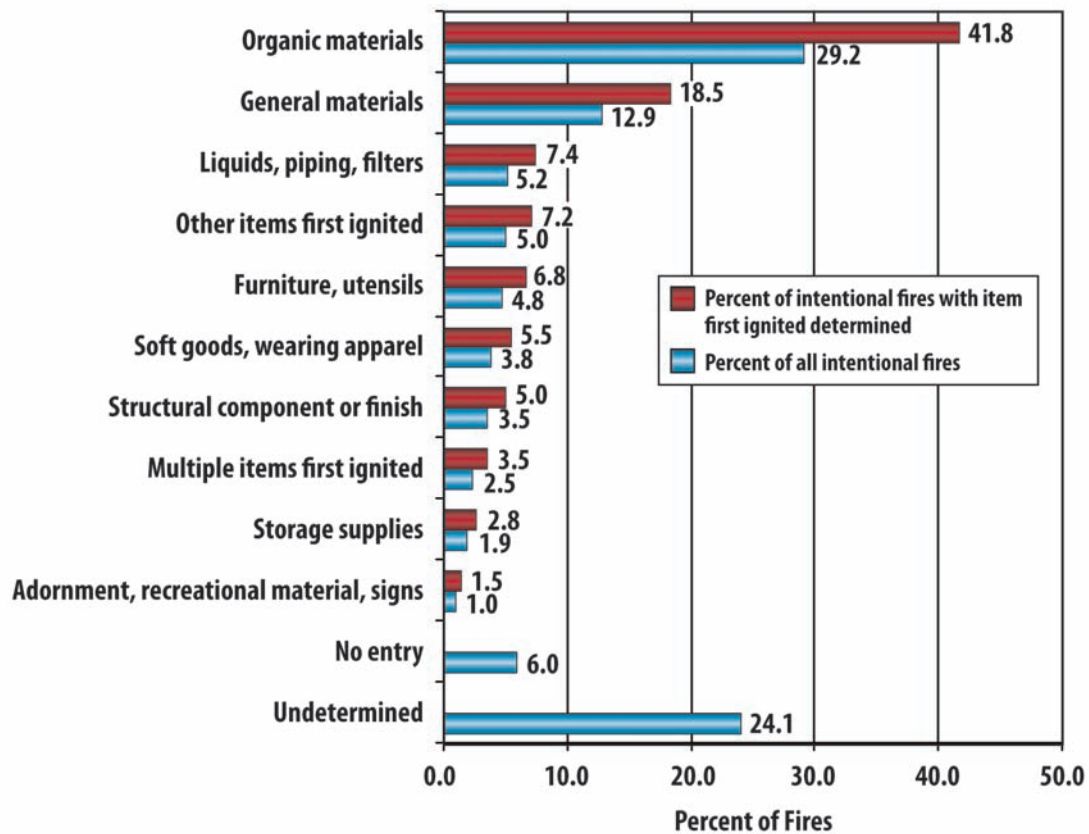
What Ignites First in Intentionally Set Fires

In 42 percent of intentionally set fires, the items first ignited fall under the general category of organic materials. This category primarily includes materials such as agricultural crops, light vegetation including grass, and heavy vegetation

(including trees and brush). Ignition of light vegetation accounts for 26 percent of all intentional fires (Figure 6).

The second leading category of items first ignited is general materials (19 percent), which includes rubbish, trash, waste, and paper products. Rubbish, trash, and waste account for 11 percent of all intentional fires.

Figure 6. Item First Ignited in Intentionally Set Fires (2004–2006)



Source: NFIRS 5.0

Factors Contributing to Ignition

Playing with a heat source accounts for 17 percent of intentional fires. This category includes playing with lighters, matches, and other open flame or smoking materials. These fires are considered to be intentionally set when someone, often a child in the case of lighters and matches,

is experimenting or otherwise intentionally igniting a fire. Outside/Open fire for debris or waste disposal accounts for 15 percent (Table 2). The largest category is “other factors” (23 percent), which includes unspecified components that did not fit into any other category of contributing ignition factors.

Table 2. Leading Factors Contributing to Ignition for Intentionally Set Fires (Where Factor Contributing Specified, 2004–2006)

Factors Contributing to Ignition	Percent of Intentionally Set Fires
Playing with heat source	16.6
Outside/open fire for debris or waste disposal	15.3
Misuse of material or product, other	13.1
Abandoned or discarded materials or products	8.3
Flammable liquid used to kindle fire	5.2
High wind	4.5
Agriculture or land management burns	4.4
Other, unspecified factors contributing to ignition	22.9

Source: NFIRS 5.0

Note: Includes only incidents where factors that contributed to the ignition of the fire were specified. Multiple factors contributing to fire ignition may be noted for each incident.

Examples

The following are some recent examples of intentionally set fires reported by the media.

- October 2008: Firefighters in Topeka, Kansas, dealt with 17 intentionally set fires. Investigators stated that the majority of the fires were considered to be arson, and may include intentional fires that do not fit the legal definition of arson.⁷
- January 2008: An intentionally set fire damaged an apartment complex in southwest Houston, Texas. Investigators believe that the fire can be linked to 30 other intentional fires reported in the area.⁸
- November 2006: The National Park Service, Bureau of Land Management, and U.S. Forest Service are becoming more comfortable using fire as an “essential ecological process” that clears out underbrush and small trees to create forest openings in a mosaic pattern. These conditions help keep small fires from growing into large, catastrophic fires.^{9,10}

Conclusion

Intentionally set fires have been given significant attention, largely because they account for many injuries and deaths and cause much dollar loss. Intentional fires have become the focus of attention within the State and Federal governments, local and State fire departments, and the criminal justice system. Intentionally set fires account for 13 percent

of all fires. Intentionally set fires also account for 10 percent of all fire deaths and 8 percent of all fire injuries. The challenge for communities and the fire service is to pinpoint the reasons why people set intentional fires and address these issues to prevent future fires from occurring, with the exception of controlled burn fires that are attended by the fire service.

NFIRS Data Specifications for Intentionally Set Fires

Data for this report were extracted from the NFIRS annual Public Data Release (PDR) files for 2004, 2005, and 2006. Only version 5.0 data were extracted.

Intentionally set fires were defined as:

- Incident types 100-173;
- Incident type 110 (structure fire, other) was excluded as these incidents are NFIRS 4.1 incidents;
- The USFA cause hierarchy was used to determine intentionally set fire incidents:¹¹ http://www.usfa.dhs.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm; and
- Aid types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid double counting of incidents.

To request additional information or to comment on this report, visit <http://www.usfa.dhs.gov/applications/feedback/index.jsp>

Notes

¹National estimates are based on 2004-2006 native version 5.0 data from the National Fire Incident Reporting System (NFIRS) and fire loss estimates from the National Fire Protection Association's (NFPA's) annual survey of fire loss. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest \$million.

²These reports are: *Intentionally Set Outdoor Fires* (Volume 9, Issue 6), *Intentionally Set Vehicle Fires* (Volume 9, Issue 7), and *Intentionally Set Fires in Residential Buildings* (Volume 9, Issue 8).

³The average fire death and fire injury loss rates computed from the national estimates will not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The fire death rate computed from national estimates would be $(1,000 * (375 / 210,400)) = 1.8$ deaths per 1,000 intentional fires and the fire injury rate would be $(1,000 * (1,300 / 210,400)) = 6.2$ injuries per 1,000 intentional fires. In addition, NFPA has a separate estimate for intentional and arson fires. The fire death rate computed from these estimates for intentional and arson fires for 2005 would be $(1,000 * (490 / 323,900)) = 1.5$ deaths per 1,000 intentional and arson fires and the fire injury rate would be $(1,000 * (1,500 / 323,900)) = 4.6$ injuries per 1,000 intentional and arson fires. (NFPA, *Intentional Fires and Arson*, November 2007).

⁴Due to the nature of rubbish fires, information is sparse. As well, data collected for these fires are generally limited to very basic information.

⁵For the purposes of this report, the time of the fire alarm is used as an approximation for the general time the fire started. However, in NFIRS, it is the time the fire was reported to the fire department.

⁶See Topical Fire Report Series, Volume 9, Issue 2, *Outdoor Fires*.

⁷Kevin Elliot, "Arson blazes raged in 2008," *cjonline.com*, January 8, 2009. http://www.cjonline.com/stories/010809/loc_375121301.shtml, (accessed January 12, 2009).

⁸Mike Glenn, "Houston Apartment Fire Suspected to Be Latest in String of 30 Arson Fires," *HoustonChronicle.com*, January 6, 2009, http://www.fdnntv.com/news.asp_Q_articleid_E_4995_A_title_E_Houston_Apartment_Fire_Suspected_to_Be_Latest_in_String_of_30_Arson_Fires, (accessed January 7, 2009).

⁹Tom Kenworthy, "Forest fire strategy: Just let it go," *usatoday.com*, November 7, 2006, http://www.usatoday.com/news/nation/2006-11-07-fire-management_x.htm, (accessed January 7, 2009).

¹⁰Jacques Billeaud, "Wildfire strategy: fighting fire with fire," *usatoday.com*, July 10, 2008, http://www.usatoday.com/news/nation/2008-07-10-3185638564_x.htm, (accessed January 7, 2009).

¹¹USFA's cause hierarchy is designed for structure fires; however, it can be used to determine certain causes for some specific types of fires.