

# 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 655,200 outdoor fires occur annually in the United States and result in approximately 50 deaths, 875 injuries, and \$154 million in losses.
- Forty-one percent of fires in the United States are outdoor fires.
- Approximately 47 percent of outdoor fires are trash or rubbish fires.
- The incidence of outdoor fires peak in the spring (March and April) and again in midsummer (July). The July 3-5 period has the highest daily outdoor fire incidence.
- The leading cause of outdoor fires is unintentionally set fires.
- The leading factor contributing to outdoor fire ignitions is misuse of materials.

This topical report examines the characteristics of fires that occur outdoors. Between 2004 and 2006, an estimated 655,200 outdoor fires occurred annually in the United States. These outdoor fires accounted for approximately 41 percent of all fires reported to fire departments. Outdoor fires resulted in an estimated 875 civilian injuries and 50 civilian deaths.<sup>1,2</sup> Property losses for outdoor fires are sometimes difficult to assess as outdoor fires. For example, rubbish fires often do not have dollar losses associated with them. Nationally, losses from outdoor fires are estimated at \$154 million.

The term “outdoor fires” can include a variety of fires that occur out of doors: wildland fires, crop fires, rubbish fires, and others. This topical report focuses on 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.<sup>3</sup>

## Loss Measures

Table 1 presents losses (fire deaths, injuries, and dollar loss), averaged over this 3-year period, of outdoor fires and all reported fires, respectively.<sup>4</sup>

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

MEASURE	OUTDOOR FIRES	ALL FIRES
Average Loss:		
Fatalities/1,000 Fires	0.1	2.0
Injuries/1,000 Fires	0.8	10.2
Dollar Loss/Fire	\$311	\$5,918

Source: NFIRS 5.0

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

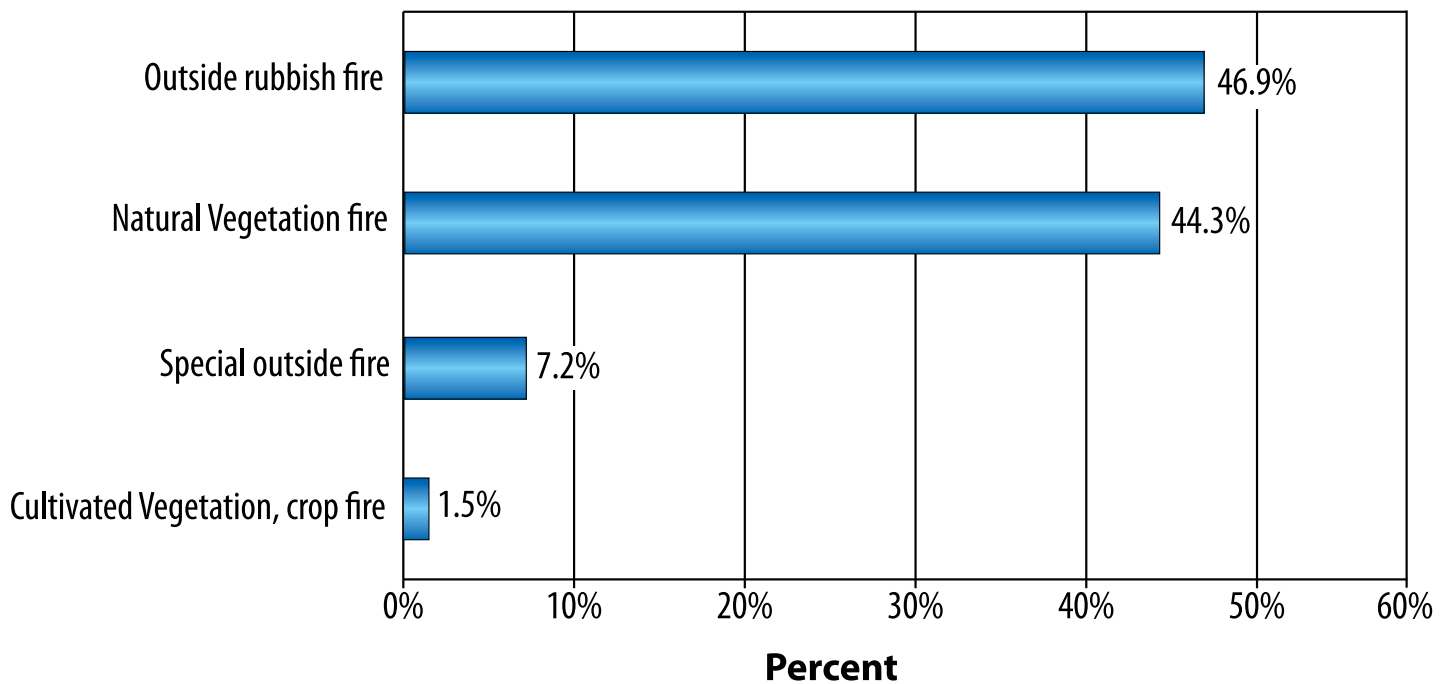
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### Types of Outdoor Fires

There are four general classifications of outdoor fires used by NFIRS. The most common type is refuse or rubbish fires (47 percent).<sup>5</sup> Fires that ignite natural vegetation—trees, brush, or grass—are the second largest category of outdoor fires (44 percent). Fires occurring outside a structure where the material burning has some value (e.g., yard storage, equipment) account for seven percent of outdoor fires. Approximately two percent of outdoor fires involve cultivated crops.

**Figure 1. – Types of Outdoor Fires (2004 to 2006)**

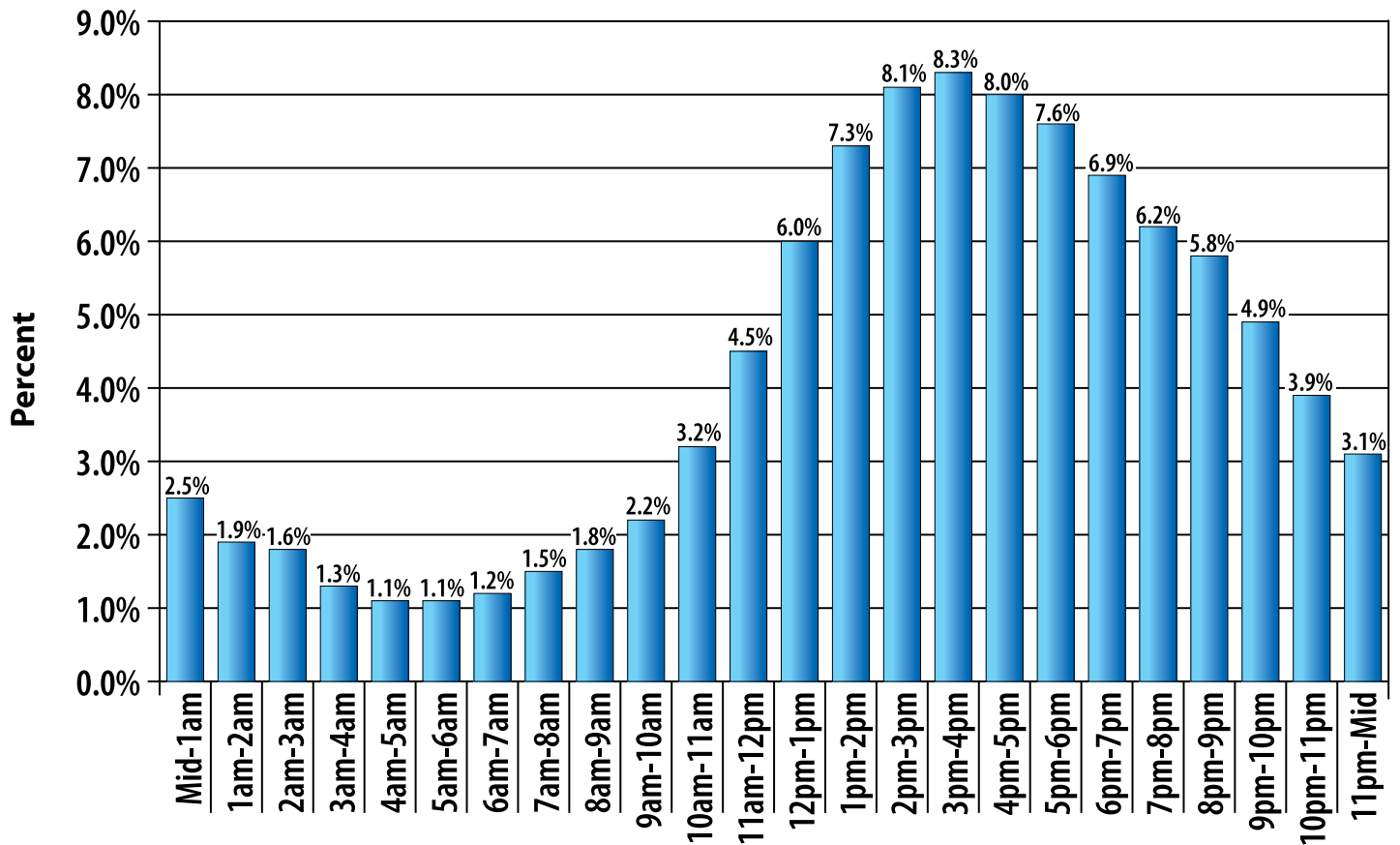


Source: NFIRS 5.0  
887,417 total incidents

### When Outside Fires Occur

Overall, outside fires tend to occur in midafternoon to evening, with the peak period between 2 p.m. and 5 p.m. (Figure 2). This 3-hour period accounts for 24 percent of outdoor fires. Outdoor fires gradually decline after this point until the early morning (5 to 6 a.m.) after which fire ignitions begin to increase.<sup>6</sup>

**Figure 2. – Time of Alarm for Outdoor Fires (2004 to 2006)**

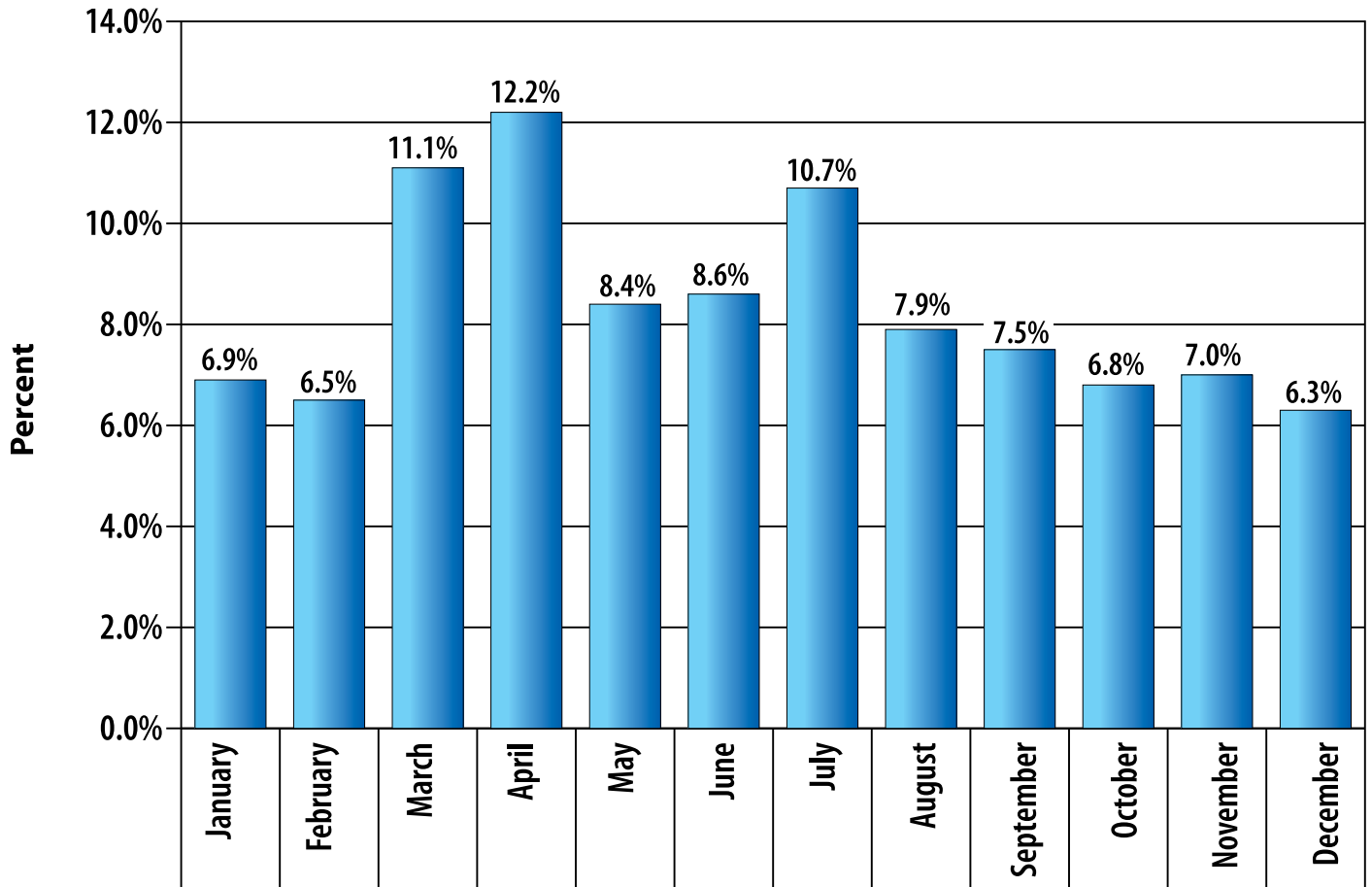


Source: NFIRS 5.0  
887,417 total incidents

Outdoor fires peak in the spring, March and April, when the daily fire experience is higher, and again in midsummer in July (Figure 3 and Figure 4). The Virginia Department of Forestry puts forth this explanation: "...during these times the relative humidities are usually lower, winds tend to be higher, and the fuels are cured to the point where they readily ignite. Also hardwood leaves are on the ground providing more fuel, and allowing sunlight to directly reach the forest floor, warming and drying the surface fuels."<sup>7</sup> This same explanation may apply to most vegetation and outdoor materials.

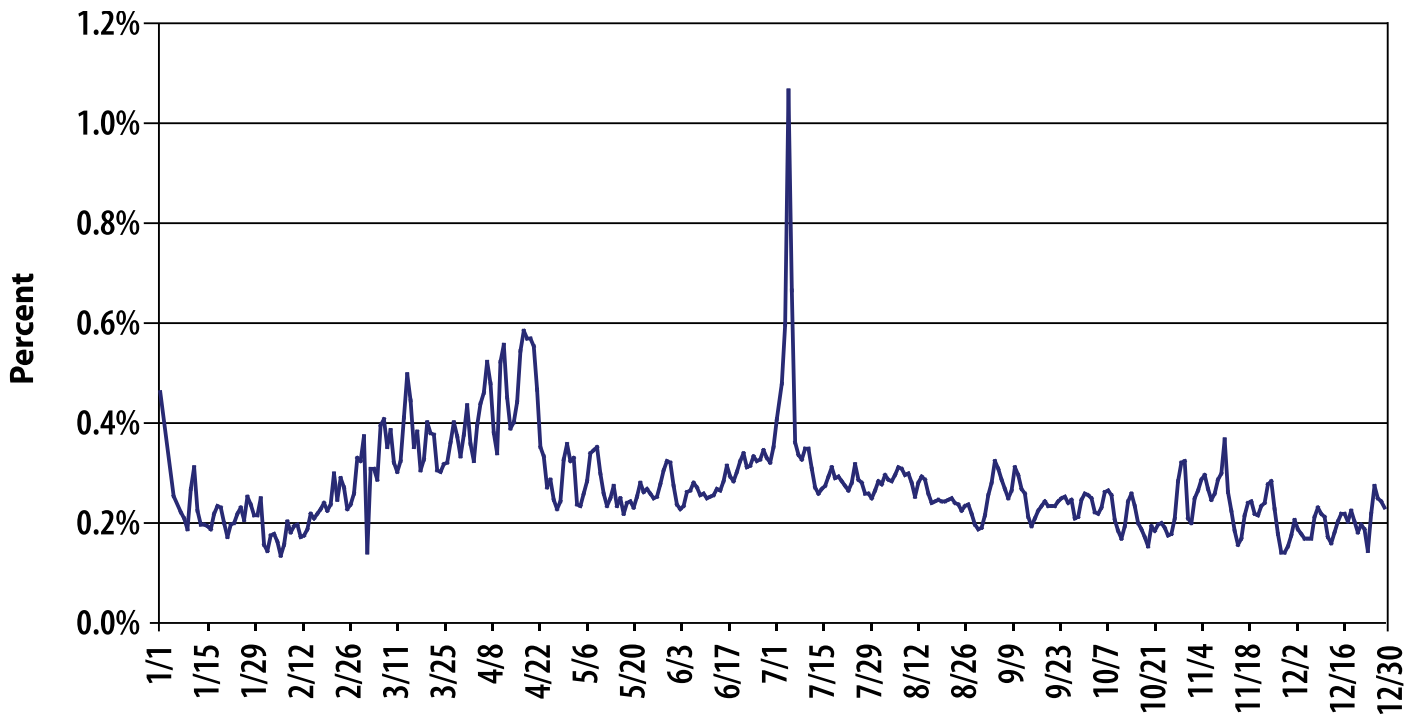
The July peak is a result of the elevated fire incidence associated with Fourth of July activities (Figure 4).

**Figure 3. – Outdoor Fires by Month (2004 to 2006)**



Source: NFIRS 5.0  
887,417 total incidents

**Figure 4. – Daily Incidence of Outdoor Fires (2004 to 2006)**

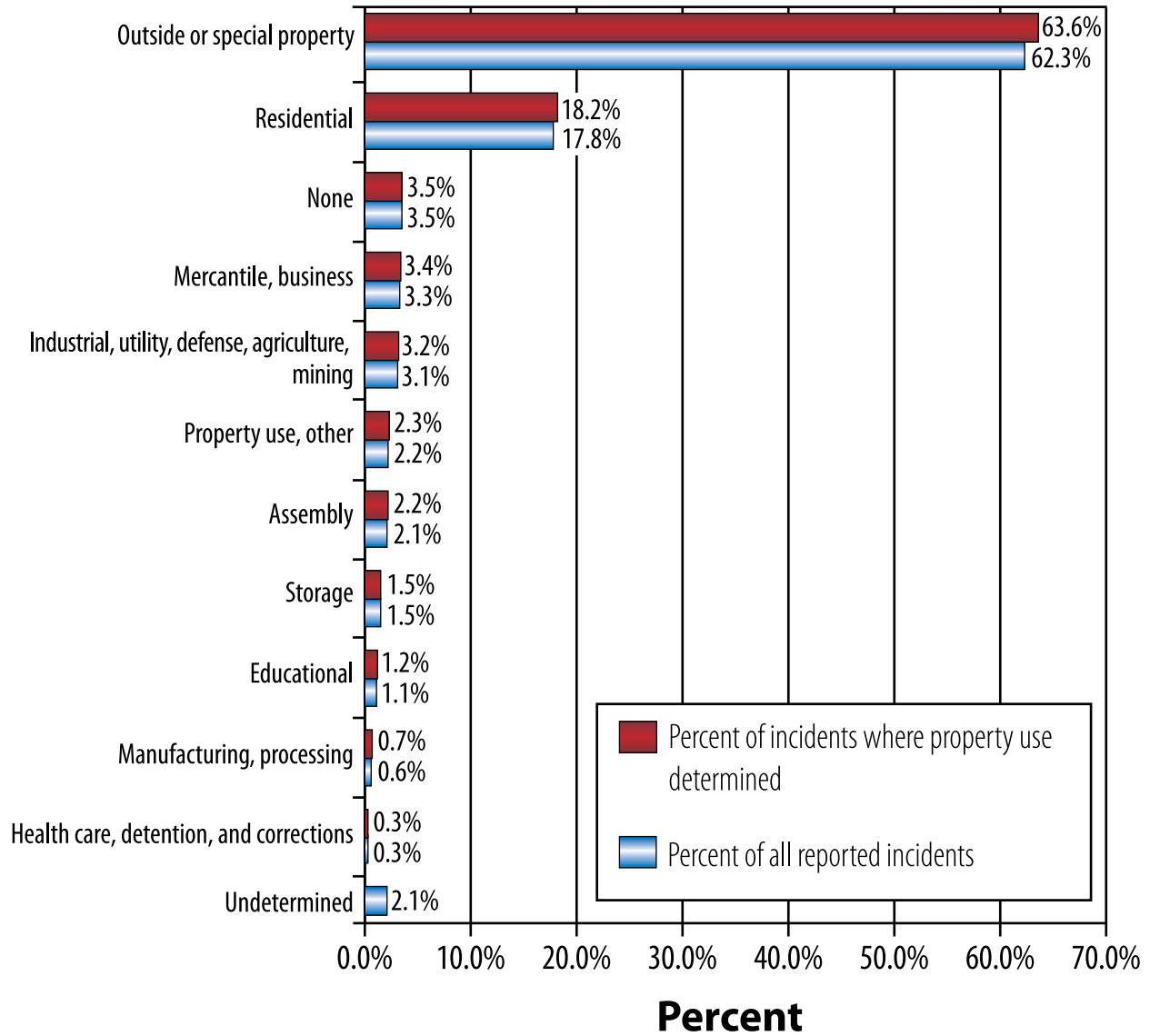


Source: NFIRS 5.0  
887,417 total incidents

### Property Use

Not unexpectedly, 64 percent of outside fires occur on outside or special properties (Figure 5). Thirty-six percent of these fires (23 percent of all outside fires) occur on open land or fields and 31 percent (19 percent of all outside fires) occur on streets, roads, and vehicle parking areas. The next leading property use category is residential properties (18 percent).

**Figure 5. – Property Use for Outdoor Fires (2004 to 2006)**

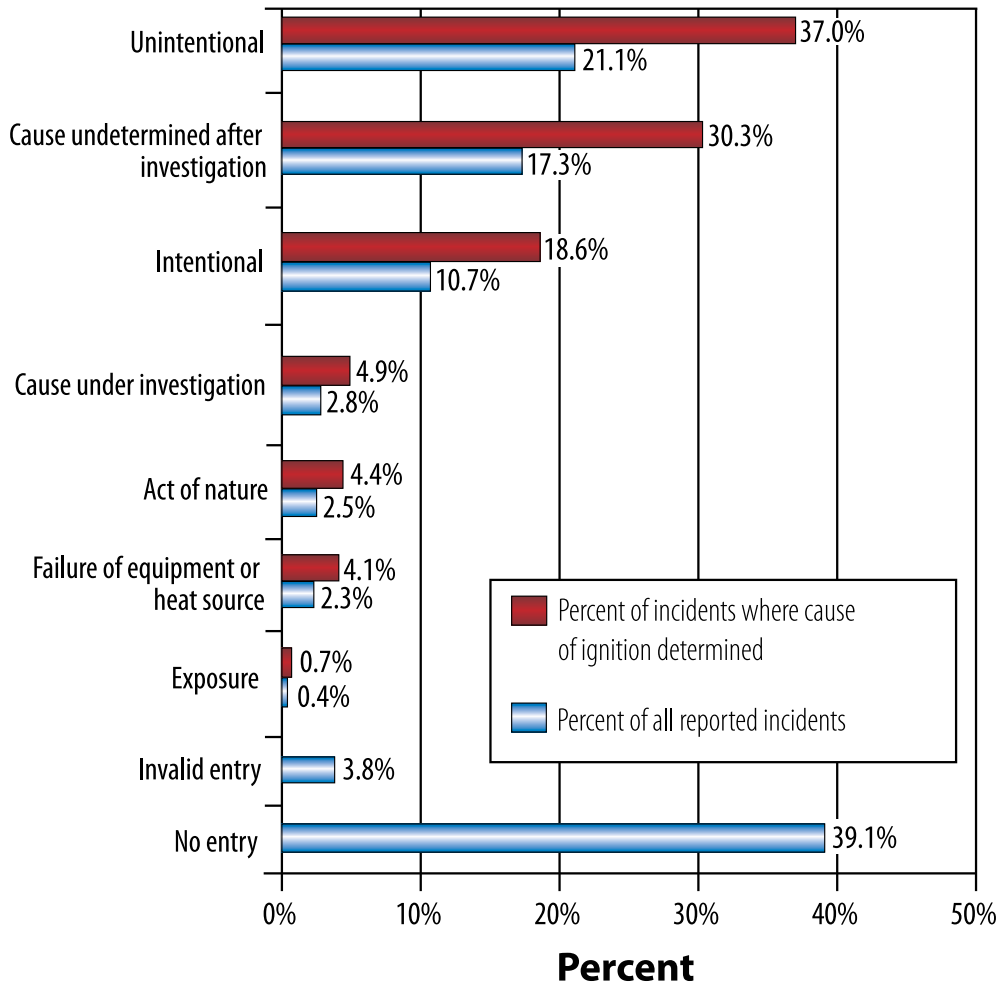


Source: NFIRS 5.0  
 887,417 total incidents  
 18,681 undetermined entries

### What Causes Outdoor Fires?

As shown in Figure 6, fires that begin unintentionally are the leading cause of outdoor fires (37 percent). Determining the cause of ignition for outdoor fires is often difficult. As a result, no cause of ignition was able to be identified after investigation in 30 percent of outdoor fires. Intentionally set fires is the third leading cause of ignition according to NFIRS reporting (19 percent).

**Figure 6. – Cause of Ignition for Outdoor Fires (2004 to 2006)**



Source: NFIRS 5.0

887,417 total incidents  
 347,005 entries with no data (rubbish fires)  
 33,527 invalid entries

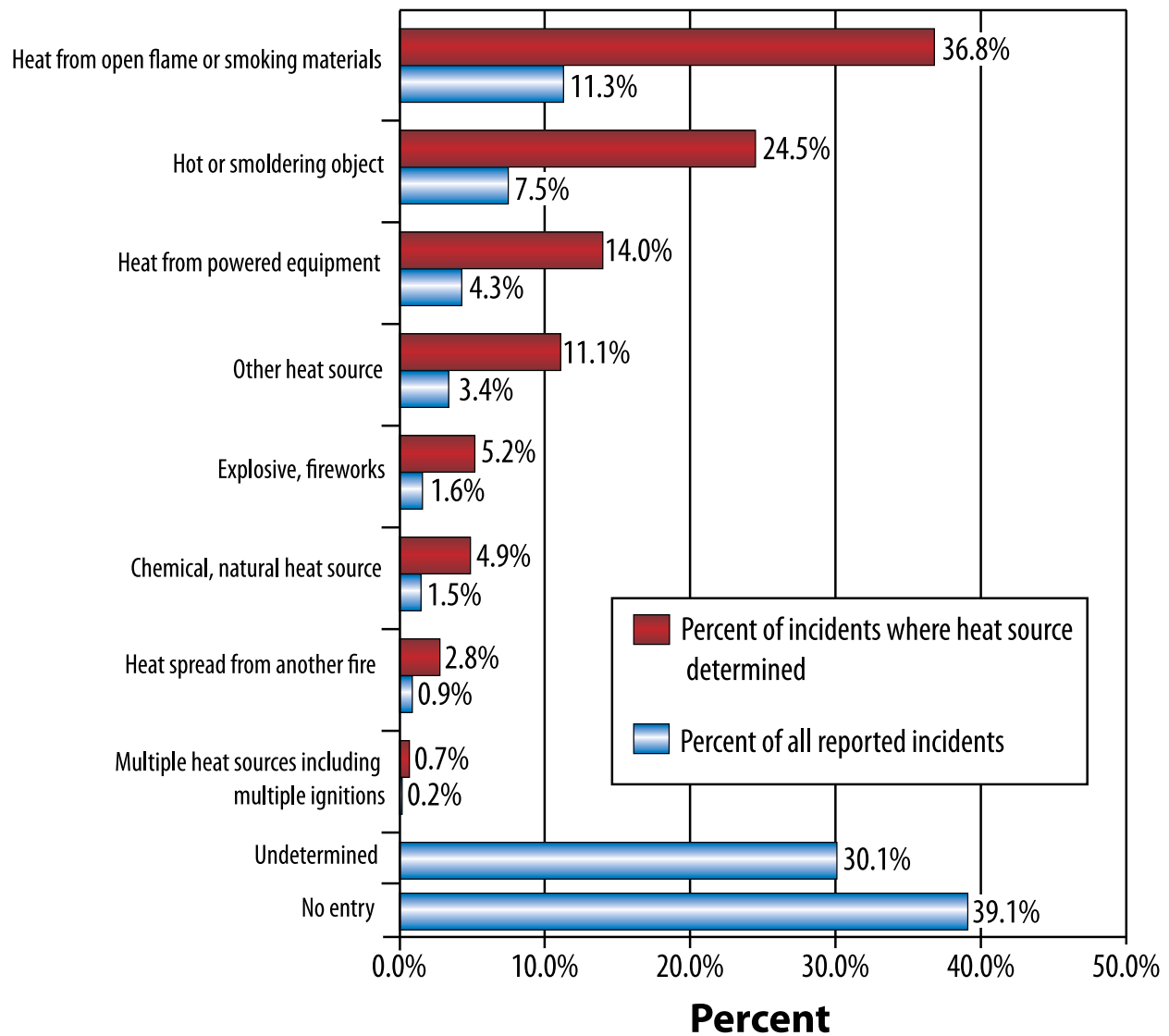
Note: Cause of ignition is not required for rubbish fires. The "No entry" category reflects those rubbish fire incidents where cause of ignition data are not available.

### What Ignites the Fire?

Thirty-seven percent of outdoor fires derive their heat source from open flames, such as campfires or smoking materials. Not surprisingly, this category includes heat from matches and cigarettes, which account for 12 and 9 percent of outdoor fires, respectively (Figure 7).

Heat from hot or smoldering objects account for 25 percent of heat sources for outdoor fires. While this may be the second leading category for outdoor fires, the subcategory within this category—heat from hot embers or ash—is the most common type of heat source in outdoor fires overall, accounting for 15 percent of all outdoor fires.

**Figure 7. – Heat Source for Outdoor Fires (2004 to 2006)**



Source: NFIRS 5.0  
 887,417 total incidents  
 267,443 undetermined entries  
 347,005 entries with no data (rubbish fires)

Note: Heat source is not required for rubbish fires. The "No entry" category reflects those rubbish fire incidents where heat source data are not available.

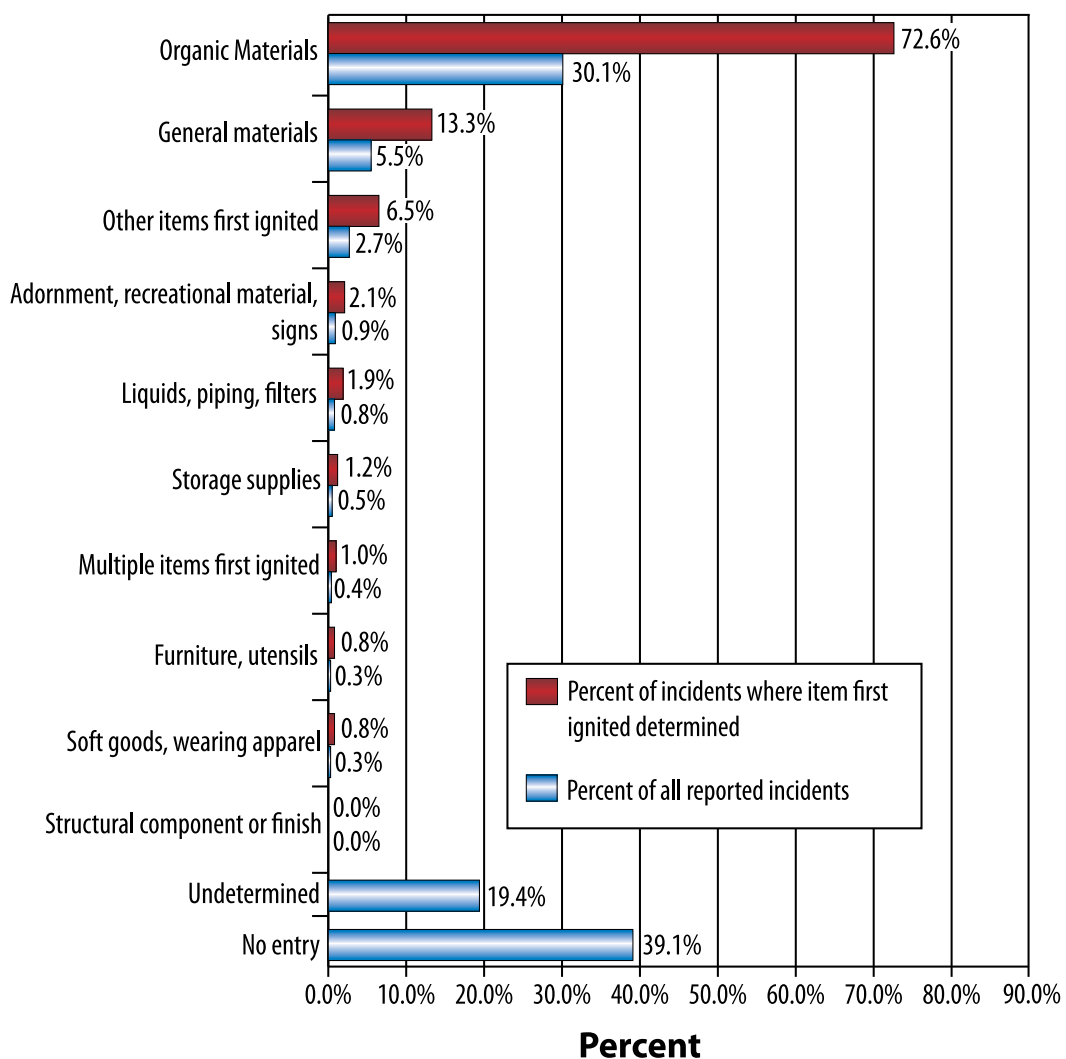
### Where Do These Fires Occur?

Eighty-seven percent of outdoor fires occur in an outside area, including open areas such as farm land and fields (32 percent) and highways, parking lots, and streets (13 percent).

### What Ignites and Why

Organic materials—grass, trees, crops, etc.—were the items first ignited in 73 percent of outdoor fires (Figure 8). Light vegetation, a subcategory of organic materials that includes grass, accounted for 50 percent of all outdoor fires. Where ignition factors were specified, misuse of material or product accounted for the ignition of 36 percent of outdoor fires (Figure 9). Fire spread and control issues accounted for 26 percent of outside fires, of which half were due to outside/open fires for debris or waste disposal.

**Figure 8. – Item First Ignited in Outdoor Fires (2004 to 2006)**

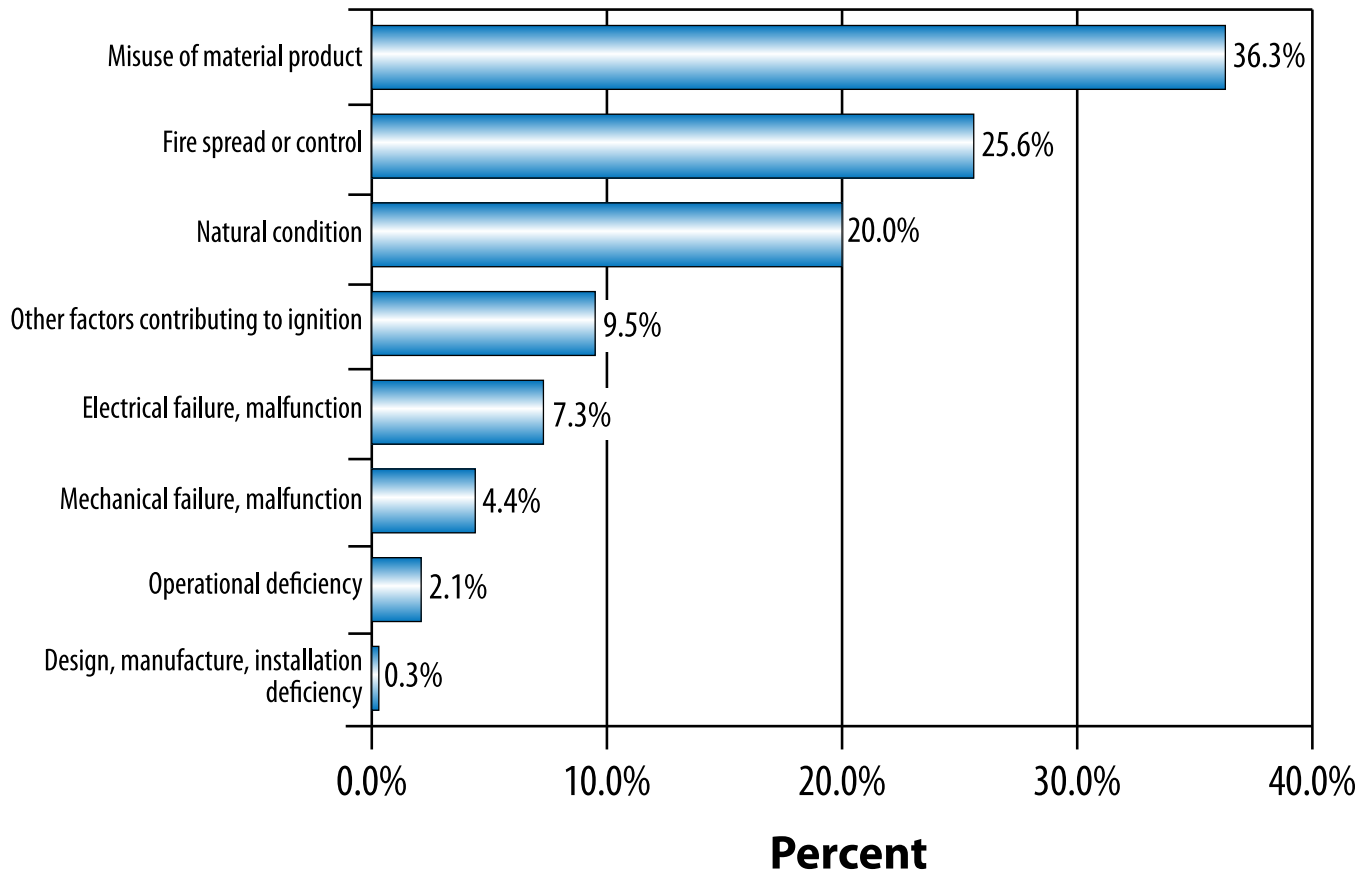


Source: NFIRS 5.0

887,417 total incidents  
 172,322 undetermined entries  
 347,005 entries with no data (rubbish fires)

Note: Item first ignited is not required for rubbish fires. The "No entry" category reflects those rubbish fire incidents where item first ignited data are not available.



**Figure 9. – Factors Contributing to Ignition for Outside Fires (2004 to 2006)**

Source: NFIRS 5.0

203,872 total incidents

Notes: Includes 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.

## Examples

The following are some recent examples of outdoor fires. These were all reported by the media, though many outdoor fires, particularly smaller fires, receive little or no media attention.

- April 2008:** Sparks from a metal grinder ignited dry leaves and started a fire that caused \$20,000 in damage to the vinyl siding of a home. Officials said the fire was accidental and was caused when the grinder was used during maintenance on a piece of machinery.<sup>8</sup>
- March 2007:** A prolonged drought in Southern California left the brush-covered hills highly combustible. Over 500 homes were evacuated as a fast-moving fire consumed three square miles of the dry hillside. The fire may have been started by a vehicle fire.<sup>9</sup>
- April 2006:** Two contractors renovating a house left an outdoor trash fire unattended. The fire spread to the house as the wind picked up, destroying the roof and attic.<sup>10</sup>
- March 2006:** An elderly man, trying to contain a small outdoor fire that had gotten out of control, caught fire and was killed, and his son suffered severe burns trying to help his father.<sup>11</sup>

## Conclusion

Ranging from small trash fires to large brush fires, from unintentionally set fires in a backyard to intentionally set crop-clearing fires, from fires set by lightning to fires set by careless actions, approximately 1,800 outdoor fires occur across the United States everyday. The challenge to individuals is to prevent these fires from occurring; the challenge to the fire service is to keep these outdoor fires small and contained.

## NFIRS Data Specifications for 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.

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.
- 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

<sup>1</sup> As outdoor fires are a major property class, the national estimates are based only on the National Fire Protection Association's (NFPA) 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 dollars.

<sup>2</sup> 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 nonspecific outside fires, NFIRS allows the use of this separate wildland module, with the potential to shift legitimate nonwildland 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 outdoor fires and fire losses should be taken as a maximum estimate.

<sup>3</sup> As noted above, 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.

<sup>4</sup> 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  $(1000 * (50 / 655,200)) = 0.08$  deaths per 1,000 outdoor fires and the fire injury rate would be  $(1000 * (875 / 655,200)) = 1.3$  injuries per 1,000 outdoor fires.

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

<sup>6</sup> While referred to as "ignition," the variable is actually "alarm time" or the time the fire department received the alarm. There is a lag between ignition and alarm time which, in some cases, could be considerable.

<sup>7</sup> Virginia Department of Forestry, <http://www.dof.virginia.gov/fire/va-fire-history.shtml>, (retrieved July 2008).

<sup>8</sup> "Outdoor fire damages house in Lower Alsace," [readingeagle.com](http://www.readingeagle.com/article.aspx?id=89710), 4/26/2008, <http://www.readingeagle.com/article.aspx?id=89710> (accessed July 3, 2008).

<sup>9</sup> Ana Beatriz Cholo, "Hundreds evacuated as brush fire burns OC homes," [sfgate.com](http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2007/03/11/state/n152940D82.DTL), March 11, 2007, <http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2007/03/11/state/n152940D82.DTL> (accessed July 1, 2008).

<sup>10</sup> Douglass Dowty, "Outdoor Fire Spreads to Hastings House; Trash Fire Left Unattended Outside Home Spread Through Brush to House, Official Says," [highbeam.com](http://www.highbeam.com/doc/1G1-144465695.html), April 13, 2006, <http://www.highbeam.com/doc/1G1-144465695.html> (accessed July 3, 2008).

<sup>11</sup> "Outdoor fire kills man, 83," [dailyfreeman.com](http://www.dailyfreeman.com/articles/2006/03/02/top%20stories/16225181.txt), March 2, 2006, <http://www.dailyfreeman.com/articles/2006/03/02/top%20stories/16225181.txt> (accessed July 3, 2008).