

Intentionally Set Outdoor 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

- An estimated 176,100 intentionally set outdoor fires occur annually in the United States and result in approximately 20 deaths, 250 injuries, and \$23 million in losses.
- Twenty-seven percent of outdoor fires in the U.S. are intentionally set.
- Approximately 63 percent of intentionally set outdoor fires are vegetation fires. Another 23 percent are trash or rubbish fires.
- The incidence of intentionally set outdoor fires peak in the spring (March and April) and again in mid-summer (July). The July 3-5 period has the highest daily intentionally set outdoor fire incidence.
- The leading factor contributing to intentionally set outdoor fire ignitions is outside/open fire for debris or waste disposal.

Between 2004 and 2006, an estimated 176,100 outdoor fires were intentionally set each year in the United States. These intentionally set fires accounted for approximately 27 percent of outdoor fires reported to fire departments and 7 percent of all fires. Intentionally set outdoor fires resulted in an estimated 250 civilian injuries and 20 civilian deaths.^{1,2} Property losses for intentionally set outdoor fires are sometimes difficult to assess as intentionally set outdoor fires. For example, rubbish fires often do not have dollar losses associated with them. Nationally, losses from intentionally set outdoor fires are estimated at \$23 million.

The term "outdoor fires" can include a variety of fires that occur out of doors: wildland fires, crop fires, rubbish fires, and others. Intentionally set 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 of crops, rubbish, and waste that required fire service intervention. This topical report focuses on intentionally set outdoor fires that are reported to the National Fire Incident Reporting System (NFIRS) using the standard fire reporting modules and does not include wildland fires.³

This topical report is part of the Intentionally Set Fires Topical Reports series. The first, *Intentionally Set Fires* (Volume 9, Issue 5), presents the overall intentionally set fires problem. Other aspects of the intentionally set fire problem are explored in *Intentionally Set Vehicle Fires* (Volume 9, Issue 7) and *Intentionally Set Fires in Residential Buildings* (Volume 9, Issue 8).

Loss Measures

Table 1 presents losses (fire deaths, injuries, and dollar loss) averaged over this 3-year period for all reported outdoor fires and intentionally set outdoor fires, respectively.⁴

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

Measure	All Outdoor Fires	Intentionally Set Outdoor Fires
Average Loss:		
Fatalities/1,000 Fires	0.1	0.3
Injuries/1,000 Fires	0.8	1.6
Dollar Loss/Fire	\$311	\$332

Source: NFIRS 5.0

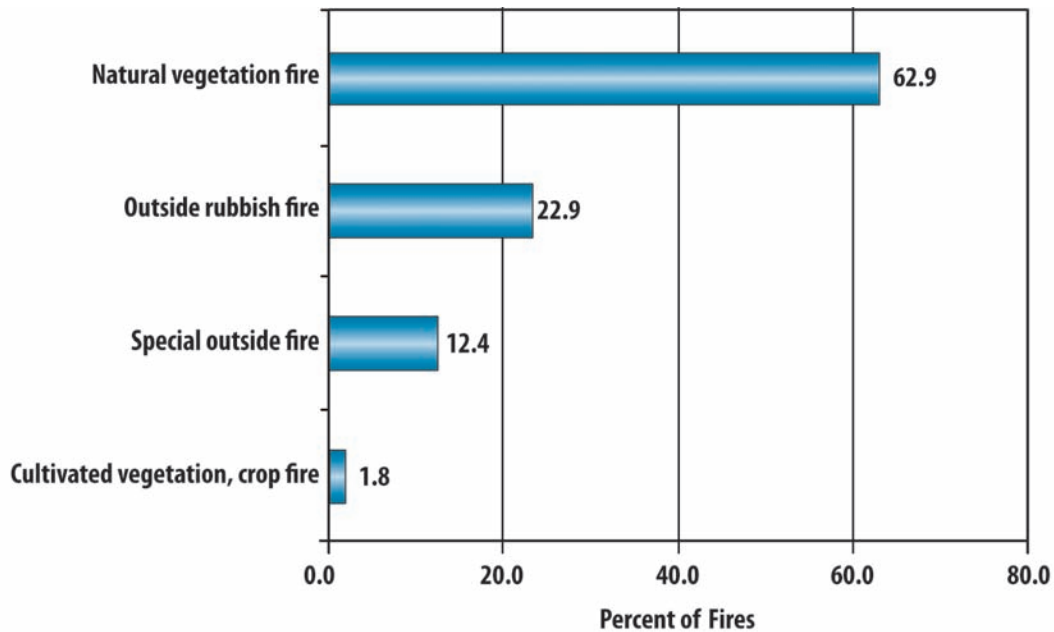
Note: Average loss for fatalities and injuries is computed per 1,000 fires; average dollar loss is computed per fire.

Types of Intentionally Set Outdoor Fires

There are four general classifications of intentionally set outdoor fires used by NFIRS (Figure 1). The largest category is natural vegetation fires (63 percent)—trees, brush, or grass—more than two-and-a-half times the second leading category of refuse or rubbish fires (23 percent).⁵ Fires occurring outside a structure where the material burning has some value (e.g., yard storage, equipment) account for 12 percent of intentionally set outdoor fires. Only 2 percent of intentionally set outdoor fires involve cultivated crops.

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Figure 1. Types of Intentionally Set Outdoor Fires (2004–2006)



Source: NFIRS 5.0

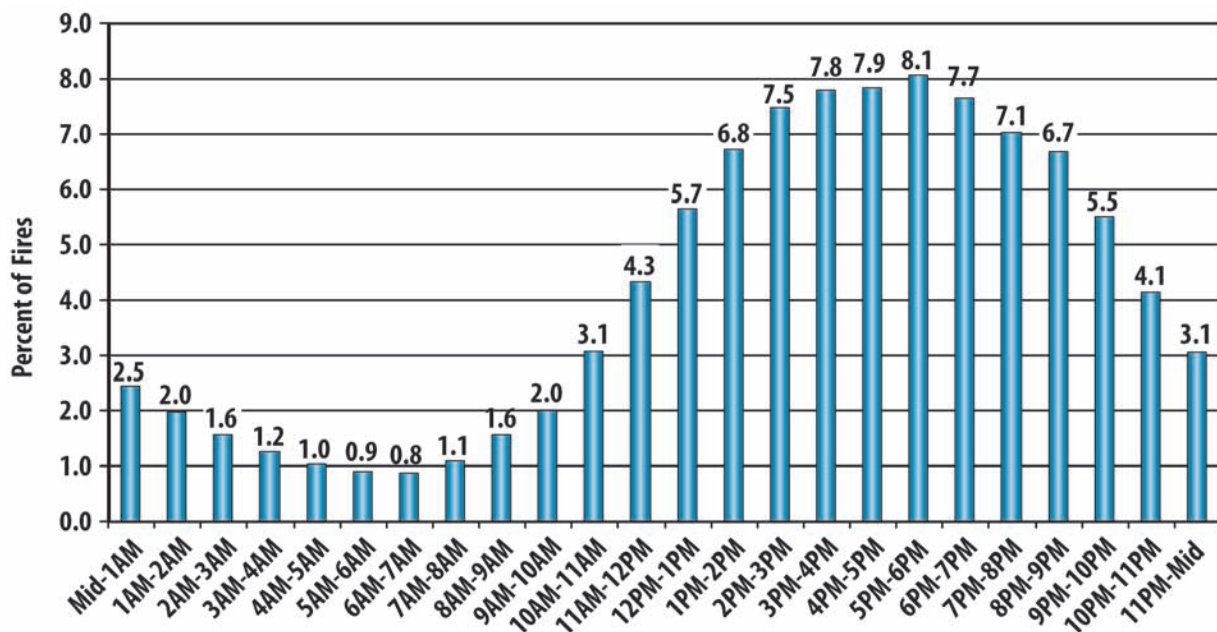
Note: Total may not add to 100 percent due to rounding.

When Intentionally Set Outdoor Fires Occur

Most intentionally set outdoor fires occur between 11 a.m. and 11 p.m., accounting for 79 percent of these types of fires in a single day. These fires begin to increase starting at 11 a.m., and continue to rise throughout the afternoon and

early evening, peaking between 5 p.m. and 6 p.m. (Figure 2). The number of fires gradually decline after this point until the early morning (6 a.m. to 7 a.m.) after which fire ignitions begin to increase.⁶

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



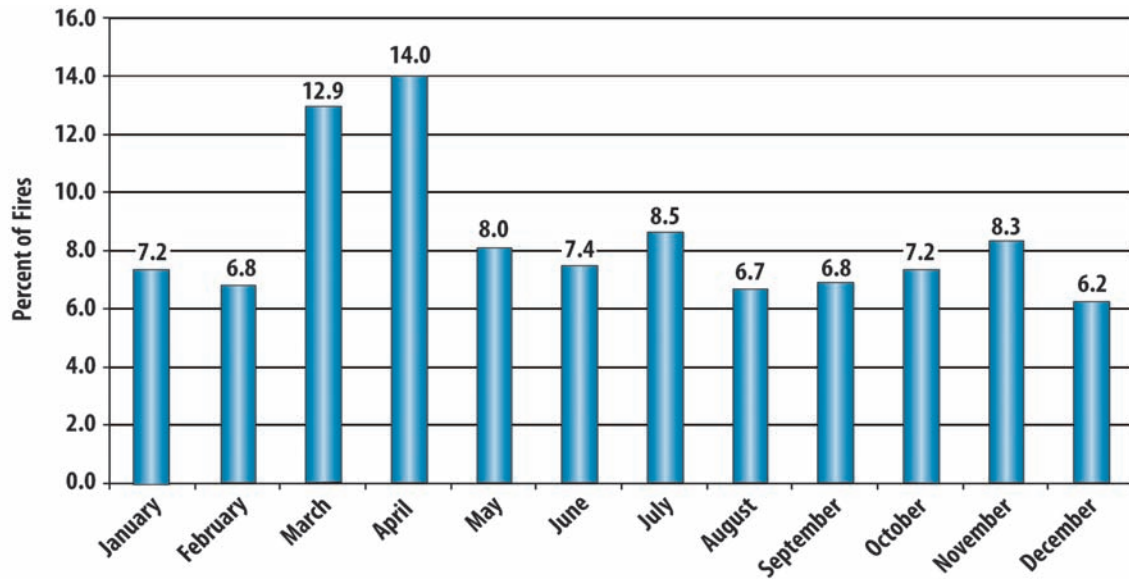
Source: NFIRS 5.0

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

Intentionally set outdoor fires by month range from 6 to 9 percent throughout the year, with the exception of March and April when fire incidence jumps to 13 and 14 percent as shown in Figure 3. As noted in the *Outdoor Fires* topical report (Volume 9, Issue 2), the cause for this sudden

increase may be due to lower relative humidity, higher winds, and fuels cured to a point where they readily ignite.⁷ This same explanation may apply to most vegetation and intentionally set outdoor materials.

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



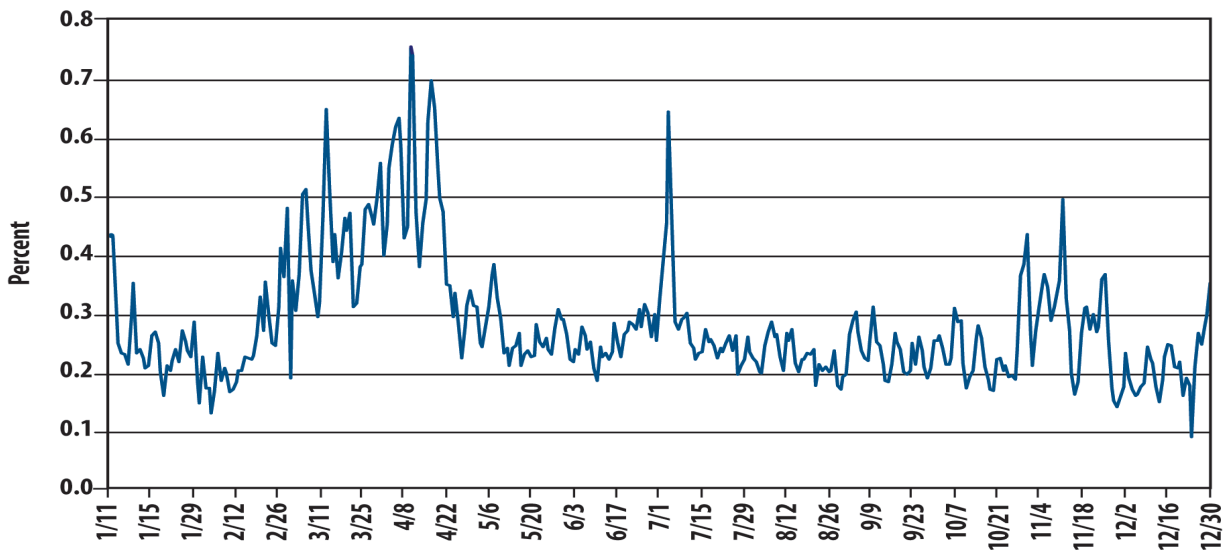
Source: NFIRS 5.0

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

The daily incidence of intentionally set fires follows the monthly pattern. The peak in July is a result of the

elevated fire incidence associated with July 4 activities (Figure 4).

Figure 4. Daily Incidence of Intentionally Set Outdoor Fires (2004–2006)



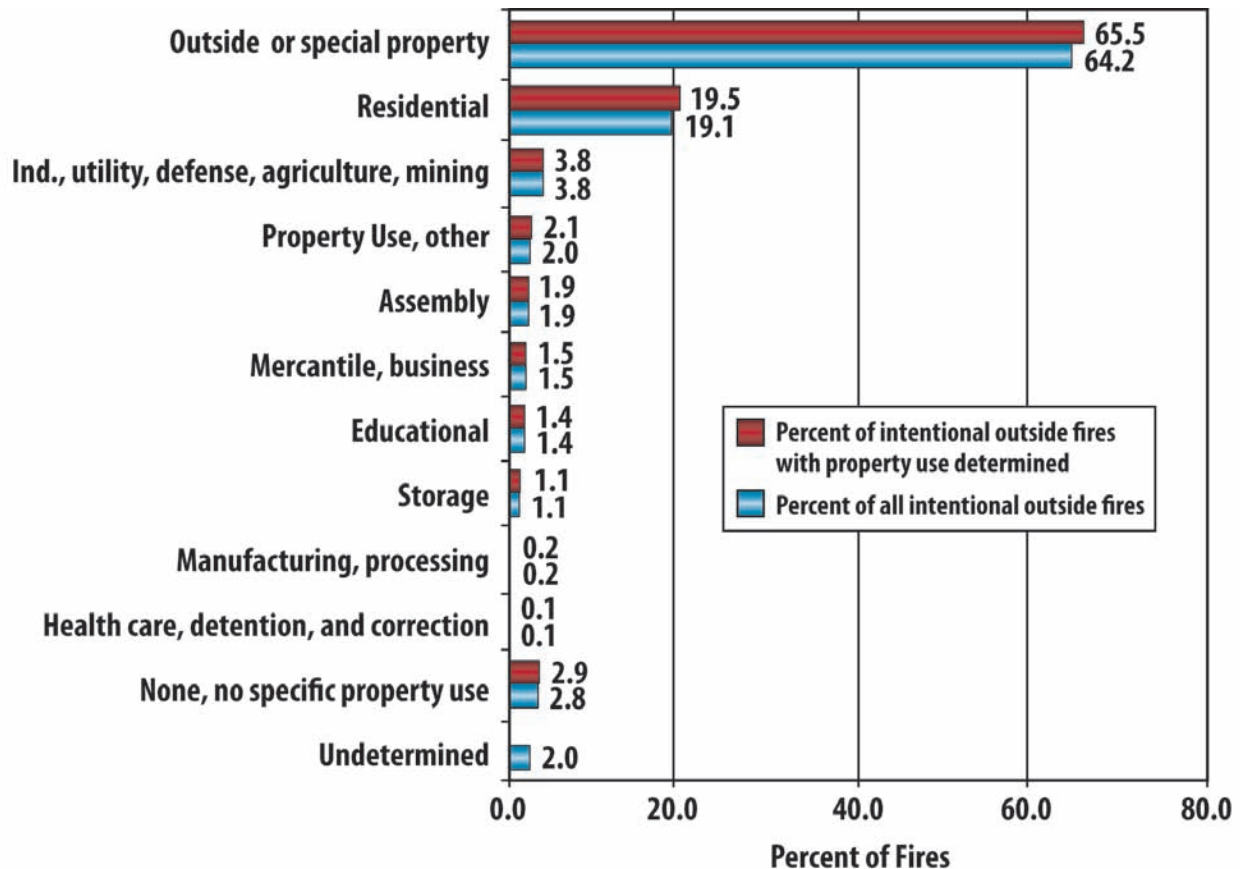
Source: NFIRS 5.0

Property Use

Not unexpectedly, 66 percent of intentionally set outdoor fires occur on outside or special properties (Figure 5), such as open land or field fires, fires in graded and cared-for plots of land, and fires in vacant lots. Twenty percent of the

intentionally set outdoor fires occur on residential properties, and the remaining 14 percent comprise educational, assembly, storage, and mercantile, business properties, to name a few.

Figure 5. Property Use for Intentionally Set Outdoor Fires (2004–2006)



Source: NFIRS 5.0

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

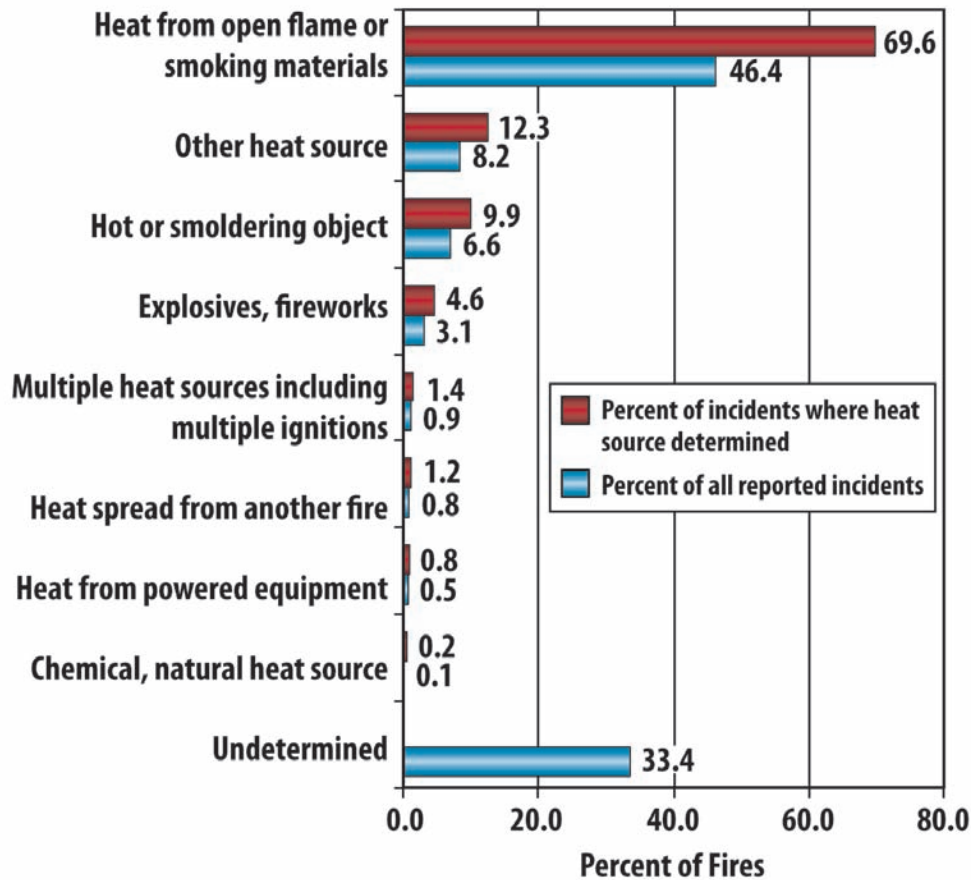
What Ignites the Fire?

The leading heat source of intentionally set outdoor fires, by more than five times the second leading source, is heat from open flames, such as campfires, or smoking materials (70 percent). Not surprisingly, this category includes heat from matches and lighters, which together account for 51 percent of intentionally set outdoor fires (Figure 6).

The next leading category of heat source is other, unspecified heat sources, accounting for 12 percent of

all intentionally set outdoor fires. The heat source for an additional 10 percent of the fires is from hot or smoldering objects, which include hot embers or ashes, sparks from friction, and molten, hot materials, making it the third leading category for intentionally set outdoor fires. The remaining five categories of heat sources together account for only 8 percent of intentionally set outdoor fires.

Figure 6. Heat Source for Intentionally Set Outdoor Fires (2004–2006)



Source: NFIRS 5.0

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

Where Do These Fires Occur?

Ninety-one percent of intentionally set outdoor fires occur in an outside area, including open areas such as farm land and fields (37 percent) and wildlands and woods (9 percent). Additionally, 31 percent of intentionally set outdoor fires occur in unspecified outside areas and 9 percent on streets and highways (Table 2).

Table 2. Leading Area of Fire Origin for Intentionally Set Outdoor Fires

Area of Fire Origin	Percent of Intentionally Set Outdoor Fires
Open area, outside; included are farmland, field	36.9
Outside area, other	31.1
Wildland, woods	9.0
Highway, parking lot, street: on or near	8.5

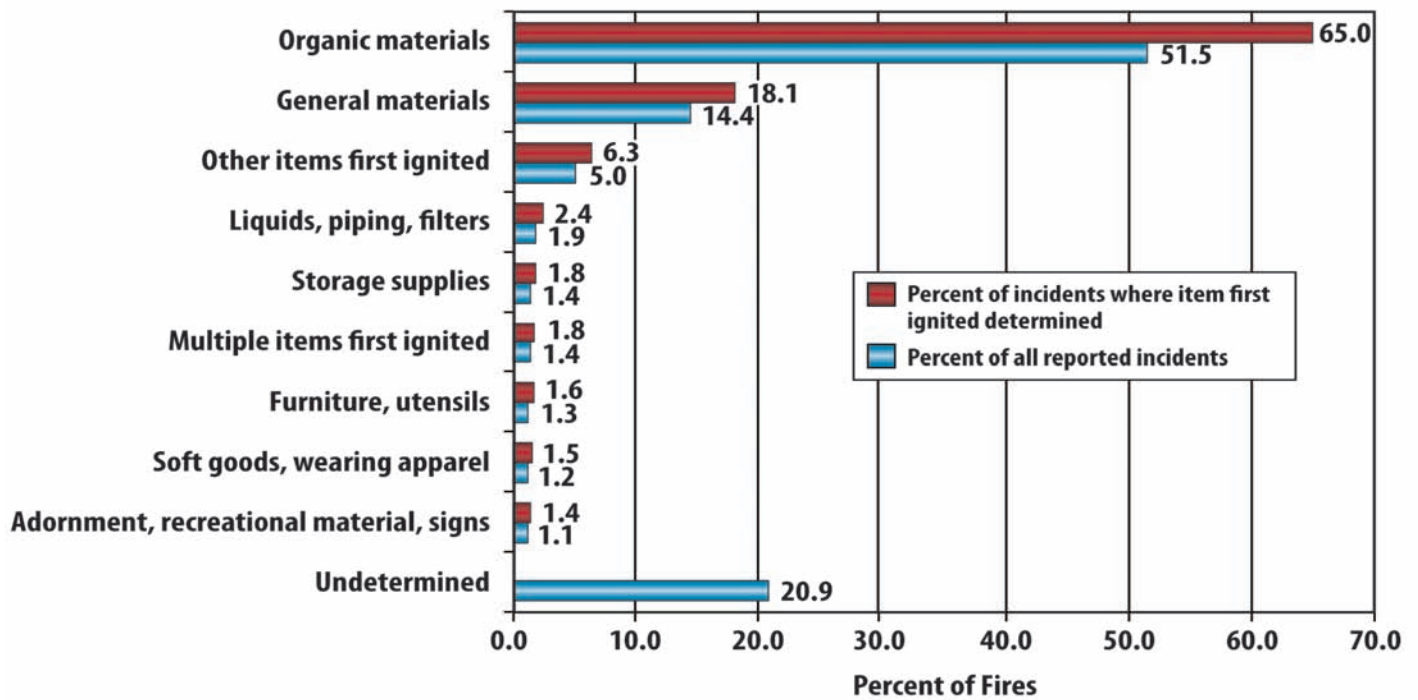
Source: NFIRS 5.0

What Ignites and Why

Organic materials—grass, trees, crops, etc.—were the items first ignited in 65 percent of intentionally set outdoor fires (Figure 7). Light vegetation, a subcategory of organic materials that includes grass, accounted for 42 percent of all intentionally set outdoor fires. Where ignition factors were specified, fire spread or control accounted for the ignition of 40 percent of intentionally set outdoor fires (Figure 8). Misuse of materials or products accounted for 38 percent of intentionally set outside fires. Playing with heat source, a subset of misuse of materials or products, accounted for 15 percent of intentionally set outside fires (Table 3).

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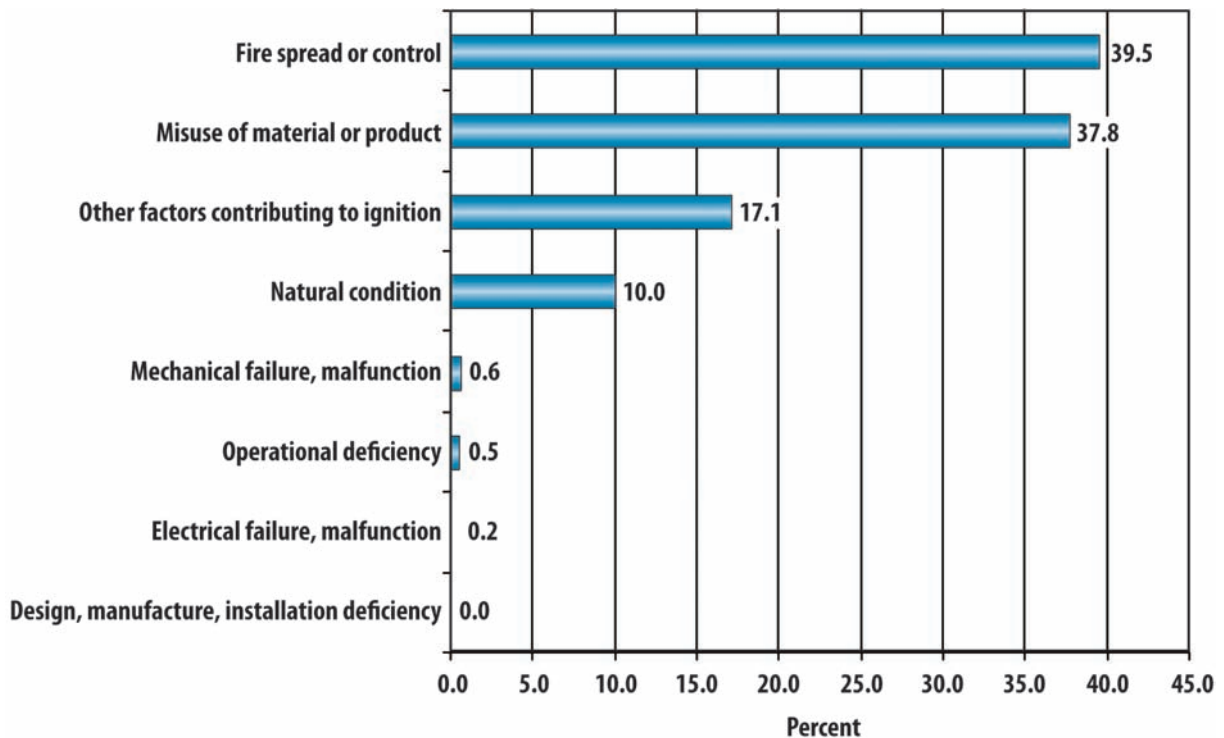
Figure 7. Item First Ignited in Intentionally Set Outdoor Fires (2004–2006)



Source: NFIRS 5.0

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

Figure 8. General Factors Contributing to Ignition of Intentionally Set Outdoor Fires (2004–2006)



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. Percentages may add to more than 100 percent.

Table 3. Leading Factors Contributing to Ignition for Intentionally Set Outdoor Fires (Where Factor Contributing Specified, 2004–2006)

Factors Contributing to Ignition	Percent of Intentionally Set Outdoor Fires
Outside/open fire for debris or waste disposal	23.7
Playing with heat source	15.2
Misuse of material or product, other	10.8
Agriculture or land management burns	7.5
Abandoned or discarded materials or products	7.3
High wind	7.3
Other, unspecified factors contributing to ignition	17.1

Source: NFIRS 5.0

Notes: 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 outdoor fires. These were reported by the media, though many intentionally set outdoor fires, particularly smaller fires, receive little or no media attention.

- March 2009: Firefighters in San Antonio, TX, put out an intentionally set fire at an outdoor movie theater which caused very little damage. The theater was old and had been closed for several years.⁸
- March 2009: A controlled burn in an avocado grove in Temecula, CA, grew out of control and required more than 250 firefighters to contain it. The landowner was clearing agricultural waste from his field when winds unexpectedly picked up and pushed flames beyond the area he had intended to burn. The 77-acre fire has been officially designated the Grande Incident.⁹
- March 2009: Dry conditions led to an increase in the number of wildfires in Maryland. The Maryland Department of Natural Resources Forest Service (MDNRFS) advised taking caution in any outdoor

activity that could spark outside fires, particularly wild-fires, due to the dry conditions experienced throughout the State. Outdoor debris burning is legal in Maryland. However, due to the dry conditions, MDNRFS suggests alternatives to debris and outdoor burning: composting or mulching of yard waste, leaves, and brush, and using larger brush or trees for firewood, which are both safer and environmentally friendly. They also recommend postponing outdoor burning until after sufficient rainfall, and strict adherence to regulations.¹⁰

Conclusion

Approximately 500 intentionally set outdoor fires occur in the U.S. everyday. As with all fires, the challenge to individuals is to prevent these fires from occurring. The challenge to the fire service is to keep these intentionally set outdoor fires small and contained. As shown in the examples, the potential for these fires to become large, uncontrolled fires is significant. Rules and regulations for lawful burning of substances such as rubbish and waste, especially in periods of dry climate, need to be strictly observed to reduce the number of intentionally set outdoor fires.

NFIRS Data Specifications for Intentionally Set Outdoor 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 outdoor fires were defined as:

- Incident types:
 - 140 to 143 (natural vegetation fires);
 - 150 to 155 (rubbish fires outside a structure or vehicle);
 - 160 to 164 (special outside fires with definable value) not including incident type 163 (outside gas or vapor combustion exposition without sustained fire); and

- 170 to 173 (cultivated vegetation or crop fires).
- Aid types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid double counting of 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.
- Intentionally set outdoor fires with records in the wildlands module were excluded. These fires are considered to be wildland fires rather than outdoor fires.

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

Notes

¹ As outdoor fires are a major property class, the national estimates are based only on the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States*. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to the nearest \$million.

² There is discrepancy between the NFPA estimates and the data collected in NFIRS. The NFPA estimates include wildland fires with no separate estimate of these fires. NFIRS has a separate data collection module designed for wildland fires. However, for vegetation, crop, and non-specific outside fires, NFIRS allows the use of this separate wildland module, with the potential to shift legitimate non-wildland fires to wildland fire status. As a result of the lack of a wildland fire estimate from NFPA and the potential under/over collection of fire/wildland fire data, the estimate for intentionally set outdoor fires and fire losses should be taken as a maximum estimate.

³ As noted, wildland fire data are collected separately in NFIRS and are not included in this report. From 2004 to 2006, there were 877,417 outside fires in the NFIRS data and 173,816 fires in the NFIRS wildland module.

⁴ The average fire death and injury loss rates computed from the NFPA estimates will not agree with average fire death and injury loss rates computed from NFIRS data alone. The fire death rate computed from NFPA estimates would be $(1,000 * (20/176,100)) = 0.1$ deaths per 1,000 intentionally set outdoor fires and the fire injury rate would be $(1,000 * (250/176,100)) = 1.4$ injuries per 1,000 intentionally set outdoor fires.

⁵ Due to the nature of rubbish fires, information is sparse. As well, data collected for these fires are generally limited to very basic information.

⁶ For 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.

⁷ Virginia Department of Forestry, <http://www.dof.virginia.gov/fire/va-fire-history.shtml>, (retrieved July 2008) as noted in *Outdoor Fires* (Volume 9, Issue 2).

⁸ "Arson suspected after old Mission Drive-in catches fire," [woai.com](http://www.woai.com/news/local/story/Arson-suspected-after-old-Mission-Drive-in/2cNa8e3HikCSYpwF62-CXw.csp), March 11, 2009, <http://www.woai.com/news/local/story/Arson-suspected-after-old-Mission-Drive-in/2cNa8e3HikCSYpwF62-CXw.csp>, (accessed March 25, 2009).

⁹ Olsen Ebright and Bonnie Buck. "Crews Mash Avocado Grove Fire," [msnbc.com](http://www.msnbc.msn.com/id/29472626), March 4, 2009, <http://www.msnbc.msn.com/id/29472626>, (accessed March 25, 2009).

¹⁰ "Warm, dry weather heightens wildfire danger," [times-news.com](http://www.times-news.com/local/local_story_083234329.html/resources_printstory), March 24, 2009, http://www.times-news.com/local/local_story_083234329.html/resources_printstory, (Accessed March 26, 2009).

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