U.S. Fire Administration

Nonresidential Building Fires

April 2010

FEMA

U.S. Fire Administration

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INTRODUCTION

According to the National Fire Protection Association (NFPA) estimates for 2006, there were 111,500 nonresidential structure fires. These fires resulted in 85 deaths, 1,425 injuries, and $2.6 billion in direct dollar loss.[1] Although nonresidential structure fires represent only 7 percent of all reported fires and account for just 3 percent of fire deaths and 9 percent of fire injuries, they account for 23 percent of the dollar losses from fire nationwide.[2]

Residential fires account for the majority of injuries and deaths and outdoor fires account for the majority of fires. Nonresidential fires, by contrast, tend to be the most costly fires per incident.

Analyses of the National Fire Incident Reporting System (NFIRS) data on the nonresidential structure fire problem were formerly published as a chapter in each edition of *Fire in the United States*. In this report, as in previous editions of *Fire in the United States*, an attempt has been made to keep the data presentation and analysis as straightforward as possible. It is also the desire of the United States Fire Administration (USFA) to make the report widely accessible to many different users, so it avoids unnecessarily complex methodology. Because it takes over a year to collect data from all participating States and a year to verify the collected data, this analysis, largely undertaken in 2008, used the latest full year of data available at the time, 2006.

Terminology

"Nonresidential buildings," which are a subset of nonresidential structures, refers to buildings on nonresidential properties. Buildings include enclosed structures, subway terminals, underground buildings, and fixed portable or mobile structures. The vast majority of nonresidential fires, deaths, and injuries occur in buildings and that is where prevention efforts are most often targeted. The term "nonresidential buildings" refers to those nonresidential structures that are enclosed.[3]

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[1] National Fire Protection Association, *Fire Loss in the United States During* 2006, September 2007. Nonresidential structure fires include nonresidential buildings as well as other built structures.

[2] These percentages are derived from summary data presented in the NFPA's annual survey and report, *Fire Loss in the United States During* 2006.

[3] USFA uses the structure type data element in NFIRS to determine the type of structure. Buildings include enclosed structures, a fixed portable or mobile structure (often used in conjunction with mobile (manufactured) homes). Nonresidential structures with no structure type noted in NFIRS are included in the analysis here as these structures frequently are associated with confined structure heating and cooking fires, which in turn are associated most often with enclosed buildings. These definitions are noted in detail in a later section.

Nonresidential properties include assembly, eating and drinking places, educational facilities, stores, offices, basic industry, manufacturing, storage, detached garages, outside properties, and other nonpermanent residential buildings. The term nonresidential also includes institutional properties such as prisons, nursing homes, juvenile care facilities, and hospitals, though many people may reside there for short (or long) durations of time.

In this report, the term "fire casualties" refers to deaths and injuries; the term "fire losses" collectively includes fire casualties and dollar loss due to fire. Fire data are collected fire by fire, and many of the data elements collected reflect the characteristics of the fire versus the characteristics of the casualties. This report, therefore, uses the following terms: "fatal fires" for those fires where one or more civilian fire fatalities occur, "fires with injuries" for those fires where one or more civilian fire injuries occur, and "fires with dollar loss" for those fires where a loss greater than zero was reported.

Organization of Report

This report analyzes nonresidential building fires over the 3-year period from 2004 to 2006, with a focus on 2006 data. It is organized differently from its predecessor chapters on nonresidential buildings in the many editions of *Fire in the United States*. As before, there is a section on each major subgroup of nonresidential buildings, such as assembly, stores and offices, storage, etc.

Each section discusses the causes of fires, time of fire alarm, month, the presence and effectiveness of smoke alarms, and the presence of automatic extinguishment systems (AESs). Where appropriate, findings are given separately for fires and fires with dollar loss, and for confined fires. An Appendix provides the raw NFIRS numbers for the smoke alarm and AES analyses.

The "Resources" section, formerly at the end of each chapter of *Fire in the United States*, is now in one, comprehensive resource list at the following URL: http://www.usfa.fema.gov/statistics/reports/fius.shtm.

Before presenting the data, the next chapter discusses the methodology used, and how various data issues are handled.

METHODOLOGY

This report relies on data from NFIRS, the Nation's largest fire incident database; on independent surveys from the NFPA; and on analytic techniques widely accepted by fire data analysts. The primary data source and analytic considerations when using the data are addressed in the following sections.

National Fire Incident Reporting System Data

NFIRS is a State-based, voluntary data collection system administered by the USFA, an agency under the Department of Homeland Security (DHS). From an initial six States in 1976, NFIRS has grown both in participation and in use. NFIRS is the world's largest collection of incidents to which fire departments respond. Over the life of the system, all 50 States, the District of Columbia, and Native American Tribal Authorities have reported to NFIRS. Participation in NFIRS is voluntary, although some States do require their departments to participate in the State system. Additionally, if a fire department is a recipient of a Fire Act Grant, participation is required.[4]

Not all States necessarily participate each year and, for those that do, reported fire incidents do not reflect all of a State's fire activity. Within a State, the participating fire departments include career, volunteer, and combination career/volunteer departments. These departments serve communities that range from rural hamlets to the largest cities.

NFIRS has also undergone a transformation from primarily a paper-based data collection system to a sophisticated web-based data collection system. The current version of NFIRS, NFIRS 5.0, features a wholly different collection concept from it predecessors. Because of the collection change and other changes, NFIRS 5.0 also accepted converted data from the previous NFIRS version, NFIRS 4.1, until December 31, 2008. As of January 2009, USFA no longer accepts data collected using NFIRS 4.1. Data analyses in this and other documents produced by the USFA, however, are based solely on data collected in the NFIRS 5.0 format, also referred to as "native" 5.0 data.

Not all reported information on each fire is complete. Nonetheless, more than half of all fire departments report to NFIRS, representing a very large data set that enables good estimates to be made of various facets of the fire problem.[5] For 2006, approximately 1.3 million fire incidents and 17 million nonfire incidents were submitted to the database.

There are several longstanding issues regarding how to analyze NFIRS data when it is neither as complete nor as accurate as desired. Other analytic issues are the result of changes in definitions and data collection procedures from NFIRS 4.1 to NFIRS 5.0. The sections below discuss how the analyses in this report address these various issues.

[4] From the Assistance to Firefighters Grant Program guidance, if the applicant is a fire department, the department must agree to provide information, through established reporting channels, to NFIRS for the period covered by the assistance. If a fire department does not currently participate in the incident reporting system and does not have the capacity to report at the time of the award, the department must agree to provide information to the system for a 12-month period that begins as soon as the department develops the capacity to report. See http://www.firegrantsupport.com/docs/2009AFGguidance.pdf.

[5] *Fire in the United States 1995-2004, Fourteenth Edition*, United States Fire Administration, August 2007: http://www.usfa.fema.gov/statistics/reports/fius.shtm.

Analytic Issues and Considerations

National Estimates

Numbers presented in this report are national estimates, scaled-up from NFIRS data or percentages of totals in NFIRS. Raw totals from NFIRS are not presented (except for smoke alarm and AES data in the Appendix) and are not useful by themselves because they represent only a portion of the total fires. National estimates are derived by computing the percentage of fires, deaths, injuries, or dollar loss in a particular NFIRS category and multiplying it by the corresponding total estimate from the NFPA annual survey. For example, the national estimate for the number of nonresidential building fires (Figure 1) was computed by taking the percentage of NFIRS nonresidential structure fires that are building fires and multiplying it by the estimated total number of nonresidential structure fires from the NFPA survey. This methodology is the accepted practice of national fire data analysts.[6]

Ideally, one would like to have all of the data come from one consistent data source. Because the "population protected" is not reported to NFIRS by many fire departments and the reliability of that data element is suspect in many other cases, especially where a county or other jurisdiction is served by several fire departments that each report their population protected independently, this data element was not used. Instead, extrapolations of the NFIRS sample to national estimates are made using the NFPA survey for the gross totals of fires, deaths, injuries, and dollar loss.

One problem with this approach is that the proportions of nonresidential fires and fire losses differ between the large NFIRS data set and the NFPA survey sample. Nonetheless, to be consistent with approaches being used by other fire data analysts, the NFPA estimates of fires, deaths, injuries, and dollar loss for nonresidential structures are used as a starting point. The details of the nonresidential fire problem below this level are based on proportions from NFIRS. Because the proportions of fires and fire losses differ between NFIRS and the NFPA estimates, from time to time this approach leads to minor inconsistencies. These inconsistencies will remain until all estimates can be derived from NFIRS data alone.

Unknown Entries

On a fraction of the incident reports or casualty reports sent to NFIRS, the desired information for some data items either is not reported, is reported as "unknown" or "undetermined," or the data submitted is invalid. The total number of blank, unknown, or invalid entries is often larger than some of the important subcategories. For example, 35 percent of fatal nonresidential building fires reported in 2006 do not have sufficient data reported to NFIRS to determine cause. For data items that are not required, the "unknown" category is often larger than any other category. The lack of data masks the true picture of the nonresidential fire problem. Many prevention and public education programs use NFIRS data to target at-risk groups or to address critical problems; fire officials use the data in decisionmaking that affects the allocation of firefighting resources; and consumer groups and litigators use the data to assess product fire incidence. When the unknowns are large, the credibility of the data suffers. In some cases, even after the best attempts by fire investigators, the information is truly unknown. In other cases, the information reported as unknown in the initial NFIRS report is not updated after the fire investigation is completed. Fire departments need to be more aware of the effect of incomplete reporting and need to update the initial NFIRS report if additional information is available after investigation.

[6] Hall, John R., and Beatrice Harwood, "The National Estimates Approach to U.S. Fire Statistics," *Fire Technology*, May 1989. Also available at: http://www.nfpa.org/assets/files/PDF/Research/Nationalestimates.pdf.

In making national estimates of the fire problem, unknown or undetermined data in the NFIRS database are not ignored. The approach taken in this report is to provide an "adjusted" percentage that is computed using only those incidents for which the valid information was provided for the data item being analyzed. In effect, this distributes the unknown responses in the same proportion as the known responses for the data item, which may or may not be approximately right.

As in past editions of the parent document, *Fire in the United States*, both the reported data and the adjusted data are plotted on the bar charts if unknowns are present. Unless otherwise noted, the adjusted percentages are used in the text.

Incomplete Loss Reporting

As troublesome as insufficient data for the various NFIRS data items can be, equally challenging is the apparent nonreporting of injuries and property loss associated with many fire incidents. For example, there are many reported fires where the flame spread indicates damage but property loss is blank. It is notoriously difficult to estimate dollar loss, but an approximation is more useful than leaving the data item blank. The degree to which there is incomplete reporting of civilian fire deaths is more difficult to identify, as the numbers of deaths, especially for fires in nonresidential buildings, is relatively small. Incomplete reporting of civilian injuries also is difficult to ascertain, but the injury-per-fire profiles for most departments are within reason.

Computing Trends

A frequently asked question is how much a particular aspect of the fire problem has changed over time. The usual response is in terms of a percentage change from 1 year to another. However, because the real-world data fluctuate from year to year, a percent change from one specific year to another can be misleading. This is especially true when the beginning and ending data points happen to be outliers or unusual years, either high or low. For example, Table 1 shows the percent change in nonresidential structure fire deaths from 1997 (120 deaths) to 2006 (85 deaths) would be a decrease of 29 percent. Yet, if the following year, 1998, was chosen as the beginning data point (170 deaths), the change would be a 50 percent decrease. To reduce the effect of the fluctuations, this report uses the computed best-fit linear trend line for reporting the trend. In the example in Table 1, the 10-year trend, using the best-fit linear trend line, is a decrease in nonresidential structure fire deaths of 39 percent. Trends that incorporate NFIRS data from both the 4.1 and 5.0 systems may reflect definitional and system design changes rather than a true trend change. The effect of these changes is discussed in the section, Definitional Changes.

Table 1. Comparison of Percentage Change Indicators

Year	Nonresidential Structure Fire Deaths	Best-Fit Linear Trend	Change between 1997 and 2006	Change between 1998 and 2006
1997	120	136	120	
1998	170	130		170
1999	120	124		
2000	90	118		
2001	80	112		
2002	80	107		
2003	220	101		
2004	80	95		
2005	50	89		
2006	85	83	85	85
Percent Change		**-39%**	**-29%**	**-50%**

Sources: Nonresidential structure fire death data, NFPA; best-fit linear trend analysis, USFA.

Trend data presented in this report are 3-year national estimate trend data for nonresidential building fires (2004–2006) based on the proportion of NFIRS nonresidential buildings and the NFPA annual survey estimates for nonresidential structure fires and associated losses.

Rounding

Percentages on each chart are rounded to one decimal point. In the text, these percentages are then rounded to whole numbers. Thus, 13.4 percent is rounded to 13 percent and 13.5 percent is rounded to 14 percent.

National estimates are rounded as follows: fires are rounded to the nearest 100 fires, deaths to the nearest 5 deaths, injuries to the nearest 25 injuries, and loss to the nearest million dollars.

Small Numbers

Because some subsets of fires are a small portion of the total number of fires, there is insufficient data to make reasonable estimates for some types of analyses. For example, the section "Nonresidential Buildings by Property Type" shows the number of fires and fires with dollar loss, but not fatal fires and fires with injuries because there are too few cases of the latter to draw meaningful conclusions. The associated smoke alarm and AES analyses also do not include fatal fires and fires with injuries due to small numbers and insufficient data.

Additionally, detached garages include only a small number of fires with smoke alarm operation and effectiveness data. The analysis gives preliminary findings only, and no definitive conclusions concerning the operation or effectiveness of smoke alarms should be drawn.

When Fires Occur

NFIRS collects information on the date and time the fire alarm was received by the fire department, not when the fire started. For many reasons, such as in the case of a long-smoldering fire or when fires occur at night, there may be a significant time lag between fire ignition and fire department notification. This observation is especially noteworthy for any analysis that attempts to determine how long a fire burned freely before the fire department arrived—in this case, what can be derived is the response time from the fire department receipt of alarm to the first apparatus arrival on the fire scene.

For the purposes of this report, the time of the fire alarm is used as an approximation for the general time the fire started. The text associated with each section on time of fire alarm presumes this to be the case. More precisely, however, it is the time the fire was reported.

Comparing Current and Previous Analyses

Differences between the current NFIRS and older versions have, or may have, an effect on the analyses of fire topics. These differences, the result of both coding changes and data element design changes, required revisions to long-standing groupings and analyses. These revisions have caused some challenges when comparing current data to past data.

Streamlined reporting for qualified incidents; the collection of smoke alarm and AES data (formerly called sprinklers); definition changes for some property types; the differentiation between buildings and structures; and changes in the cause methodology are among the areas that are approached differently in NFIRS 5.0.[7] As these revisions have resulted in changes in overall trends—some subtle and some substantial—this report does not include trends based on previous versions of NFIRS data. Subsequent editions will build on the analyses presented here.

In addition, detached residential garages, a subset of storage properties, was previously included under residential structures. They are now included with nonresidential properties.

Data Collection and Reporting Changes

Confined Fires. Streamlined reporting of confined, low-loss structure fires[8] allows the fire service to capture incidents that either might have gone unreported prior to the introduction of NFIRS 5.0 or were reported, but as a nonfire incident as no loss was involved.[9] Data from this reporting option were investigated in a 2006 USFA report, *Confined Structure Fires*.

These confined fires accounted for 40 percent of nonresidential structure fires in 2006. The addition of these fires results in increased proportions of cooking and heating fires in analyses of fire cause. Nearly 45 percent of these confined nonresidential structure fires were no- or low-loss cooking fires (36 percent) and heating fires (9 percent). Fifty-three percent of confined nonresidential structure fires were coded as trash fires; most of these fires, 85 percent, had insufficient information available to determine cause. In other analyses, the inclusion of confined fires may also result in larger unknowns than in previous analyses, as detailed reporting of fire specifics (e.g., area of fire origin) is not required.

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[7] Other changes between NFIRS 4.1 and 5.0, such as mutual aid, do not have as significant an impact on analyses. As such, they are not addressed in this document. The NFIRS 5.0 documentation at http://www.nfirs.fema.gov/documentation provides detailed information.

[8] Confined structure fires are defined in NFIRS as incident types 113-118.

[9] Some fire departments routinely reported such non–loss fires as smoke scares. The result, from a reporting viewpoint, is that the incident was reported but not coded as a fire incident, thereby reducing the number of reported fires in NFIRS.

In the case of buildings, confined fires play an even larger role. For nonresidential buildings, confined fires accounted for 45 percent of fires in 2006. Confined trash fires accounted for more than half (53 percent) of these fires and ranged from 10 percent of confined fires in health care, detention, and correctional facilities to 91 percent of confined fires in buildings on outside and miscellaneous properties. This latter statistic may be overstated as the lack of detailed fire specifics precludes analysts from determining if these confined trash fires actually occurred in buildings (incident type 118) or whether these fires would more properly be coded as a type of outside rubbish fire (incident types 150–155).

Smoke Alarm Data. The term smoke alarm encompasses a variety of devices intended to warn occupants of the presence of fire. Smoke alarms are thought to play a significant role in the decrease in fire deaths. They also tend to decrease reported fires by alerting occupants early enough to extinguish a fire themselves, or even prevent a smoldering situation from becoming an open fire. The use of smoke alarms began to increase in the mid 1970s and has continued to increase since then.[10]

NFIRS 5.0 changed reporting of data on the presence and effectiveness of smoke alarms in two significant ways. First, in keeping with the abbreviated reporting for confined fires, smoke alarm performance data for confined structure fires is limited to information on smoke alarm alert notification. Second, for nonconfined structure fire reporting, only incidents reported as buildings are required to provide detailed information on smoke alarm presence, type, operational status, and the like. Because the data items are not wholly compatible for analytic purposes, smoke alarm performance is presented separately for confined and nonconfined fires. Adjustments for unknowns are not presented.

The effectiveness of smoke alarms depends on whether the alarm alerted occupants to the fire. In the case of confined fires, effectiveness data are collected by a single data element. In the case of nonconfined fires, data are collected on the presence of alarms, operation of alarms when present, and alerting status for present and operating alarms. All three data elements are shown in this report. Effectiveness is then a combination of alarms being present and operating, with the successful alert of occupants.

At the time of publication, a methodology to analyze NFIRS 5.0 smoke alarm data is under review. As an interim measure, each smoke alarm data element is presented separately. This format is maintained throughout the document; while it is repetitive, each property use category has a stand-alone section on smoke alarm performance.

As smoke alarm data are of great interest to many readers, the NFIRS 5.0 smoke alarm data (e.g., raw NFIRS 5.0 counts) for each nonresidential building category are also presented in the Appendix.

Automatic Extinguishment Systems. Included in AESs are sprinkler, dry chemical, foam, halogen, and carbon dioxide systems. As with smoke alarms, NFIRS changed reporting of data on the presence and effectiveness of AES in two significant ways. First, in keeping with the abbreviated reporting for confined fires, AES data are not collected for confined structure fires. Second, for nonconfined structure fire reporting, only incidents reported as buildings are required to provide detailed information on AES presence, type, operational status, and the like. Analytic methodologies for AES analyses are ongoing and under review. As such, only the presence of an AES system is presented in this report and adjustments for unknowns are not made.

[10] *Fire Incident Study National Smoke Detector Project*, Consumer Product Safety Commission, January 1995. By 2004, 96 percent of U.S. homes with telephones had at least one smoke alarm, as reported in *Considerations For Installation Of Smoke Alarms On Residential Branch Circuits*, Consumer Product Safety Commission, October 2005.

The installation of sprinklers and other AESs may provide significant protection against fire. However, data to support this conclusion cannot be drawn from NFIRS data alone since NFIRS combines properties of different size and values in the same property class. AES are more likely to be installed in large and highly valued properties than in small, inexpensive ones.[11] A fire contained to one percent of a large structure by AES may have more dollar loss than a fire that burns 25 percent of a small structure without AES.

Currently, sprinklers and other AESs are reported to be present in more fires in nonresidential buildings (18 percent) than in residential buildings (3 percent). Commercial properties and public assembly sites tend to occupy large structures that have been built to strict construction codes. In addition, owners and proprietors of large structures are more likely to invest in such systems, driven by insurance discounts.[12] Thus, it is difficult to form conclusions about fire protection features when large and small properties are mixed in the same category.

As AES data are also of interest to many readers, the NFIRS 5.0 AES data (e.g., raw NFIRS 5.0 counts) for each nonresidential building category are also presented in the Appendix.

Definitional Changes

Property Types. Examples of property type changes include manufacturing and properties that are vacant and under construction. Manufacturing properties are no longer assigned a specific property use code based on the type of item manufactured. Instead, these properties are differentiated by an additional data element, "on-site materials." Vacant and under construction now is an attribute of a structure and no longer is considered a separate property type.

Buildings and Structures. NFIRS 5.0 allows for the differentiation between buildings and nonbuildings. In NFIRS 5.0, a structure is a built object and can include platforms, tents, connective structures (e.g., bridges), and various other structures (e.g., fences, underground work areas, etc). This distinction between buildings and nonbuildings is important when determining the effectiveness of engineered fire safety features such as smoke alarms and sprinklers. These important components of early fire detection and automatic suppression apply to buildings and not necessarily to other types of structures. To facilitate analysis of these components and to acknowledge that prevention efforts generally are focused on buildings, USFA separates the subset of buildings from the rest of the structures.

Structure fires are defined by the NFIRS incident type. Structure fires are defined as the 110 incident type series (structure fires) and the 120 incident type series (fires in mobile property used as a fixed structure).[13]

[11] *Fire in the United States 1992-2001, Thirteenth Edition*, United States Fire Administration, October 2004, page 8.

[12] USFA, NFPA, and other organizations are actively promoting to change this situation, by strengthening codes to include residences. Highrise residences often are sprinklered, under the newer building codes. The new effort is directed toward all residences, including single-family dwellings.

[13] Note that incident type 110 is not included. Incident type 110 is a conversion code for NFIRS 4.1. Incident type 110 is not a valid code for data collected in NFIRS 5.0. Incidents in the NFIRS 5.0 database with a 110 incident type are incidents collected under the NFIRS 4.1 system and are converted to NFIRS 5.0 compatible data.

These incident types are

111 - Building fire;
112 - Fires in structure other than in a building;[14]
113 - Cooking fire, confined to container;
114 - Chimney or flue fire, confined to chimney or flue;
115 - Incinerator overload or malfunction, fire confined;
116 - Fuel burner/boiler malfunction, fire confined;
117 - Commercial compactor fire, confined to rubbish;
118 - Trash or rubbish fire, contained;
120 - Fire in mobile property used as a fixed structure, other;
121 - Fire in mobile home used as fixed residence;
122 - Fire in motor home, camper, recreational vehicle; and
123 - Fire in portable building, fixed location.

Building fires are a subset of structure fires. They are defined as structure fires where the structure type is an enclosed building, a fixed portable, or mobile structure. By definition, this excludes nonbuilding structures. Previous USFA analyses demonstrated that confined structure fire incidents with full incident reporting primarily occurred in buildings. To accommodate the confined fire incident types with abbreviated incident reporting, the incident is also assumed to be a building if the structure type is not specified. In terms of NFIRS data, building fires are therefore defined as:

- NFIRS version 5.0 data.
- Aid types:

  1 - Mutual aid received;
  2 - Automatic aid received; and
  5 - Other aid given.

  Note: Mutual aid given and automatic aid given (aid types 3 and 4) were excluded to avoid double counting of incidents.
- Incident types:

  111 - Building fire;
  112 - Fires in structure other than in a building;[15]
  113 - Cooking fire, confined to container;
  114 - Chimney or flue fire, confined to chimney or flue;
  115 - Incinerator overload or malfunction, fire confined;
  116 - Fuel burner/boiler malfunction, fire confined;
  117 - Commercial compactor fire, confined to rubbish;
  118 - Trash or rubbish fire, contained;
  120 - Fire in mobile property used as a fixed structure, other;
  121 - Fire in mobile home used as fixed residence;
  122 - Fire in motor home, camper, recreational vehicle; and
  123 - Fire in portable building, fixed location.

  (Note that incident types 113 to 118 do not specify if the structure is a building.)

[14] Preliminary findings noted that the fires coded as 112s appear to be buildings. A more detailed look at these incident types is required to determine whether they were coded correctly.
[15] Preliminary findings noted that the fires coded as 112s appear to be buildings. A more detailed look at these incident types is required to determine whether they were coded correctly.

- Structure type:

  1 - Enclosed building;
  2 - Fixed portable or mobile structure; and
  Structure type not specified (null entry).

Cause Methodology

Since the introduction of NFIRS Version 5.0, the implementation of the cause hierarchy has resulted in a steady increase in the percentages of unknown fire causes. This increase may be due, in part, to the fact that the original cause hierarchy (described in *Fire in the United States 1995-2004, Fourteenth Edition*) does not apply as well to Version 5.0. Causal information now collected as part of NFIRS Version 5.0 was not incorporated in the old hierarchy. As a result, many incidents were assigned to the unknown cause category. USFA, therefore, developed a modified version of the previous hierarchy of cause groupings for structure fires as shown in Table 2. The revised schema provides three levels of cause descriptions: a set of more detailed causes (priority cause description), a set of mid-level causes (cause description), and a set of high-level causes (general cause description). The priority cause description and the cause description existed previously as part of the original cause hierarchy, but have been expanded to capture the new 5.0 data.

Table 2. Three-Level Structure Fire Cause Hierarchy

Priority Cause Description (in hierarchical order)	Cause Description	General Cause Description
Exposure	Exposure	Exposure
Intentional	Intentional	Firesetting
Investigation with Arson Module	Investigation with Arson Module	Unknown
Children Playing	Playing with Heat Source	Firesetting
Other Playing		
Natural	Natural	Natural
Fireworks	Other Heat	Flame, Heat
Explosives		
Smoking	Smoking	
Heating	Heating	Equipment
Cooking	Cooking	
Air Conditioning	Appliances	
Electrical Distribution	Electrical Malfunction	Electrical
Appliances	Appliances	Equipment
Special Equipment	Other Equipment	
Processing Equipment		
Torches	Open Flame	Flame, Heat
Service Equipment	Other Equipment	Equipment
Vehicle, Engine		
Unclassified Fuel-Powered Equipment		
Unclassified Equipment w/Other or Unknown Fuel Source	Unknown	Unknown
Unclassified Electrical Malfunction	Electrical Malfunction	Electrical
Matches, Candles	Open Flame	Flame, Heat
Open Fire		
Other Open Flame, Spark	Other Heat	
Friction, Hot Material		
Ember, Rekindle	Open Flame	
Other Hot Object	Other Heat	
Natural Condition, Other	Natural	Natural
Heat Source or Product Misuse	Other Unintentional, Careless	Unknown
Equipment Operation Deficiency	Equipment Misoperation, Failure	Equipment
Equipment Failure, Malfunction		
Trash, Rubbish	Unknown	Unknown
Other Unintentional	Other Unintentional, Careless	
Exposure (Fire Spread, Other)	Exposure	Exposure
Unknown	Unknown	Unknown

Note: Fires are assigned to a cause category in the hierarchical order shown. For example, if the fire is judged to be intentionally set and a match was used to ignite it, it is classified as intentional and not open flame because intentional is higher on the list.

The causes of fires are often a complex chain of events. To make it easier to grasp the "big picture," the 16 mid-level categories of fire causes such as heating, cooking, and playing with heat source are used by the USFA here and in many other reports. The alternative is to present scores of detailed cause categories or scenarios, each of which would have a relatively small percentage of fires. For example, heating includes subcategories such as misuse of portable space heaters, wood stove chimney fires, and fires involving gas central heating systems. Experience has shown that the larger categories are useful for an initial presentation of the fire problem. A more detailed analysis can follow.

Fires are assigned to one of the 16 mid-level cause groupings using a hierarchy of definitions, approximately as shown in Table 3.[16] A fire is included in the highest category into which it fits on the list. If it does not fit the top category, then the second one is considered, and if not that one, the third, and so on (See Table 2 Note for examples).

The cause categories displayed in the graphs are listed in the same order to make comparisons easier from one to another. The y-scale varies from figure to figure depending on the largest percentage that is shown; the y-scale on a figure with multiple charts, however, is always the same.

The cause categories used throughout most of this report were designed to reflect the causes of structure fires—where the majority of fatal fires occur. While these categories have usefulness for other property types, there are limitations. For example, in vehicle fires, these limitations are such that the cause categories are not used because all of the cause categories do not necessarily apply to the other property types. In the future, USFA also plans to investigate and develop cause categories for vehicle and outside fires.

An additional problem to keep in mind when considering the rank order of causes in this report is that sufficient data to categorize the cause were not reported to NFIRS for all fatal fires in the database. The rank order of causes might be different than shown here if the cause profile for the fires whose causes were not reported to NFIRS were substantially different from the profile for the fires whose causes were reported. However, there is no information available to indicate that there is a major difference between the known causes and the unknown causes, and so our present best estimate of fire causes is based on the distribution of the fires with known causes.

[16] The structure fire cause hierarchy and specific definitions in terms of the NFIRS 5.0 codes may be found at http://www.usfa.fema.gov/fireservice/nfirs/tools/fire_cause_category_matrix.shtm. The hierarchy involves a large number of subcategories that are later grouped into the 16 mid-level cause categories, then the 8 high-level cause groupings.

Table 3. Mid-Level Cause Groupings

Cause Category	Definition
Exposure	Caused by heat spreading from another hostile fire
Intentional	Cause of ignition is intentional or fire is deliberately set
Investigation with Arson Module	Cause is under investigation and a valid NFIRS arson module is present
Playing with Heat Source	Includes all fires caused by individuals playing with any materials contained in the categories below as well as fires where the factors contributing to ignition include playing with heat source. Children playing fires are included in this category
Natural	Caused by the sun's heat, spontaneous ignition, chemicals, lightning, static discharge, high winds, storms, high water including floods, earthquakes, volcanic action, and animals
Other Heat	Includes fireworks, explosives, flame/torch used for lighting, heat or spark from friction, molten material, hot material, heat from hot or smoldering objects
Smoking	Cigarettes, cigars, pipes, and heat from undetermined smoking materials
Heating	Includes confined chimney or flue fire, fire confined to fuel burner/boiler malfunction, central heating, fixed and portable local heating units, fireplaces and chimneys, furnaces, boilers, water heaters as source of heat
Cooking	Includes confined cooking fires, stoves, ovens, fixed and portable warming units, deep fat fryers, open grills as source of heat
Appliances	Includes televisions, radios, video equipment, phonographs, dryers, washing machines, dishwashers, garbage disposals, vacuum cleaners, hand tools, electric blankets, irons, hairdryers, electric razors, can openers, dehumidifiers, heat pumps, water cooling devices, air conditioners, freezers and refrigeration equipment as source of heat
Electrical Malfunction	Includes electrical distribution, wiring, transformers, meter boxes, power switching gear, outlets, cords, plugs, surge protectors, electric fences, lighting fixtures, electrical arcing as source of heat
Other Equipment	Includes special equipment (radar, x-ray, computer, telephone, transmitters, vending machine, office machine, pumps, printing press, gardening tools, or agricultural equipment), processing equipment (furnace, kiln, other industrial machines), service, maintenance equipment (incinerator, elevator), separate motor or generator, vehicle in a structure, unspecified equipment.
Open Flame, Spark (From Heat)	Includes torches, candles, matches, lighters, open fire, ember, ash, rekindled fire, backfire from internal combustion engine as source of heat
Other Unintentional, Careless	Includes misuse of material or product, abandoned or discarded materials or products, heat source too close to combustibles, other unintentional (mechanical failure/malfunction, backfire)
Equipment Misoperation, Failure	Includes equipment operation deficiency, equipment malfunction
Unknown	Cause of fire undetermined or not reported

Source: USFA

NFIRS fire causal data can be analyzed in many ways, such as by the heat source, equipment involved in ignition, factors contributing to ignition, or many other groupings. The hierarchy of causes used in this report has proven to be useful in understanding the fire problem and targeting prevention, but other approaches are useful too. Because the NFIRS database stores records fire-by-fire, and not just in summary statistics, a wide variety of analyses is possible.

Differences Between NFIRS Data and NFPA Survey Data

As there are differences between any two analysts using NFIRS data because of the many assumptions and decisions about how to analyze incomplete and imperfect data, there also are inconsistencies between different data sources. In particular, there are discrepancies between the NFIRS 5.0 data and the NFPA annual survey data. While NFIRS 5.0 and NFPA both show declines in deaths and injuries per fire, the NFIRS decline is much more prominent. In addition, NFIRS 5.0 dollar loss per fire is 10 to 15 percent lower than that of NFPA.[17] This issue is discussed further in *Fire in the United States 1995-2004*, Appendix A.

Unreported Fires

NFIRS includes only fires to which the fire service responded. In some States, fires attended by State fire agencies (such as forestry) are included; in other States, they are not.

Nonreporting to NFIRS

NFIRS includes fires from all States, but does not include incidents from many fire departments within participating States—the percent of fire departments reporting varies greatly from State to State. However, if the fires from the reporting departments are reasonably representative, this omission does not cause a problem in making useful national estimates for any but the smallest subcategories of data and for some geographic analyses.

Some fire departments submit information on most, but not all, of their fires. Sometimes the confusion is systematic, as when no-loss cooking fires or chimney fires are not reported. Sometimes it is inadvertent, such as when incident reports are lost or accidentally not submitted. The information that is received is assumed to be the total for the department and is extrapolated as such. Although there was no measure of the extent of this problem in the past, the NFIRS 5.0 provides fire departments with the capability to report this information in a simplified, more straightforward manner.

Nonreporting to the Fire Service

A very large number of fires are not reported to the fire service at all. Most are believed to be small fires in the home or in industry that go out by themselves or are extinguished by the occupant. Special surveys of homes and businesses are needed to estimate the unreported fires. No attempt is made here to estimate them. Studies undertaken in the mid 1970s and again in the mid 1980s on unreported residential fires indicated that a substantial number of fires are not reported to local fire departments. The 1984 Consumer Product Safety Commission (CPSC) study on unreported residential fires noted that, of the estimated number of fires in residences, only 3 percent were reported to fire departments and 97 percent were not.[18] Although the vast majority of fire incidents are unreported because they are small, confined, and immediately extinguished, they are still fires. Even the largest fire starts small; hence, all fires regardless of size, merit prevention attention and analytic investigation.

[17] As NFIRS 5.0 now captures a large number of small, low-loss fires (confined fires) thought to be unreported previously, these differences in loss rates per fire may not be surprising.

[18] *1984 National Sample Survey of Unreported, Residential Fires, Final Technical Report* prepared for the U.S. Consumer Product Safety Commission, Contract No. C-83-1239, Audits & Surveys, Inc., Princeton, NJ (1985).

Definition of Nonresidential Buildings

Fires and losses in nonresidential buildings are the focus of this report. In keeping with the definitions of structures and buildings, nonresidential building fires are a subset of nonresidential structure fires. Nonresidential building fires, therefore, are defined as structure fires where the structure type is an enclosed building or a fixed portable or mobile structure and where the property use is not residential. In terms of NFIRS data, the specifications are:

- NFIRS version 5.0 data.
- Aid types

  1 – Mutual aid received;
  2 – Automatic aid received; and
  5 – Other aid given.

  Note: Mutual aid given and automatic aid given (aid types 3 and 4) were excluded to avoid double counting of incidents.

- Incident types

  111 – Building fire;
  112 – Fires in structure other than in a building;[19]
  113 – Cooking fire, confined to container;
  114 – Chimney or flue fire, confined to chimney or flue;
  115 – Incinerator overload or malfunction, fire confined;
  116 – Fuel burner/boiler malfunction, fire confined;
  117 – Commercial compactor fire, confined to rubbish;
  118 – Trash or rubbish fire, contained;
  120 – Fire in mobile property used as a fixed structure, other;
  121 – Fire in mobile home used as fixed residence;
  122 – Fire in motor home, camper, recreational vehicle; and
  123 – Fire in portable building, fixed location.

  (Note that incident types 113 to 118 do not specify if the structure is a building.)

- Property use 100 – 399, 500 – 999, 000

  100-159, 163-199 – Assembly;
  160-162 – Eating and drinking establishments;
  200-299 – Educational;
  300-399 – Health care, detention, and correction;
  500-599 – Stores and offices;
  600-699 – Industrial, utility, defense, agriculture, mining;
  700 – Manufacturing, processing;
  800-880, 882-899 – Storage;
  881 – Parking garage, detached residential garage;
  900-999 – Outside or special property; and
  000 – Property use, other.

[19] Preliminary findings noted that the fires coded as 112s appear to be buildings. A more detailed look at these incident types is required to determine whether they were coded correctly.

- Structure type

  1 – Enclosed building;
  2 – Fixed portable or mobile structure; and
  Structure type not specified (null entry).

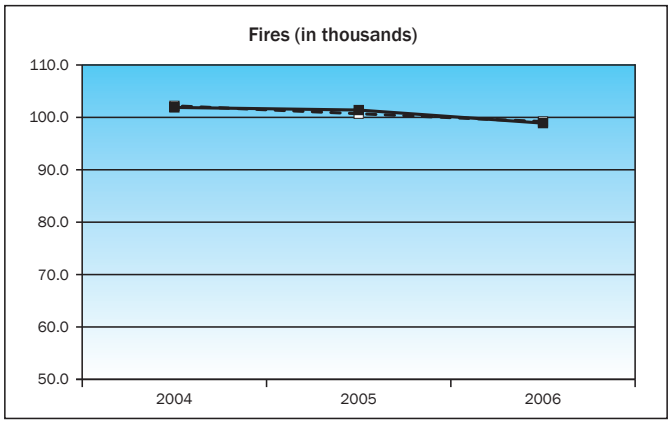
Fires in nonresidential buildings account for approximately 88 percent of nonresidential structure fires and fatal fires, 93 percent of nonresidential structure fires with injuries, and 89 percent of fires with dollar loss. During the 2004 to 2006 period, an estimated 100,700 nonresidential building fires were reported each year. This estimate reflects 6 percent of all fires. These fires cause 2 percent of all fire deaths, 8 percent of fire injuries, and 21 percent of dollar loss, adjusted for inflation.

OVERVIEW OF NONRESIDENTIAL BUILDING FIRE AND LOSS TRENDS

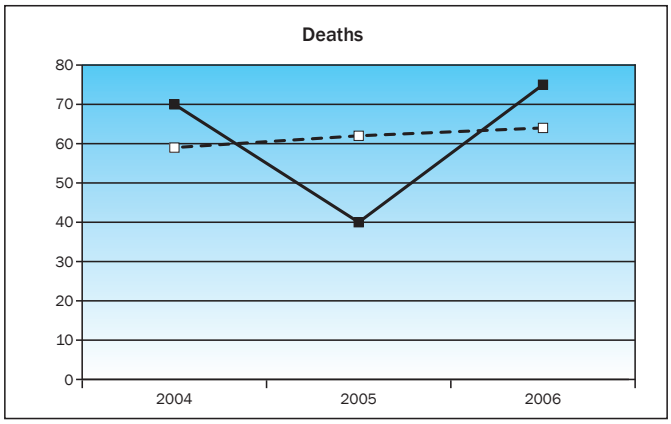
Figure 1, based on national estimates of the nonresidential building fire problem, shows the 3-year trend in nonresidential building fires, deaths, injuries, and dollar loss. During the 3-year period, the estimated number of fires declined from 101,900 in 2004 to 98,900 in 2006. The overall trend in the number of nonresidential fires declined 3 percent.

The estimated number of deaths ranged from 70 in 2004, declined to 40 in 2005, and then increased to 75 in 2006. Overall, the trend in nonresidential fire deaths increased 9 percent. An estimated 1,200 injuries were reported in 2004, with an increase to 1,400 in 2005, and a slight decrease to 1,350 in 2006, resulting in a 12 percent increase in the overall trend for fire injuries. In 2006, the estimated dollar loss for nonresidential building fires was $2.3 billion. The overall trend in dollar loss increased by 3 percent.

Figure 1. Trends in Nonresidential Building Fires and Fire Losses (2004–2006)



FIRES (in thousands)	
Year	**Value**
2004	101.9
2005	101.4
2006	98.9
3-Year Trend (%)	**-2.9**



DEATHS	
Year	**Value**
2004	70
2005	40
2006	75
3-Year Trend (%)	**8.5**

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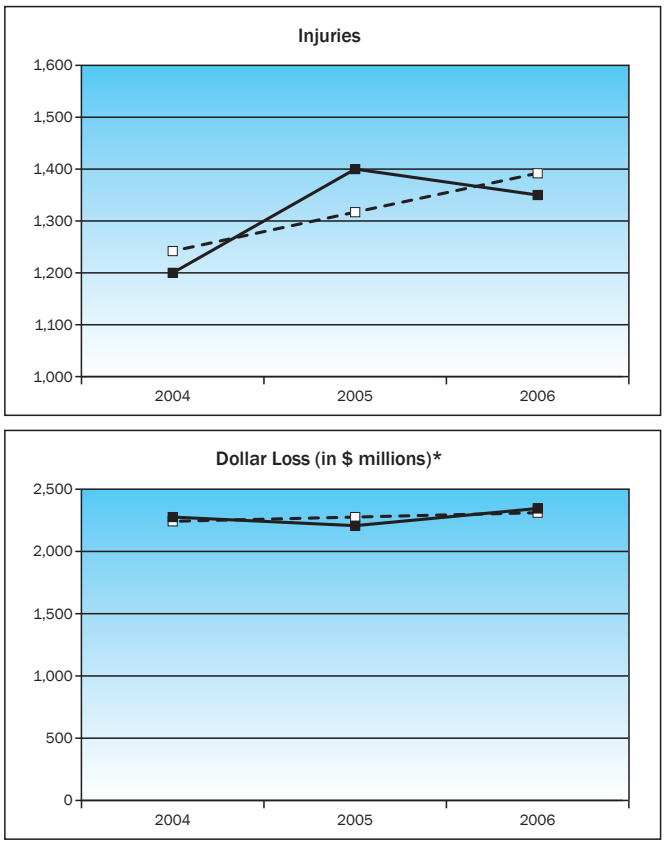
Figure 1. Trends in Nonresidential Building Fires and Fire Losses (2004–2006) (cont'd.)



INJURIES

Year	Value
2004	1,200
2005	1,400
2006	1,350
3-Year Trend (%)	**12.1**

DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

Year	Value
2004	$2,276
2005	$2,207
2006	$2,345
3-Year Trend (%)	**3.1**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

TYPES OF NONRESIDENTIAL BUILDINGS

Figure 2 shows the relative proportions of fires and losses among the 11 major nonresidential building categories in 2006. These categories include assembly, eating and drinking,[20] education, institutional, business, basic industry, manufacturing, storage, detached garage, outside, and other nonresidential buildings. Each of these categories is discussed in subsequent sections of this report. Of note, stores and offices account for approximately 19 percent of nonresidential building fires in 2006. Building fires on outside and special properties account for an additional 18 percent of nonresidential building fires. Fires in storage areas are the third largest property type at 15 percent.

Storage area fires account for the most fatalities in 2006 (26 percent), followed by stores and offices at 18 percent. Detached garages account for 14 percent of all fire deaths in nonresidential buildings.

Injuries from fires occurred most often in stores and offices (21 percent). The second and third leading nonresidential properties where fire injuries occurred are institutions (17 percent) and manufacturing areas (14 percent).

The majority of dollar loss comes from fires in stores and offices (36 percent).This is followed by eating and drinking establishments (14 percent) and storage properties (13 percent).

[20] Throughout this report, "eating and drinking buildings" will be referred to as "eating and drinking establishments" for readability.

Figure 2. Nonresidential Building Fires and Fire Losses by Property Type (2006)

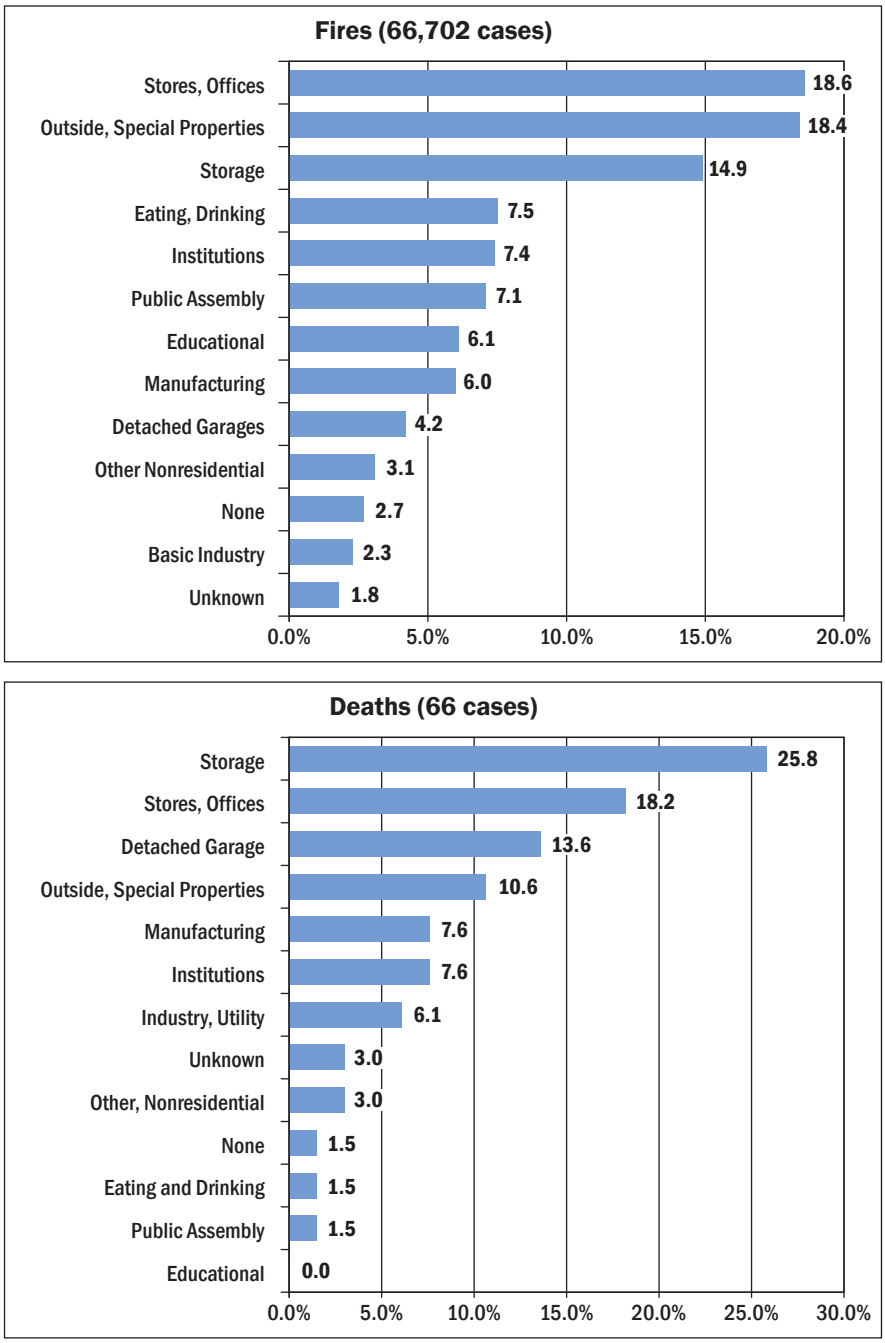


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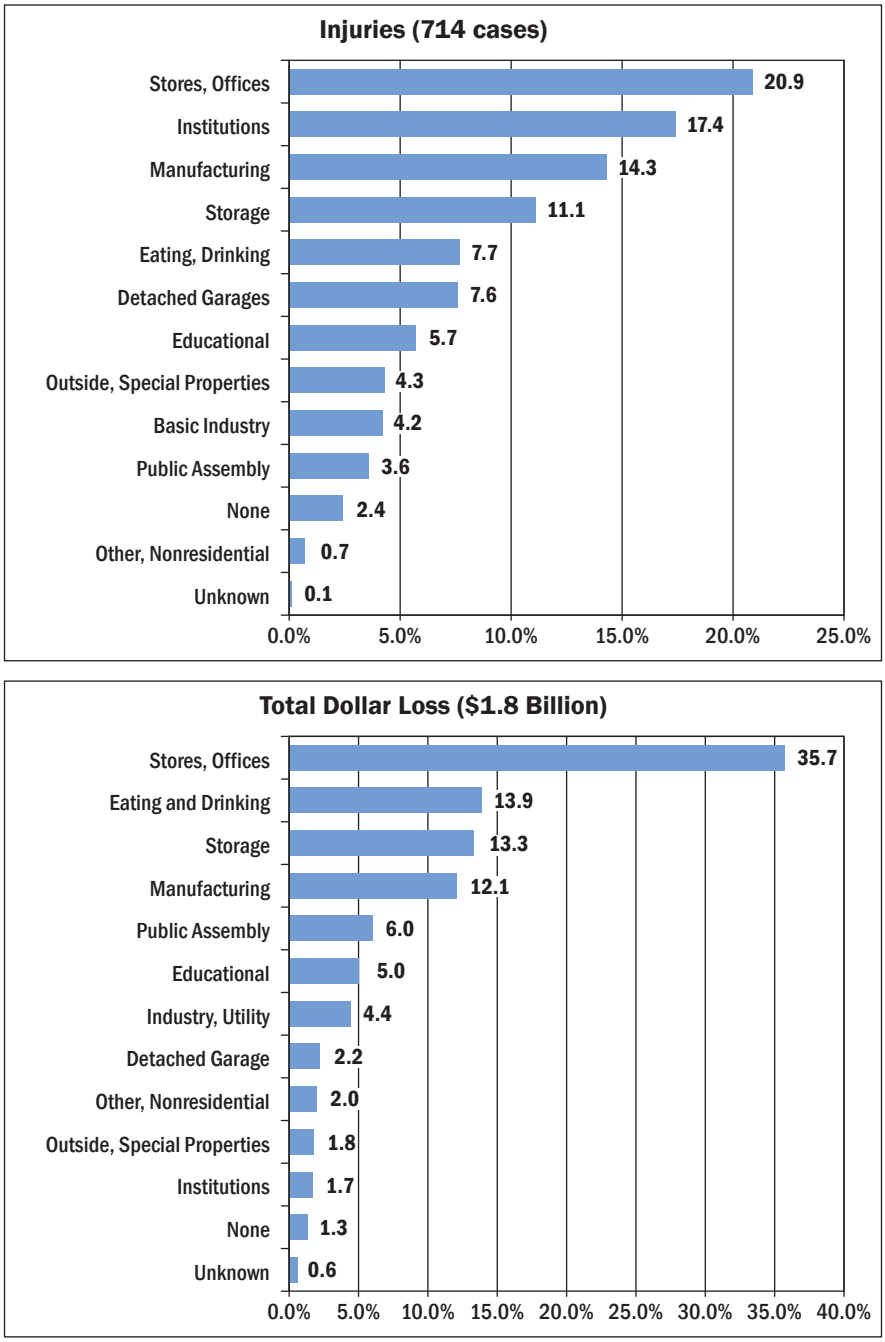
Figure 2. Nonresidential Building Fires and Fire Losses by Property Type (2006) (cont'd.)



Source: 2006 NFIRS 5.0

CAUSES OF NONRESIDENTIAL BUILDING FIRES

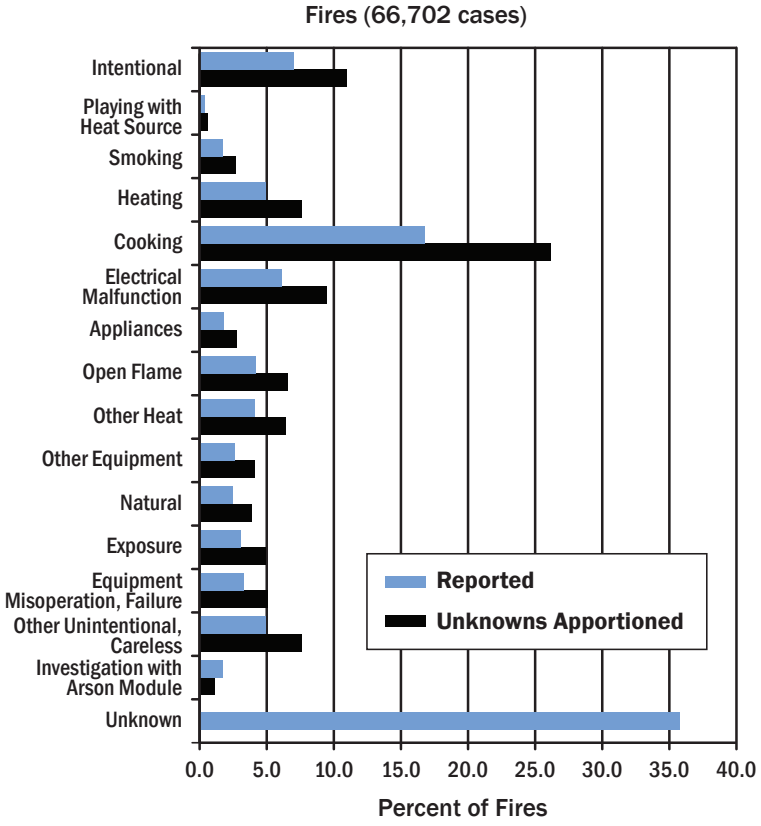
It is important to note that the leading causes are different depending on what measure is used, as can be seen from Figure 3, which shows the causes of fires and fires with losses in 2006.

Cooking is the leading cause of nonresidential building fires (26 percent). Confined cooking fires (discussed earlier in this report) are a large portion of cooking fires, making cooking fires more than twice the amount of the next leading cause, intentional fire setting (11 percent).

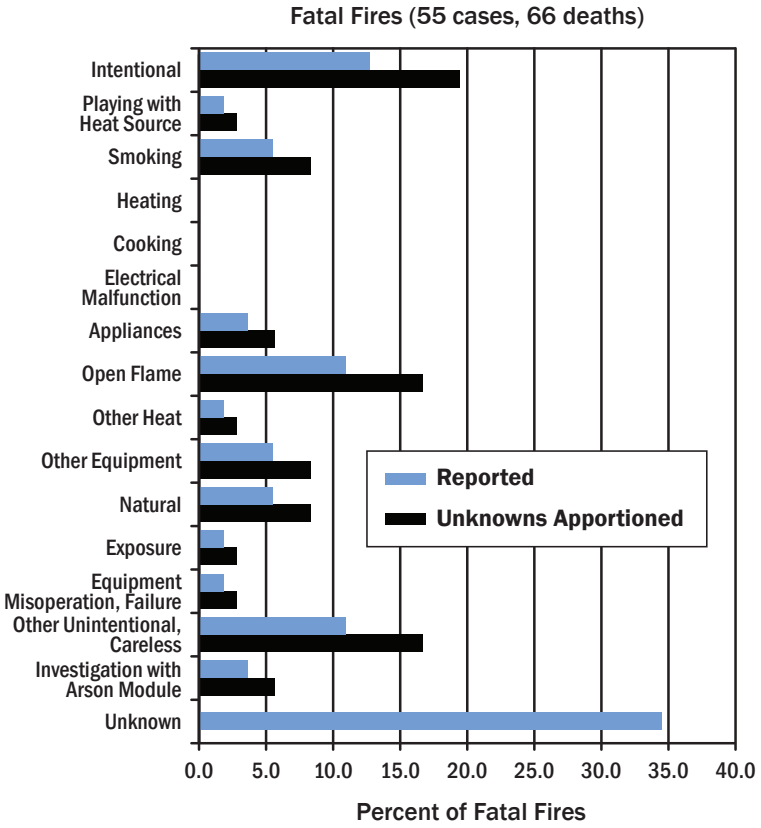
Intentional fire setting is the leading cause of fatal nonresidential building fires, accounting for 19 percent of these fatal fires. Cooking (14 percent) and open flame (13 percent) account for fires resulting in injuries.

Fires intentionally set and those involving electrical malfunction are the leading causes of fires with dollar loss. Each of these causes account for approximately 14 percent of the fires with property loss.

Figure 3. Fire Cause for Nonresidential Building Fires and Fires with Losses (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	7.0	11.0
Playing with Heat Source	0.4	0.6
Smoking	1.7	2.7
Heating	4.9	7.6
Cooking	16.8	26.2
Electrical Malfunction	6.1	9.5
Appliances	1.8	2.8
Open Flame	4.2	6.6
Other Heat	4.1	6.4
Other Equipment	2.6	4.1
Natural	2.5	3.9
Exposure	3.1	4.9
Equipment Misoperation, Failure	3.3	5.1
Other Unintentional, Careless	4.9	7.6
Investigation w/Arson Module	0.7	1.1
Unknown	35.8	



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	12.7	19.4
Playing with Heat Source	1.8	2.8
Smoking	5.5	8.3
Heating	0.0	0.0
Cooking	0.0	0.0
Electrical Malfunction	0.0	0.0
Appliances	3.6	5.6
Open Flame	10.9	16.7
Other Heat	1.8	2.8
Other Equipment	5.5	8.3
Natural	5.5	8.3
Exposure	1.8	2.8
Equipment Misoperation, Failure	1.8	2.8
Other Unintentional, Careless	10.9	16.7
Investigation w/Arson Module	3.6	5.6
Unknown	34.5	

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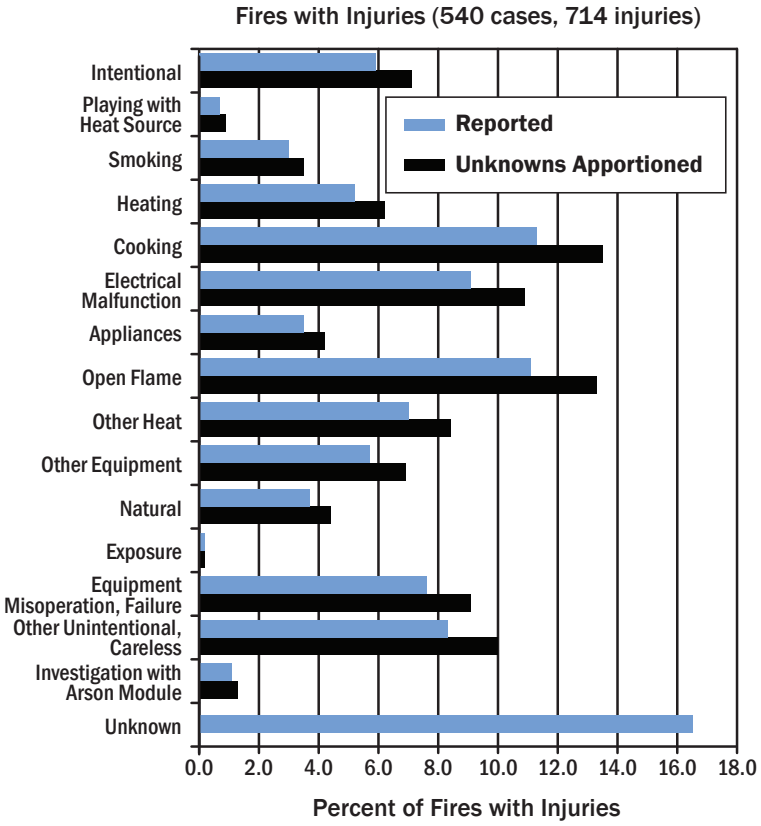
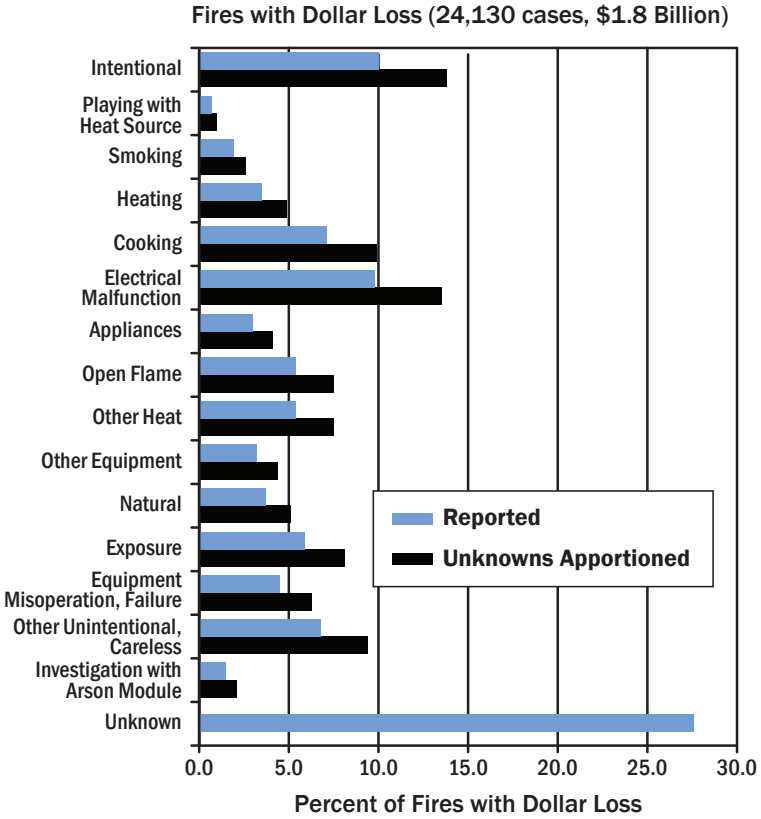
Figure 3. Fire Cause for Nonresidential Building Fires and Fires with Losses (2006) (cont'd.)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	5.9	7.1
Playing with Heat Source	0.7	0.9
Smoking	3.0	3.5
Heating	5.2	6.2
Cooking	11.3	13.5
Electrical Malfunction	9.1	10.9
Appliances	3.5	4.2
Open Flame	11.1	13.3
Other Heat	7.0	8.4
Other Equipment	5.7	6.9
Natural	3.7	4.4
Exposure	0.2	0.2
Equipment Misoperation, Failure	7.6	9.1
Other Unintentional, Careless	8.3	10.0
Investigation w/Arson Module	1.1	1.3
Unknown	16.5	



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	10.0	13.8
Playing with Heat Source	0.7	1.0
Smoking	1.9	2.6
Heating	3.5	4.9
Cooking	7.1	9.9
Electrical Malfunction	9.8	13.5
Appliances	3.0	4.1
Open Flame	5.4	7.5
Other Heat	5.4	7.5
Other Equipment	3.2	4.4
Natural	3.7	5.1
Exposure	5.9	8.1
Equipment Misoperation, Failure	4.5	6.3
Other Unintentional, Careless	6.8	9.4
Investigation w/Arson Module	1.5	2.1
Unknown	27.6	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Nonresidential building fire incidents peak from 5 p.m. to 6 p.m., as shown in Figure 4. Fatal fires peak in the mid-morning. Nine percent of nonresidential building fatal fires occur between 10 a.m. and 11 a.m. There are three secondary fatal fire peaks (7 percent), which occur in the early morning between 1 a.m. and 2 a.m., then in the afternoon between 1 p.m. and 2 p.m., and again in the evening between 9 p.m. and 10 p.m. Fires resulting in injuries peak mid-morning between 10 a.m. and 11 a.m. and again between 3 p.m. and 4 p.m. Fires with property losses track closely with the number of fires except in the early morning hours when the occurrence of fires with property loss is slightly higher. Fires with property losses are slightly lower in the afternoon and early evening.

Figure 4. Time of Fire Alarm of Nonresidential Building Fires and Fires with Losses (2006)

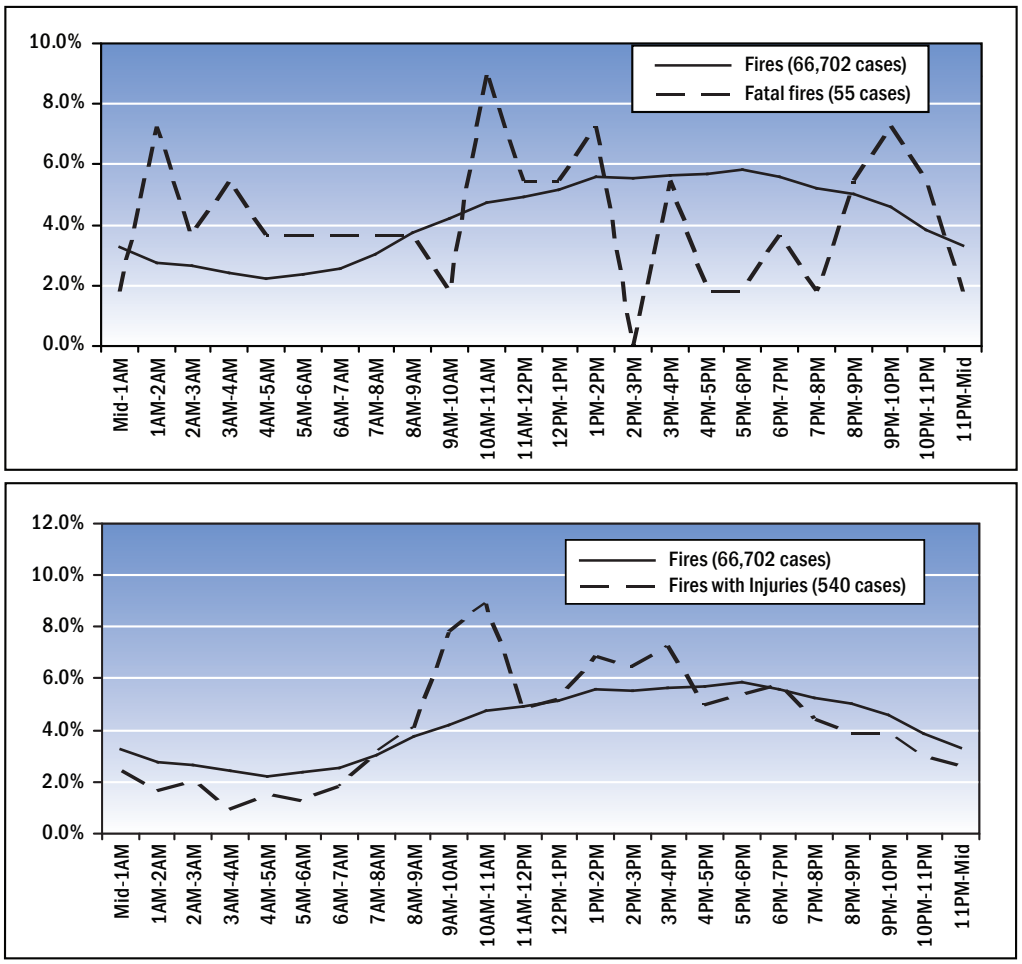


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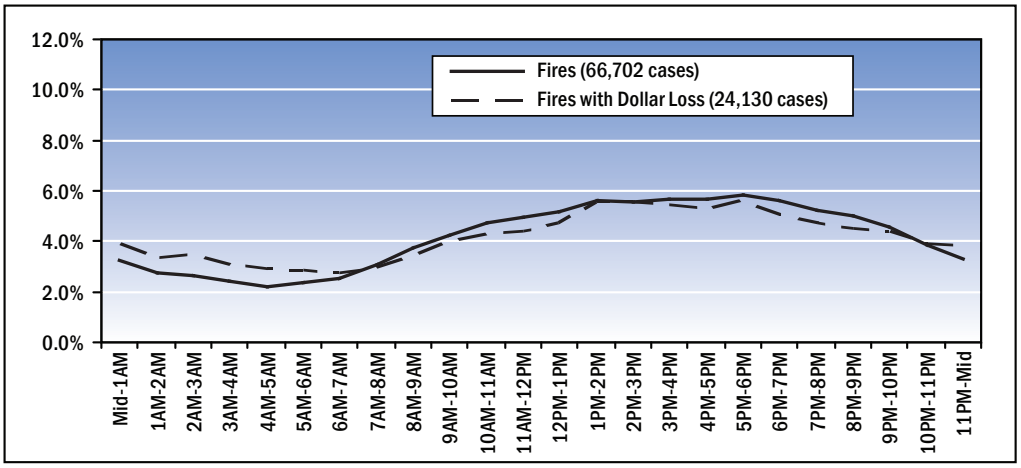
Figure 4. Time of Fire Alarm of Nonresidential Building Fires and Fires with Losses (2006) (cont'd.)



Source: 2006 NFIRS 5.0

Month of Year. Nonresidential building fires are the lowest in September and the highest in the month of March. Nonresidential building fatal fires are most frequent during winter months. Thirty-eight percent of all fatal fires occur in the cold months from January through March (Figure 5). Fires with injuries and fires with dollar loss follow the same general monthly pattern as fire incidence.

Figure 5. Month of Year of Nonresidential Building Fires and Fires with Losses (2006)

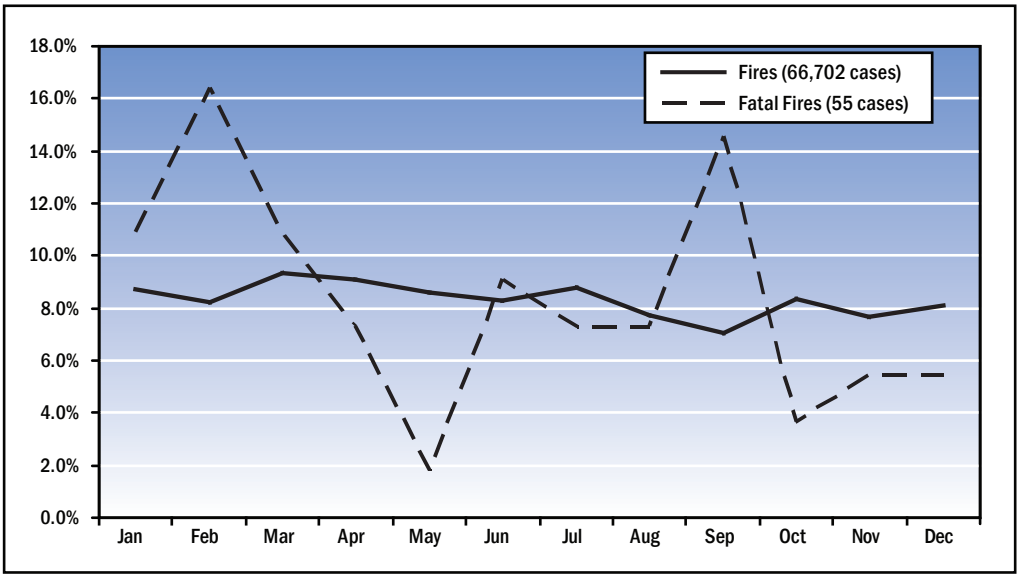


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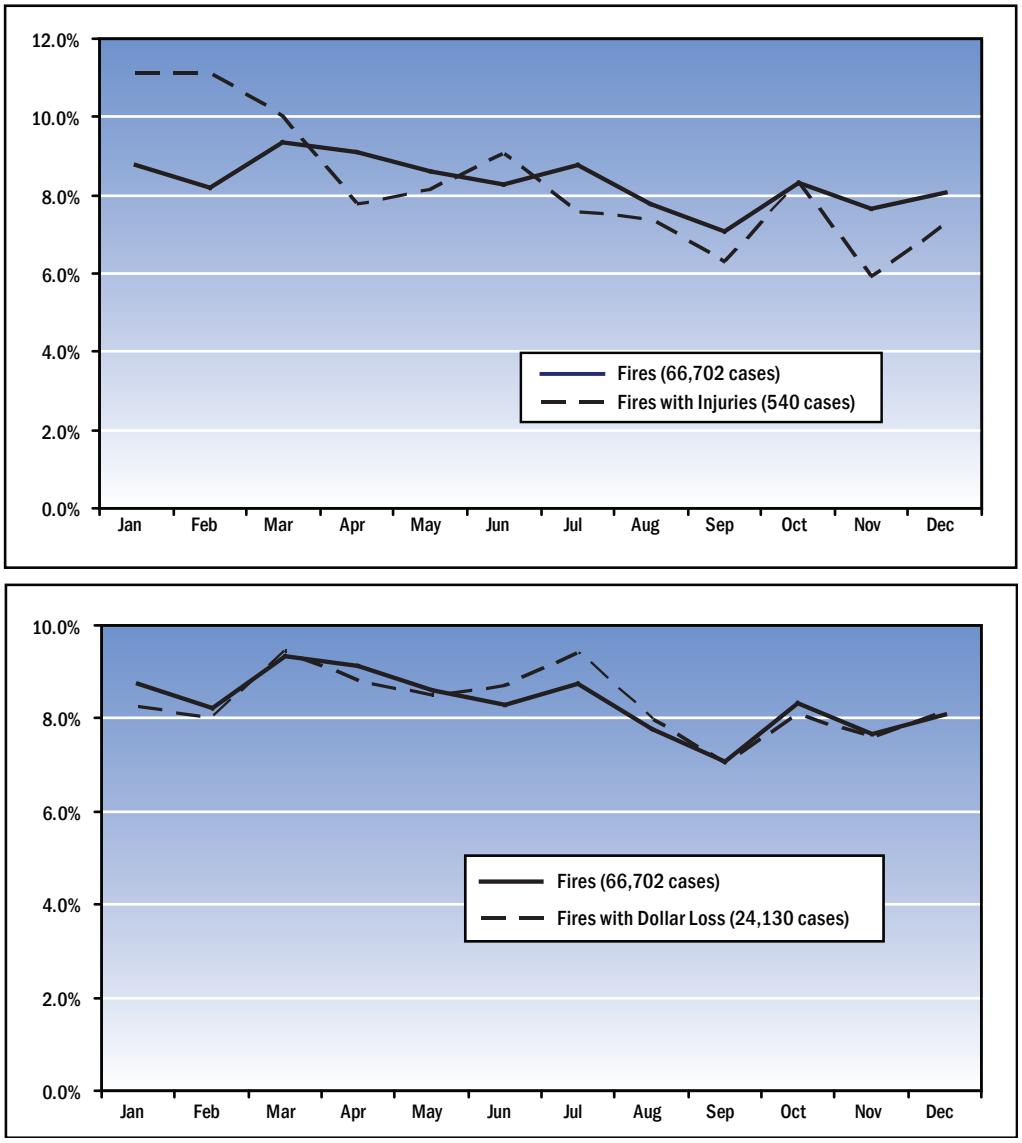
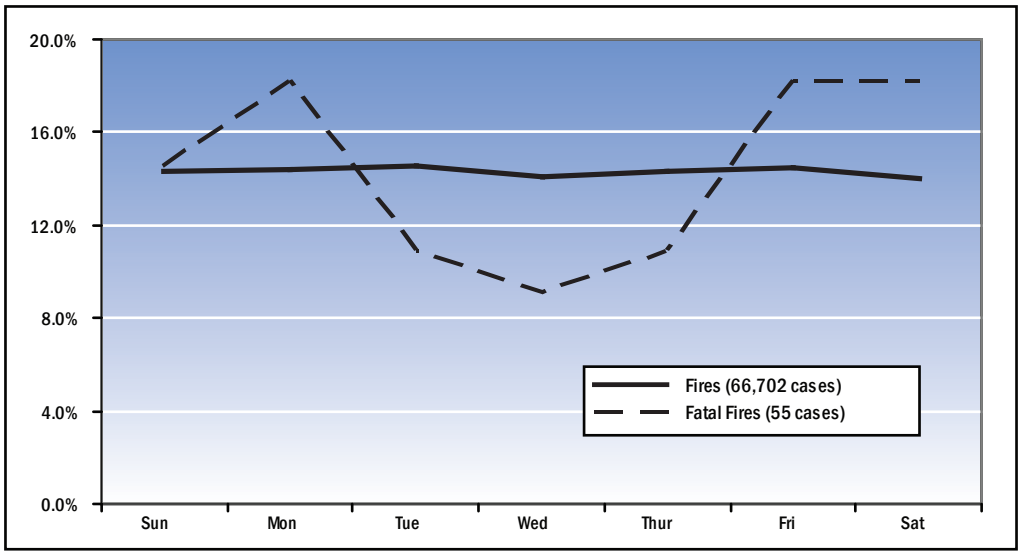
Figure 5. Month of Year of Nonresidential Building Fires and Fires with Losses (2006) (cont'd.)

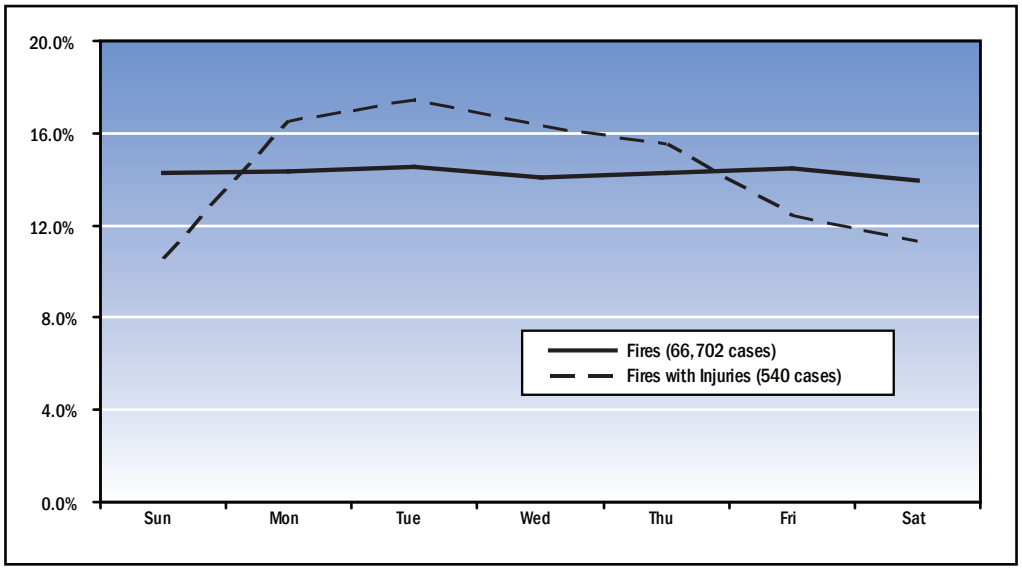


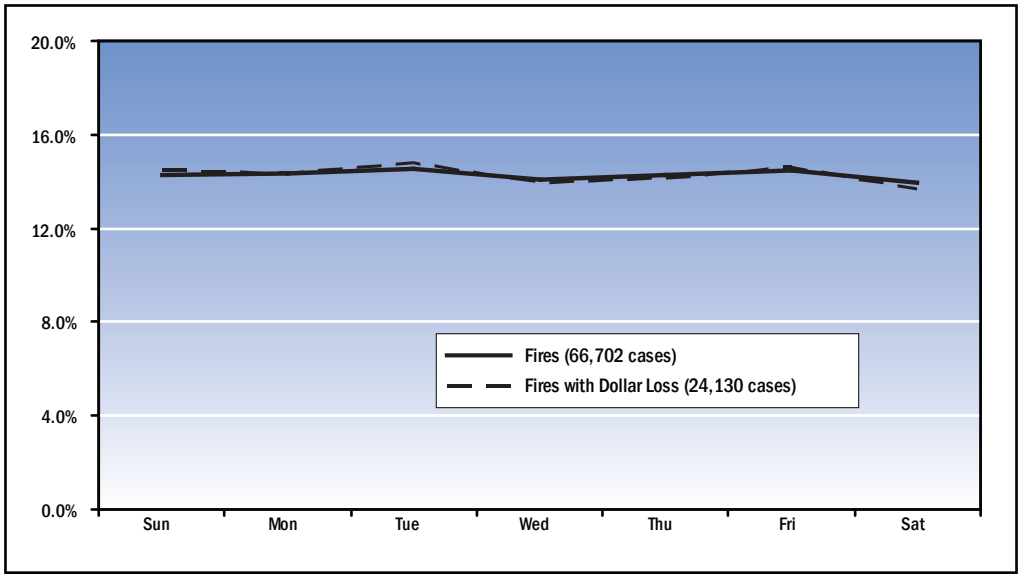
Source: 2006 NFIRS 5.0

Day of Week. Nonresidential building fires remain relatively constant throughout the week (Figure 6). Fatal fires are more variable during the week, increasing on Fridays, Saturdays, and Mondays. Fires with injuries, however, are higher during the work week and lower on Friday, Saturday, and Sunday. Fires with dollar loss are relatively constant throughout the week.

Figure 6. Day of Week of Nonresidential Building Fires and Fires with Losses (2006)







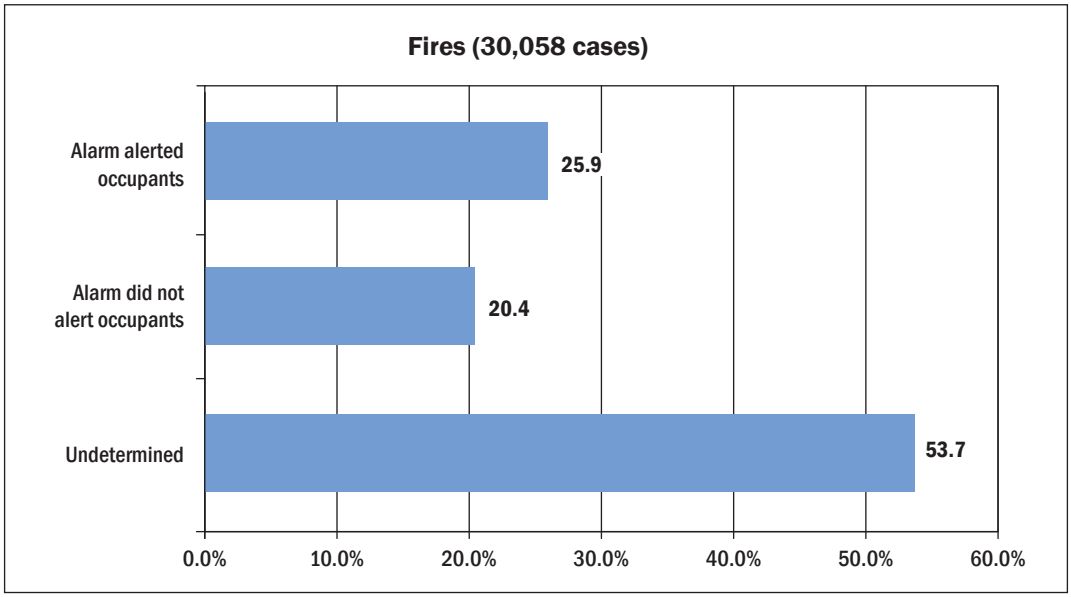
Source: 2006 NFIRS 5.0

Smoke Alarm Performance

The term smoke alarm encompasses a variety of devices intended to warn occupants of the presence of fire. Smoke alarms are thought to play a significant role in the decrease in reported fires and fire deaths. Their use began to increase in the mid 1970s and has continued to increase since then. Smoke alarm analyses only address fires overall; the analyses do not include fatal fires and fires with injuries due to small numbers and insufficient data.

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the occupants in 26 percent of confined nonresidential building fires—low-loss fires typically confined to the container of origin. Occupants were not alerted by a smoke alarm in 20 percent of these confined fires. In a large portion of nonresidential confined building fires, 54 percent, there is no information on the alert status and effectiveness of the smoke alarm (Figure 7).[21]

Figure 7. Smoke Alarm Alert Status in Confined Nonresidential Building Fires (2006)



Source: 2006 NFIRS 5.0

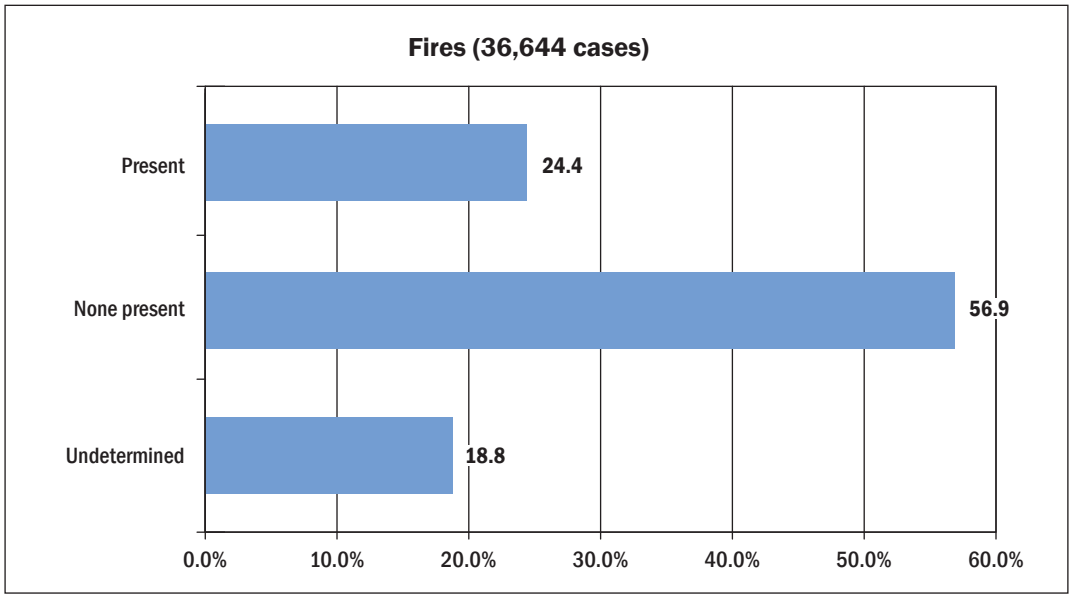
Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 1.

Smoke Alarm Effectiveness in Nonconfined Fires. To be effective, a working smoke alarm must alert the occupants. The first step is to determine if the alarm was present and whether or not it operated.

Smoke alarms were present in only 24 percent of nonconfined nonresidential building fires (Figure 8). Nonconfined fires are those fires that spread beyond the original object of origin—what is typically envisioned as a "fire." The presence or absence of alarms was not reported to NFIRS in 19 percent of nonconfined nonresidential building fires.

[21] While the number of "Undetermined" entries is high, this data item may be misleading. If the fire was very small and confined to the item of origin, the alarm may not have sounded. In this case, it is not clear how this data item would be filled in correctly. If the occupant was present at the time of the confined fire, there may have been no need for a smoke alarm to notify the occupants. Again, it is unclear what the coding would be and how the NFIRS instructions are interpreted.

Figure 8. Presence of Smoke Alarms in Nonconfined Nonresidential Building Fires (2006)

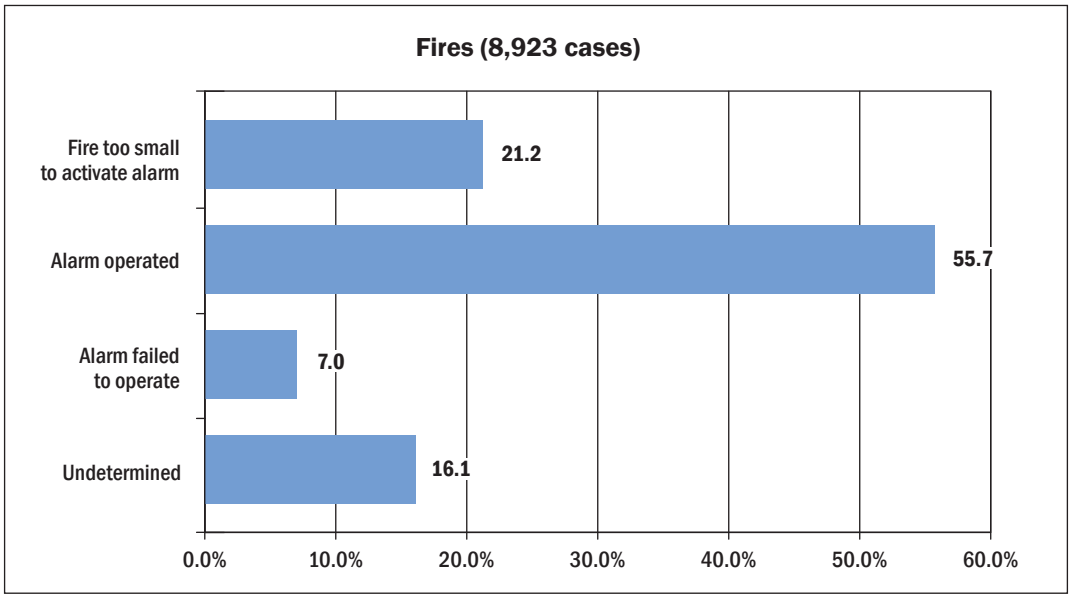


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 2.

When smoke alarms were present in nonconfined nonresidential building fires, the alarms operated in 56 percent of the incidents. In the remaining 44 percent of incidents, smoke alarms failed to operate (7 percent), the fire was too small to activate the system (21 percent), or no information on smoke alarm operation was available (16 percent) (Figure 9).[22]

Figure 9. Smoke Alarm Operation When Alarm was Present in Nonconfined Nonresidential Building Fires (2006)



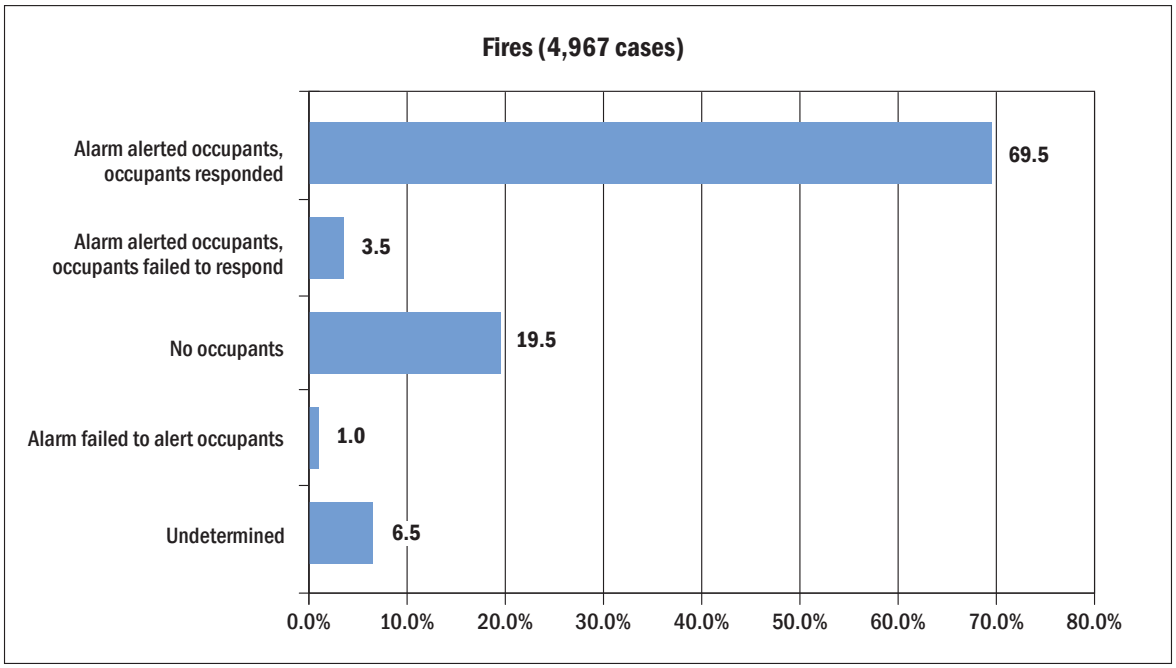
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 2.

[22] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 14 percent of all nonconfined nonresidential building fires (present 24.4% x operated 55.7% = 13.6%).

Figure 10 shows that in nearly three-quarters of the nonconfined nonresidential building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 70 percent of occupants were alerted and were able to respond to the warning, and an additional 4 percent were alerted but did not respond to the warning. Occupants were not alerted in 1 percent of nonconfined nonresidential building fires, and no occupants were in the building at the time of the fire in 20 percent of these incidents. Alarm alert effectiveness information was not available in 7 percent of nonconfined nonresidential building fires.[23]

Figure 10. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Nonresidential Building Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 2.

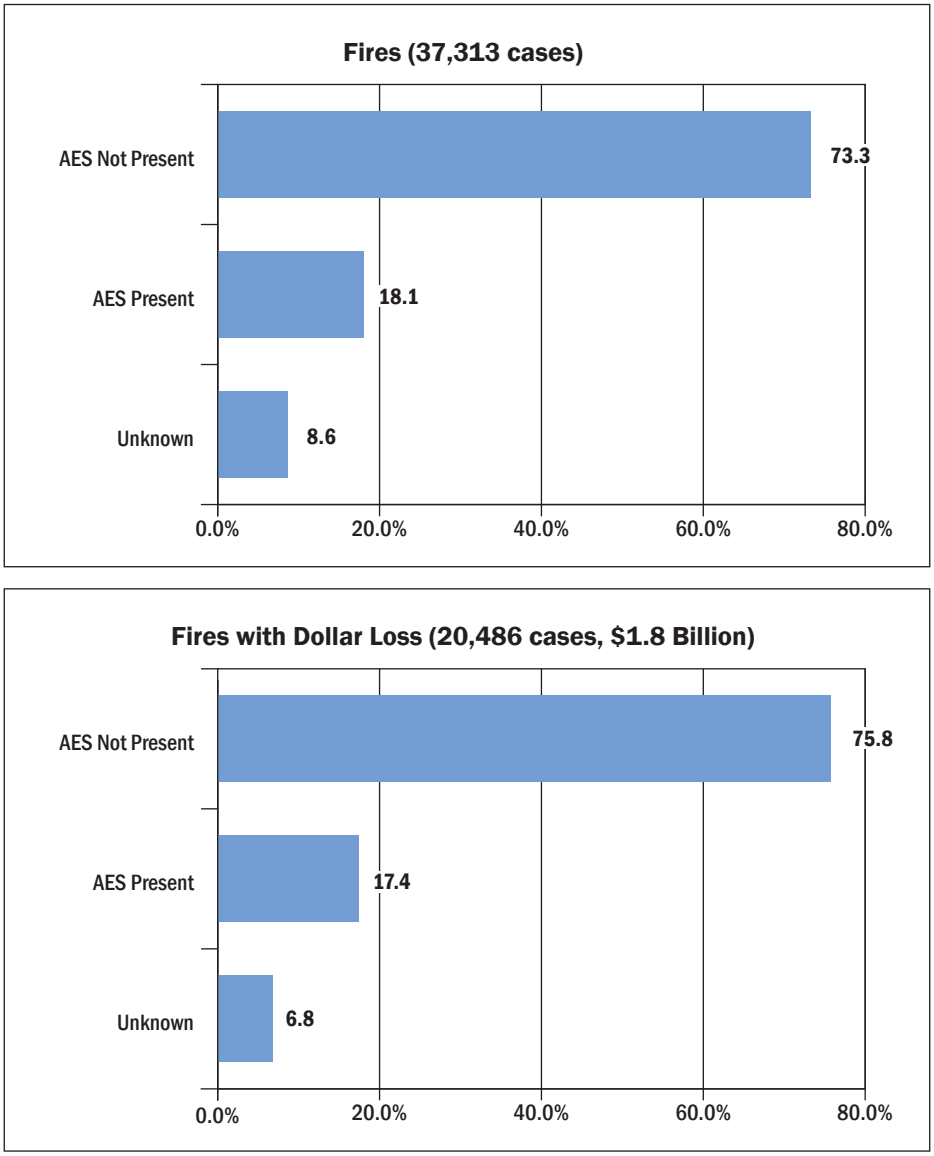
Widespread public awareness programs that focus on the proper maintenance of alarms are needed to ensure that they operate properly. A number of initiatives are focused directly on this problem. Messages are broadcast nationally when daylight savings time goes into effect, reminding the public to check and maintain their alarms. These initiatives have all helped, but there are still buildings without smoke alarms and buildings with non-working alarms that have reported fires.

[23] At a minimum, smoke alarms were effective at alerting occupants in 10 percent of all nonconfined nonresidential building fires (present 24.4% x operated 55.7% x alerted occupants 73.0% = 9.9%).

Presence Of Automatic Extinguishing Systems

Other protection types fall in the category of AESs. AESs encompass sprinkler, dry chemical, foam, halogen, and carbon dioxide systems. They are reported to be present in only 18 percent of nonresidential building fires nationally and 17 percent of nonresidential building fires with dollar loss (Figure 11). In buildings, sprinklers are widely thought to be the most effective type of system, not only alerting occupants of the presence of fire, but also helping to extinguish it. However, if a fire is extinguished by a sprinkler or other AES, it may never be reported to the fire service, and the statistics below may underrepresent the presence of AES.

Figure 11. Presence of Automatic Extinguishing Systems in Nonresidential Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES data are contained in Appendix Table 25.

NONRESIDENTIAL BUILDINGS BY PROPERTY TYPE

The 11 major nonresidential building categories in 2006 presented in the subsequent sections contain discussions on the resulting analyses. Because the numbers of deaths and injuries are small by subgroup, the discussion is limited to fires and fires with dollar loss for each nonresidential building subcategory. In addition, smoke alarm analyses only address fires overall; the analyses do not include fatal fires and fires with injuries due to small numbers and insufficient data. AES analyses address fires and fires with dollar loss. Again, the analyses do not include fatal fires and fires with injuries due to small numbers and insufficient data.

Assembly Buildings

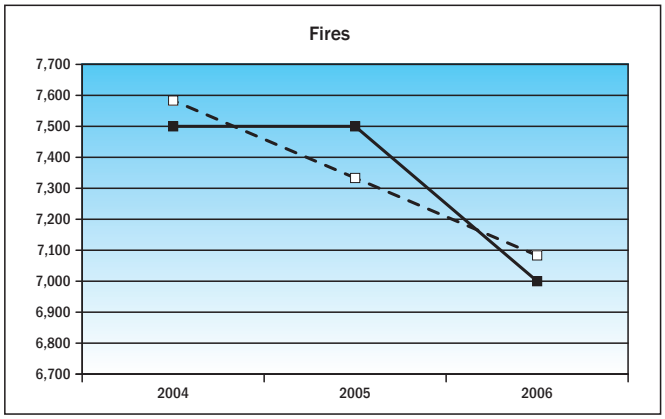
Nonresidential assembly buildings make up seven percent of the fire profile for nonresidential buildings. Assembly buildings are places where people gather such as fixed-use recreational facilities, ballrooms, and gymnasiums but do not include eating and drinking establishments.[24] Eating and drinking establishments are analyzed separately.

Trends

Trends for nonresidential assembly building fires and property loss declined during the 3-year period (2004 through 2006) by 7 and 18 percent respectively (Figure 12). Fires decreased from 7,500 in 2004 to 7,000 in 2006. Dollar loss decreased overall from $175 million in 2004 to $141 million in 2006.

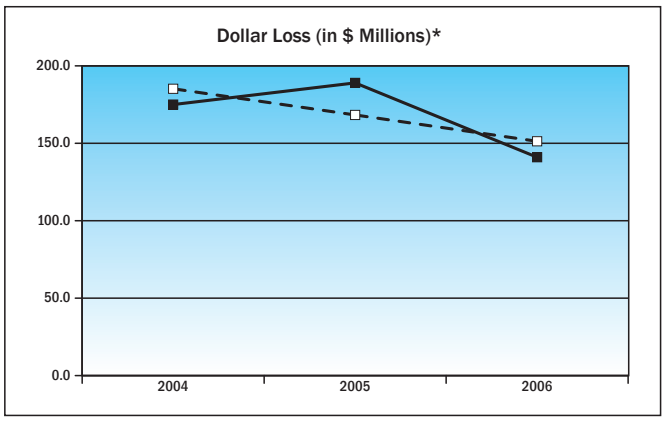
[24] An assembly building includes: bowling establishment; billiard center, pool hall; electronic amusement center; ice rink, roller rink; swimming facility; fixed-use recreation place; ballroom, gymnasium; convention center, exhibit hall; stadium, arena; playground, amusement center, indoor and outdoor; church, mosque; funeral parlor; places of worship, other; athletic and health clubs; clubhouses associated with country clubs; yacht clubs; casinos; other clubs; library; museum; memorial structures; courthouses; public or government buildings, other; airport; bus stations; rapid transit stations; passenger terminal, other; live performance theater; auditorium, concert hall; movie theater; radio, television studio; film movie/production studio; studio, theater, other; and other assembly building.

Figure 12. Trends in Assembly Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	7,500
2005	7,500
2006	7,000
3-Year Trend (%)	**-6.6**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

Year	Value
2004	$175
2005	$189
2006	$141
3-Year Trend (%)	**-18.3**

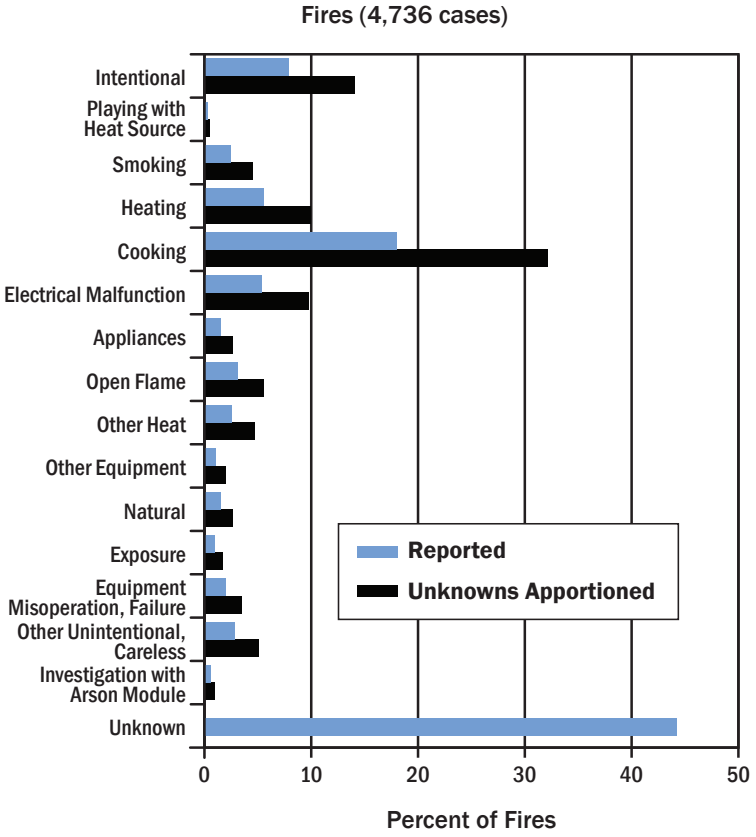
Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

Causes

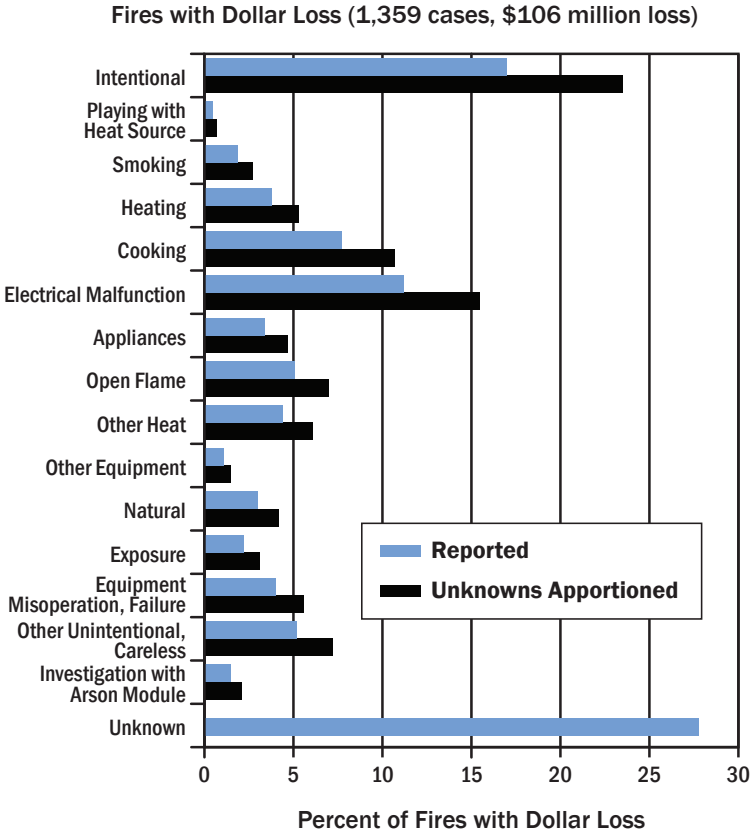
Thirty-two percent of all fires in nonresidential assembly buildings are caused by cooking incidents (Figure 13). The most common cooking fires result from unattended equipment, abandoned or discarded materials, and the heat source too close to combustibles when food (most often grease or cooking oils) catches fire. The fact that cooking is the leading cause of fires in nonresidential assembly buildings may surprise some. While these properties are not solely focused on the serving and preparation of food as are eating and drinking establishments, they nonetheless do provide food and drink. Cooking fires may be the unintended consequence of this service.

Intentionally set fires (14 percent), heating fires (10 percent), and electrical malfunction fires (10 percent) are the next leading causes of fires. The three leading causes for fires with dollar loss in assembly buildings are intentionally set (24 percent), electrical malfunctions (16 percent), and cooking (11 percent).

Figure 13. Fire Cause for Assembly Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	7.9	14.1
Playing with Heat Source	0.3	0.5
Smoking	2.5	4.5
Heating	5.6	10.0
Cooking	18.0	32.2
Electrical Malfunction	5.4	9.8
Appliances	1.5	2.7
Open Flame	3.1	5.6
Other Heat	2.6	4.7
Other Equipment	1.1	2.0
Natural	1.5	2.7
Exposure	1.0	1.7
Equipment Misoperation, Failure	2.0	3.5
Other Unintentional, Careless	2.9	5.1
Investigation w/Arson Module	0.6	1.0
Unknown	44.2	



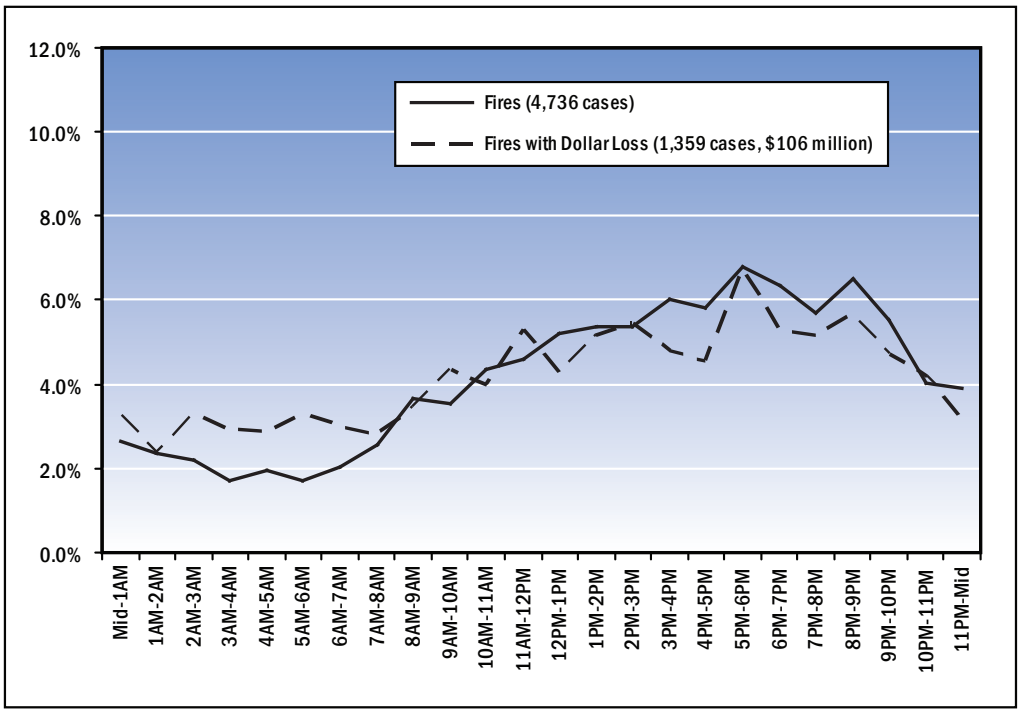
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	17.0	23.5
Playing with Heat Source	0.5	0.7
Smoking	1.9	2.7
Heating	3.8	5.3
Cooking	7.7	10.7
Electrical Malfunction	11.2	15.5
Appliances	3.4	4.7
Open Flame	5.1	7.0
Other Heat	4.4	6.1
Other Equipment	1.1	1.5
Natural	3.0	4.2
Exposure	2.2	3.1
Equipment Misoperation, Failure	4.0	5.6
Other Unintentional, Careless	5.2	7.2
Investigation w/Arson Module	1.5	2.1
Unknown	27.8	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in assembly buildings are highest between 5 p.m. and 6 p.m. (Figure 14). Fires with dollar loss reported are slightly higher than the incidence of fires after midnight until noon, where losses then remain slightly lower than the incidence of fires.

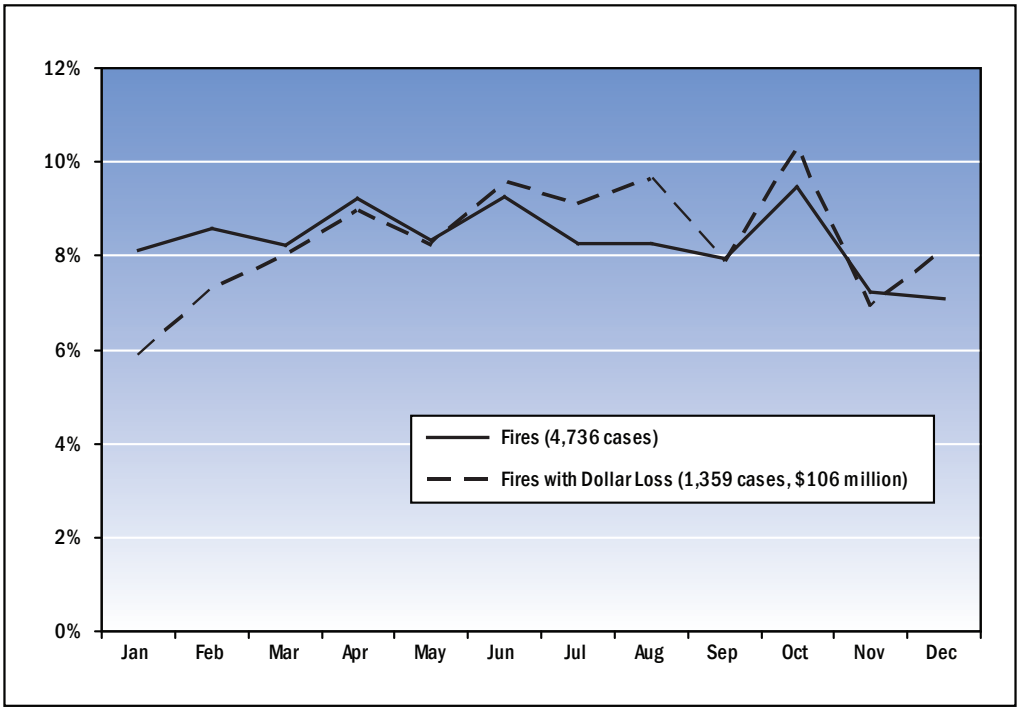
Figure 14. Time of Fire Alarm for Assembly Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. Fires in assembly buildings are constant throughout the year (Figure 15). Fires are highest in the month of October and lowest in December. Dollar loss is relatively consistent with the fire trend with a slight deviation in January when the dollar loss is below the fire average and then above the fire average between the months of June and October and then again in December.

Figure 15. Month of Year of Assembly Building Fires and Fires with Dollar Loss (2006)

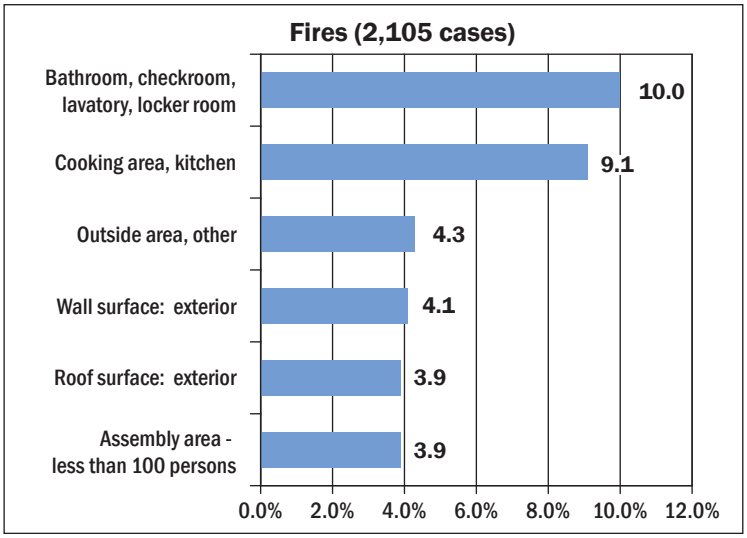


Source: 2006 NFIRS 5.0

Area of Fire Origin

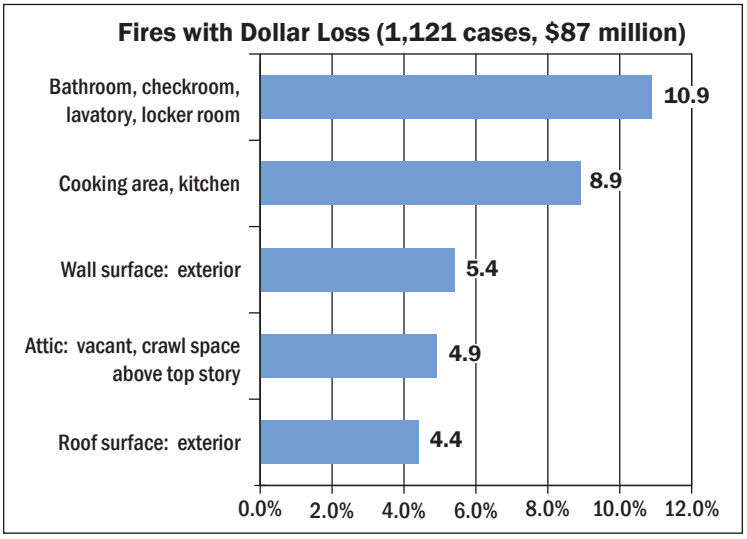
To help explain the fire problem, it is useful to describe it in terms of where different types of fires occur in the building. Figure 16 shows the leading areas where fires and fires with reported dollar loss originated in assembly buildings in 2006. Bathrooms in assembly buildings, cooking areas, and outside areas total 23 percent of assembly building fires. Leading areas of fire origin in nonresidential building fires with dollar loss occur in bathrooms (11 percent), cooking areas (9 percent), exterior wall surfaces (5 percent), attics (5 percent), and exterior roof surfaces (4 percent).

Figure 16. Leading Areas of Fire Origin in Assembly Building Fires and Fires with Dollar Loss (2006)



Source: NFIRS 5.0
4,736 total incidents
162 undetermined entries
2,469 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



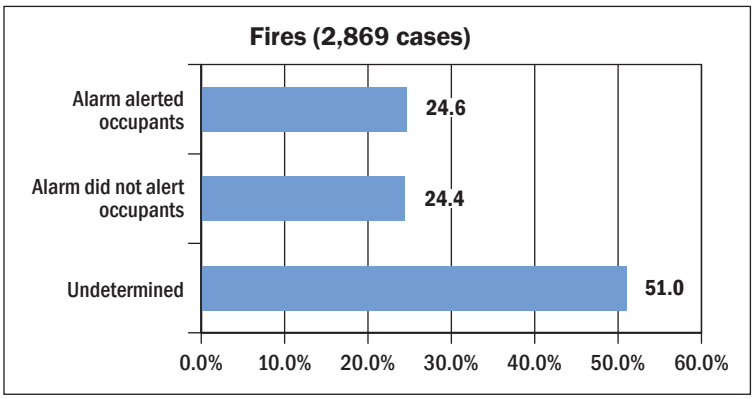
Source: NFIRS 5.0
1,359 total incidents
69 undetermined entries
169 entries with no data (rubbish fires)

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 25 percent of small, low-loss confined assembly building fires. Occupants were not alerted by a smoke alarm in 24 percent of these confined fires. In a large portion of confined assembly building fires (51 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 17).

Figure 17. Smoke Alarm Alert Status in Confined Assembly Building Fires (2006)

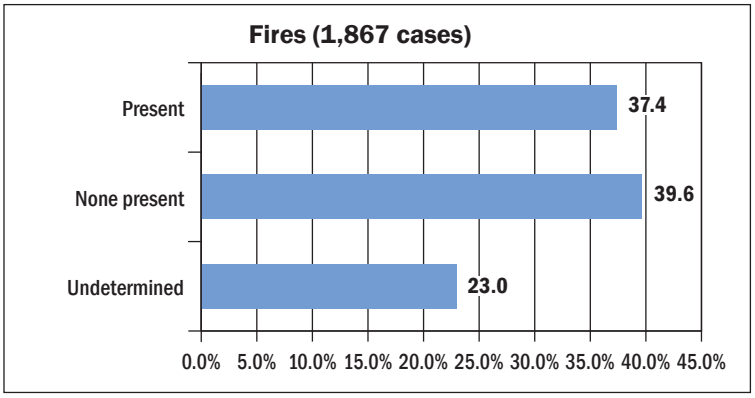


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 3.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 18, smoke alarms were present in 37 percent of nonconfined assembly building fires. Smoke alarms in nonconfined assembly building fires were not present 40 percent of the time. The presence or absence of alarms was not reported to NFIRS in 23 percent of nonconfined assembly building fires.

Figure 18. Presence of Smoke Alarms in Nonconfined Assembly Building Fires (2006)

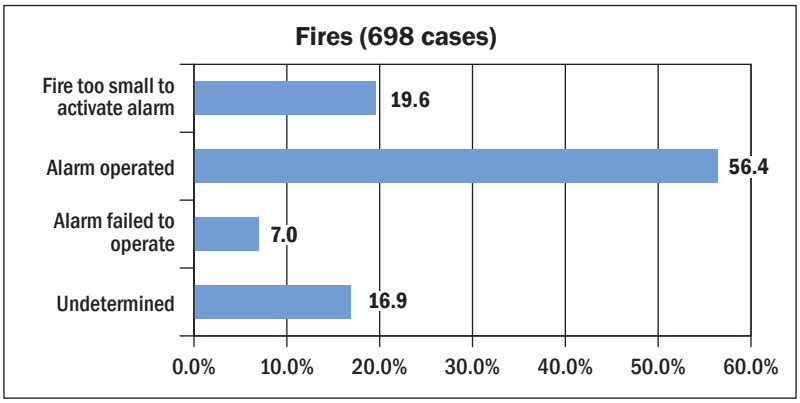


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 4.

When smoke alarms were present in nonconfined assembly building fires, the alarms operated in 56 percent of the incidents. In the remaining 44 percent of incidents, smoke alarms failed to operate (7 percent), the fire was too small to activate the system (20 percent), or no information on smoke alarm operation was available (17 percent) (Figure 19). [25]

Figure 19. Smoke Alarm Operation When Alarm was Present in Nonconfined Assembly Building Fires (2006)

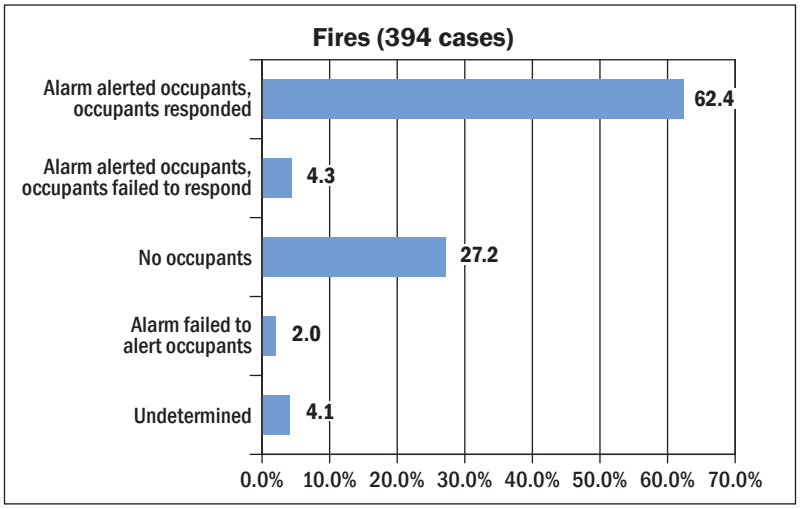


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 4.

The effectiveness of working smoke alarms in nonconfined assembly building fires is shown in Figure 20. In two-thirds of nonconfined assembly building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 62 percent of occupants were alerted and were able to respond to the warning, and an additional 4 percent were alerted but did not respond to the warning. Occupants were not alerted in 2 percent of nonconfined assembly fires, and no occupants were in the building at the time of the fire in 27 percent of these incidents. Alarm alert effectiveness information was not available in 4 percent of nonconfined assembly building fires.[26]

Figure 20. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Assembly Building Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 4.

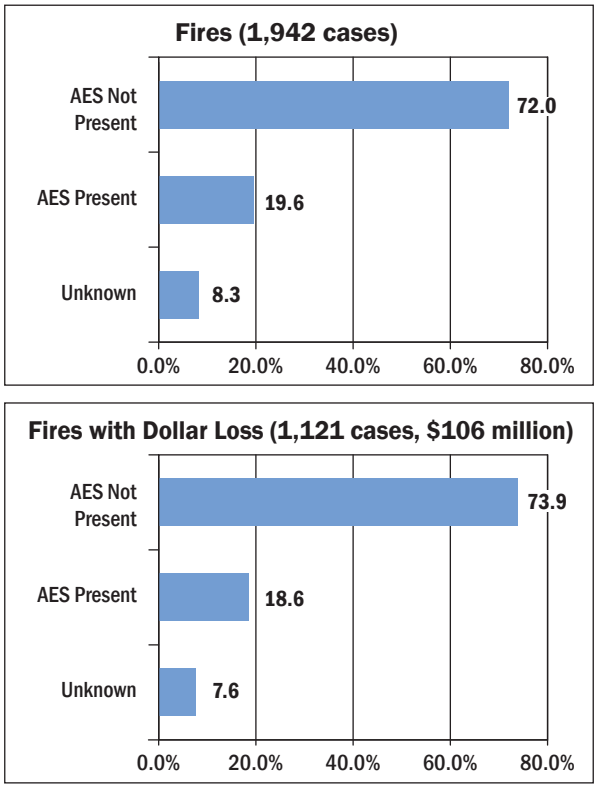
[25] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 21 percent of all nonconfined assembly building fires (present 37.4% x operated 56.4% = 21.1%).

[26] At a minimum, smoke alarms were effective at alerting occupants in 14 percent of all nonconfined assembly building fires (present 37.4% x operated 56.4% x alerted occupants 66.8% = 14.1%).

Automatic Extinguishing Systems

AESs were present in 20 percent of assembly building fires in 2006 (Figure 21). The AESs were not present in 72 percent of the incidents. In 8 percent of incidents, no information on AESs was available. The overall pattern for AES presence in assembly building fires with dollar loss was similar to that of fires. In 19 percent of nonresidential assembly building fires with dollar loss, AESs were present. In 74 percent of fires with loss, AESs were not present, and no information on AESs was available in 8 percent of incidents.

Figure 21. Presence of Automatic Extinguishing Systems in Assembly Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 26.

Eating and Drinking Establishments

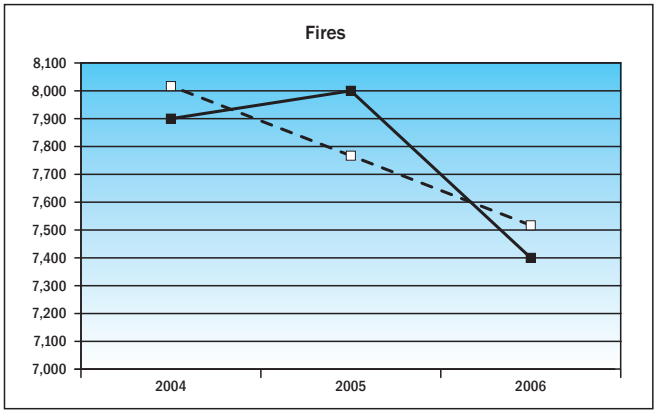
In 2006, eating and drinking establishments made up eight percent of the fire profile for nonresidential buildings. These establishments include places specializing in on-premise consumption of food, including carryout and drive-through restaurants.[27]

[27] Eating and drinking establishments include restaurants, cafeterias, bars, nightclubs, saloons, taverns, pubs, and other eating and drinking places.

Trends

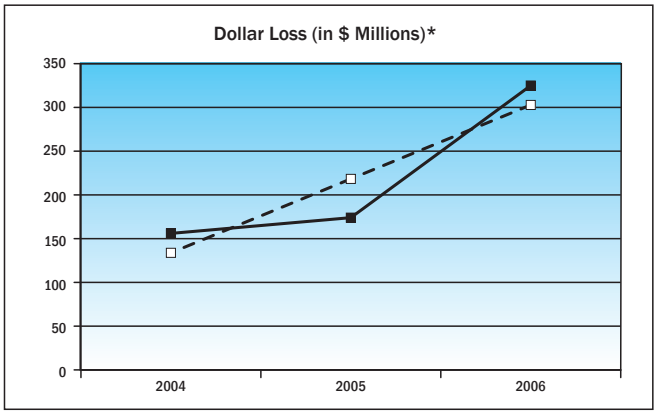
During the 3-year period (2004 through 2006), trends for fires in eating and drinking establishments declined by 6 percent. Fires declined from 7,900 in 2004 to 7,400 in 2006. The trend in property loss increased by 126 percent (Figure 22). Dollar loss increased from $156 million in 2004 to $325 million in 2006.

Figure 22. Trends in Eating and Drinking Establishment Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	7,900
2005	8,000
2006	7,400
3-Year Trend (%)	**-6.2**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

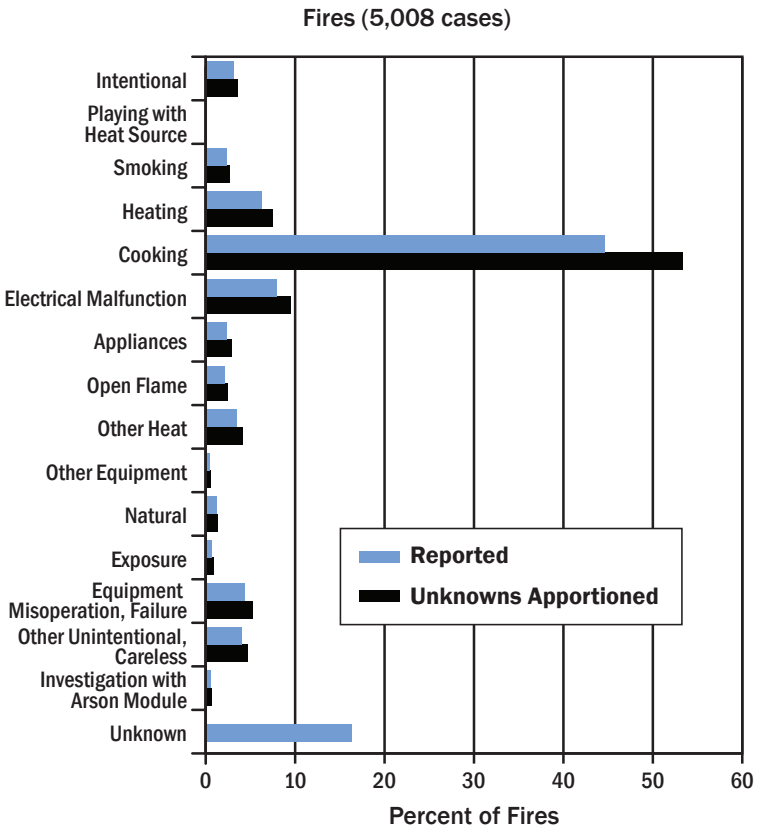
Year	Value
2004	$156
2005	$174
2006	$325
3-Year Trend (%)	**126.3**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

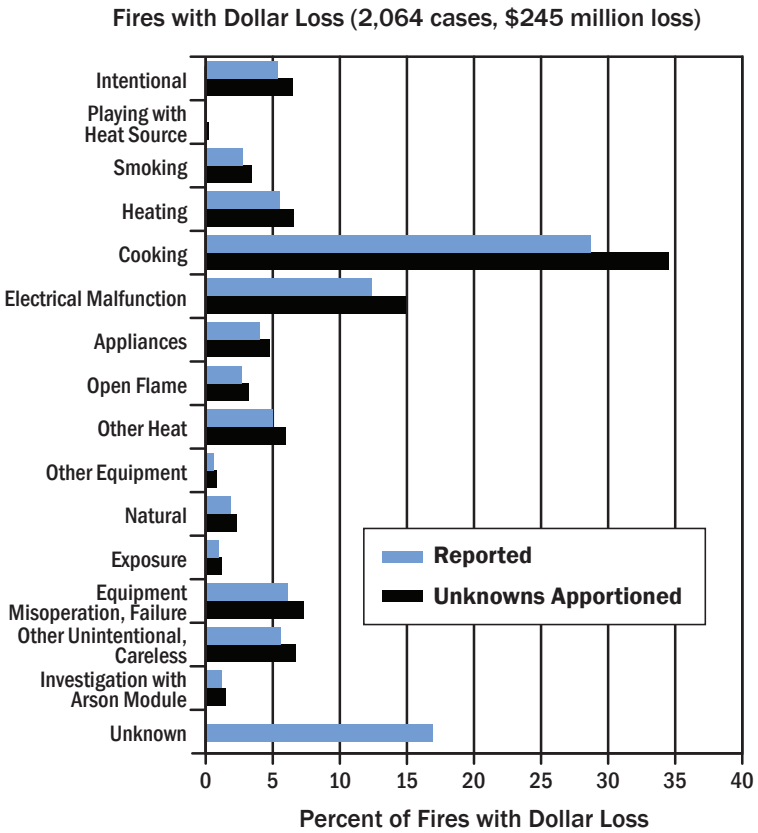
Causes

Not surprisingly, 53 percent of all fires in nonresidential eating and drinking establishments are caused by cooking (Figure 23). The next leading causes are electrical malfunctions (10 percent) and heating (8 percent). The leading causes of eating and drinking establishment fires with dollar loss are cooking fires (35 percent) and electrical malfunctions (15 percent).

Figure 23. Fire Cause for Eating and Drinking Establishment Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	3.1	3.6
Playing with Heat Source	0.1	0.1
Smoking	2.3	2.7
Heating	6.3	7.5
Cooking	44.6	53.3
Electrical Malfunction	7.9	9.5
Appliances	2.4	2.9
Open Flame	2.1	2.5
Other Heat	3.5	4.1
Other Equipment	0.5	0.6
Natural	1.2	1.4
Exposure	0.7	0.9
Equipment Misoperation, Failure	4.4	5.3
Other Unintentional, Careless	4.0	4.7
Investigation w/Arson Module	0.6	0.7
Unknown	16.3	



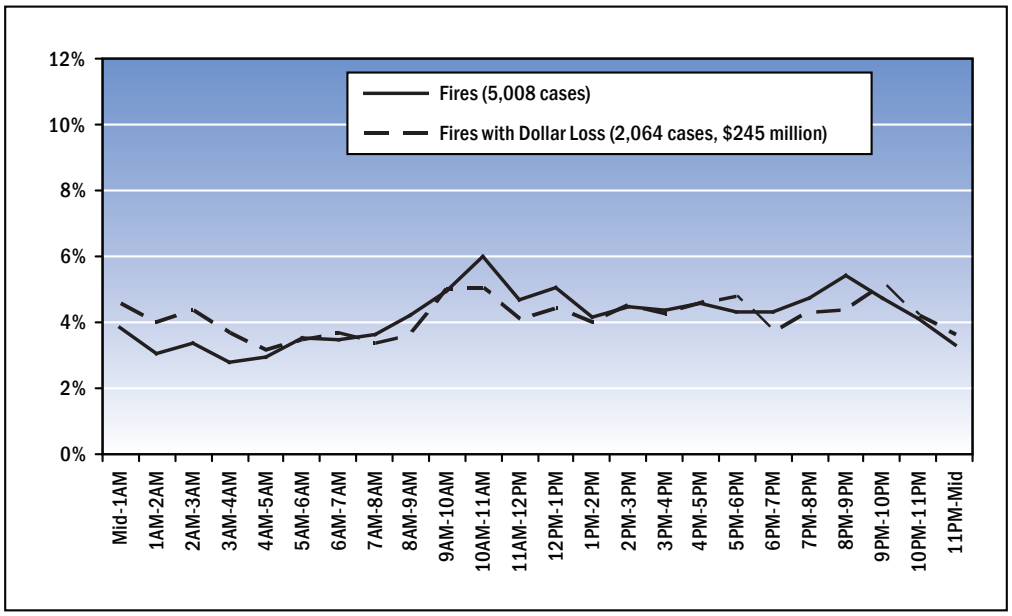
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	5.4	6.5
Playing with Heat Source	0.1	0.2
Smoking	2.8	3.4
Heating	5.5	6.6
Cooking	28.7	34.5
Electrical Malfunction	12.4	14.9
Appliances	4.0	4.8
Open Flame	2.7	3.2
Other Heat	5.0	6.0
Other Equipment	0.6	0.8
Natural	1.9	2.3
Exposure	1.0	1.2
Equipment Misoperation, Failure	6.1	7.3
Other Unintentional, Careless	5.6	6.7
Investigation w/Arson Module	1.2	1.5
Unknown	16.9	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in eating and drinking establishments are highest between 10 a.m. and 11 a.m. and lowest between 3 a.m. and 5 a.m. (Figure 24). Fires with dollar loss reported are slightly higher than the incidence of fires after midnight until 7 a.m., when fires with losses remain lower than the incidence of fires until the evening hours.

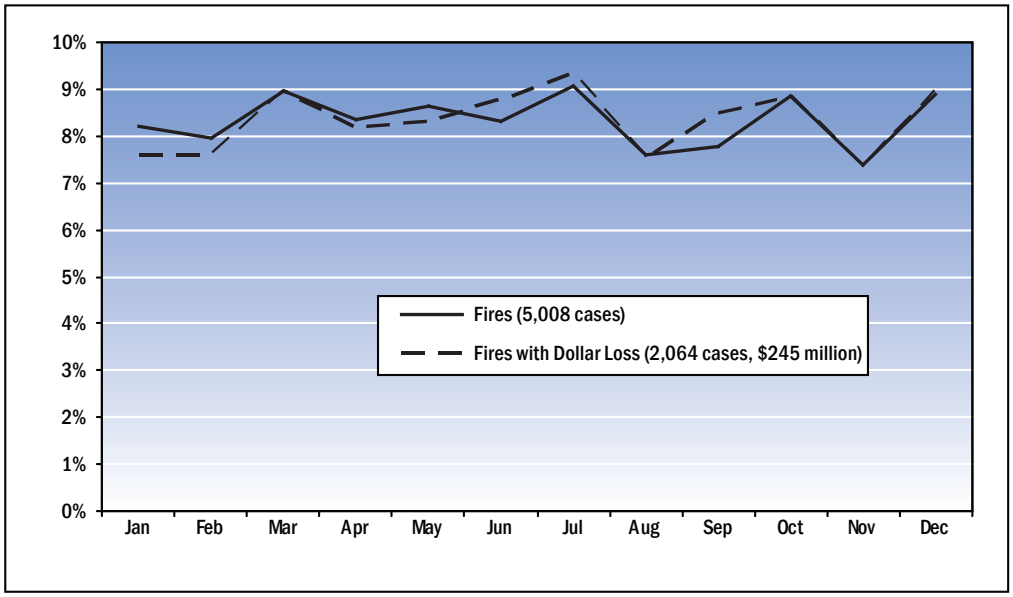
Figure 24. Time of Fire Alarm for Eating and Drinking Establishment Fires (2006)



Source: 2006 NFIRS 5.0

Month of Year. Fires and fires with dollar loss in nonresidential eating and drinking establishments are highest in the month of July and lowest in November (Figure 25).

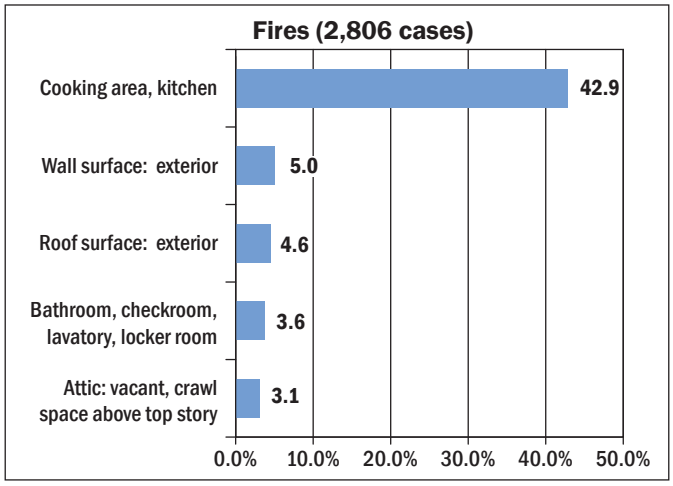
Figure 25. Month of Year of Eating and Drinking Establishment Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

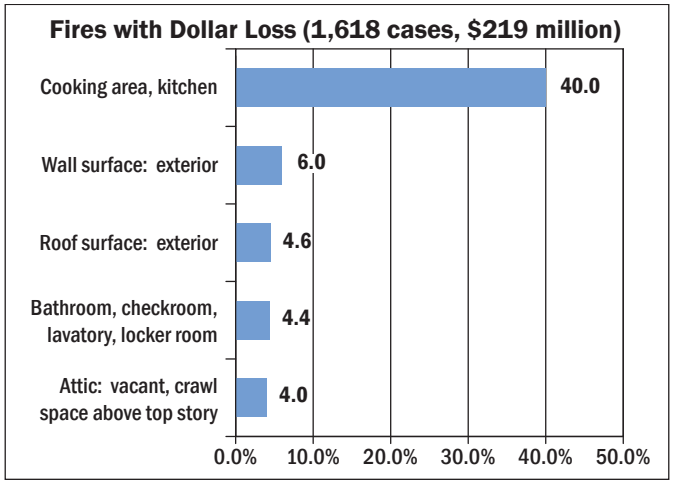
Area of Fire Origin. Figure 26 shows the leading areas where fires and fires with reported dollar loss originated in eating and drinking establishments in 2006. The top three areas of fire origin for fires are cooking areas (43 percent), exterior wall surfaces (5 percent), and exterior roof surfaces (5 percent). In eating and drinking establishment fires where dollar loss is reported, the leading areas of fire origin are the same as those for all reported fires in eating and drinking establishments. Forty percent of fires with dollar loss in eating and drinking establishments occur in cooking areas, 6 percent occur on exterior wall surfaces, and 5 percent occur on exterior roof surfaces.

Figure 26. Leading Areas of Fire Origin in Eating and Drinking Establishment Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
5,008 total incidents
127 undetermined entries
2,075 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



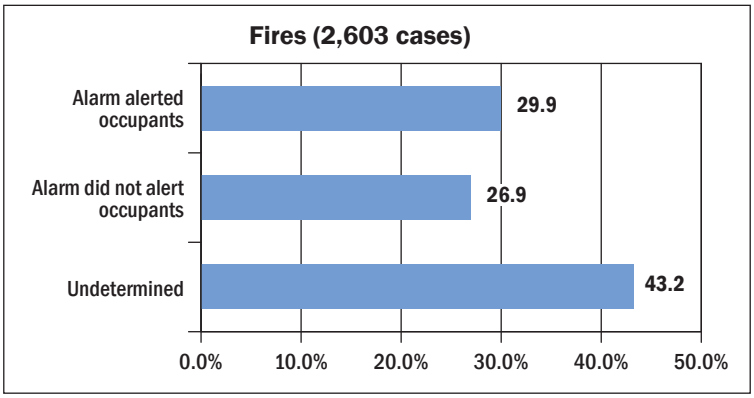
Source: NFIRS 5.0
2,064 total incidents
67 undetermined entries
379 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the occupants in 30 percent of small, low-loss confined eating and drinking establishment fires. Occupants were not alerted by a smoke alarm in 27 percent of these confined fires. In a large portion of confined eating and drinking establishment fires (43 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 27).

Figure 27. Smoke Alarm Alert Status in Confined Eating and Drinking Establishment Fires (2006)

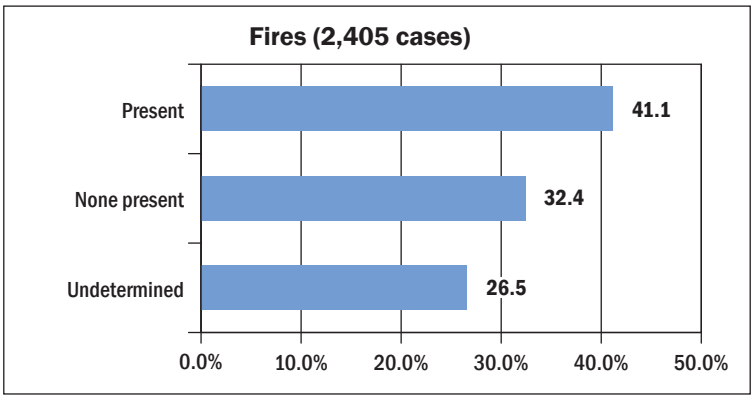


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 5.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 28, smoke alarms were present in 41 percent of nonconfined eating and drinking establishment fires. Smoke alarms were not present in 32 percent of nonconfined fires in eating and drinking establishments. The presence or absence of alarms was not reported to NFIRS in 27 percent of nonconfined eating and drinking establishment fires.

Figure 28. Presence of Smoke Alarms in Nonconfined Eating and Drinking Establishment Fires (2006)

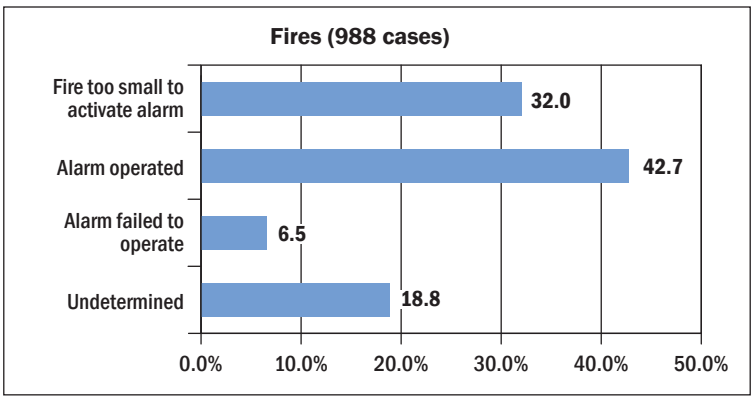


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 6.

When smoke alarms were present in nonconfined eating and drinking establishment fires, the alarms operated in 43 percent of the incidents. In the remaining 57 percent of incidents, smoke alarms failed to operate (7 percent), the fire was too small to activate the system (32 percent), or no information on smoke alarm operation was available (19 percent) (Figure 29). [28]

Figure 29. Smoke Alarm Operation When Alarm was Present in Nonconfined Eating and Drinking Establishment Fires (2006)

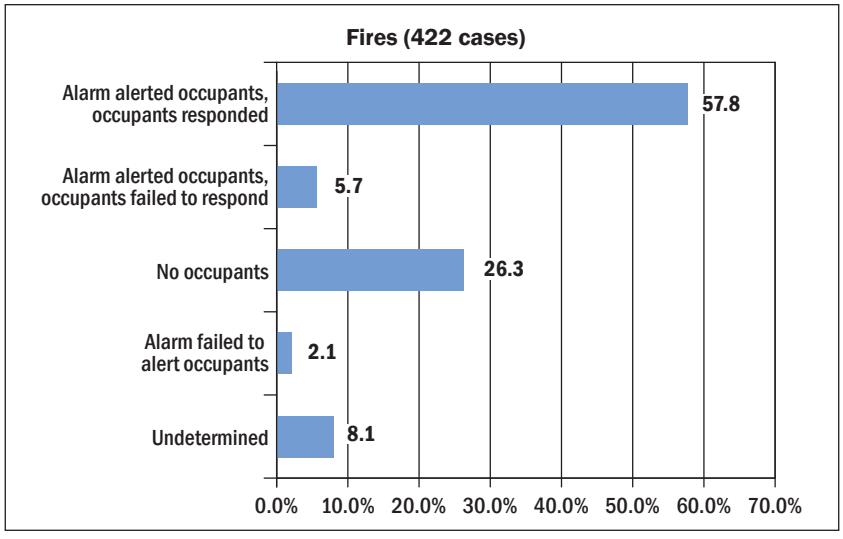


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 6.

The effectiveness of working smoke alarms in nonconfined eating and drinking establishment fires is shown in Figure 30. In approximately two-thirds of nonconfined eating and drinking establishment fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 58 percent of occupants were alerted and were able to respond to the warning, and an additional 6 percent were alerted but did not respond to the warning. Occupants were not alerted in 2 percent of nonconfined eating and drinking establishment fires, and no occupants were in the establishment at the time of the fire in 26 percent of these incidents. Alarm alert effectiveness information was not available in 8 percent of nonconfined eating and drinking establishment fires.[29]

Figure 30. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Eating and Drinking Establishment Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 6.

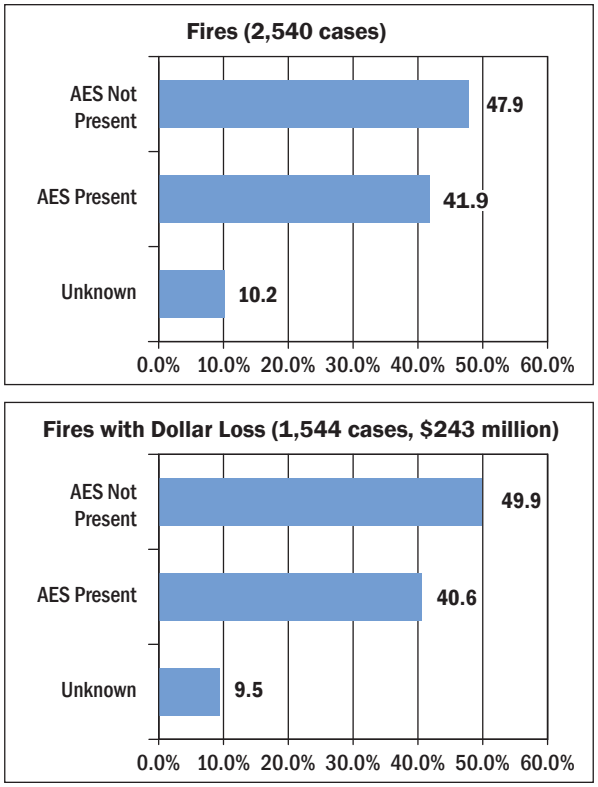
[28] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 18 percent of all nonconfined eating and drinking establishment fires (present 41.1% x operated 42.7% = 17.5%).

[29] At a minimum, smoke alarms were effective at alerting occupants in 11 percent of all nonconfined eating and drinking establishment fires (present 41.1% x operated 42.7% x alerted occupants 63.5% = 11.1%).

Automatic Extinguishing Systems

AESs were present in 42 percent of fires in eating and drinking establishments in 2006 (Figure 31). AESs were not present in 48 percent of the incidents, and in 10 percent of incidents, no information on AESs was available. In 41 percent of fires with dollar loss, AESs were present. There were no AESs present in 50 percent of fires with dollar loss, and no information on AESs was available in 10 percent of incidents.

Figure 31. Presence of Automatic Extinguishing Systems in Eating and Drinking Establishment Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 27.

Educational Buildings

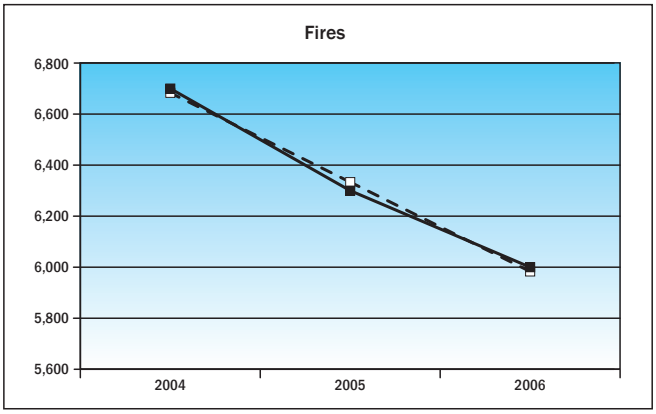
Educational buildings make up six percent of the fire profile for nonresidential buildings. Educational buildings include schools for children and adults such as daycare, preschool, elementary, middle, high school, college and adult education centers.[30]

[30] Educational buildings include schools, non-adult, other; preschool, not in the same facility with other grades (includes nursery schools), excludes kindergartens and day care facilities; elementary school, includes kindergarten; High school, junior high, middle school; adult education center, college classroom. Includes any building containing adult education classrooms. The building may include other uses incidental to teaching; day care in commercial property; day care in residence, licensed; day care in residence, unlicensed; and educational, other.

Trends

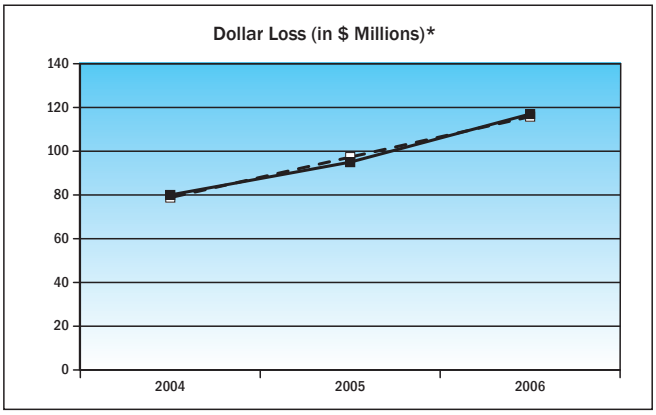
During the 3-year period (2004 through 2006), the trend in educational building fires declined by 11 percent. Fires declined from 6,700 in 2004 to 6,000 in 2006. The trend in dollar loss resulting from these fires increased by 47 percent over this same period. Dollar loss increased from $80 million in 2004 to $117 million in 2006 (Figure 32).

Figure 32. Trends in Educational Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	6,700
2005	6,300
2006	6,000
3-Year Trend (%)	**-10.5**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

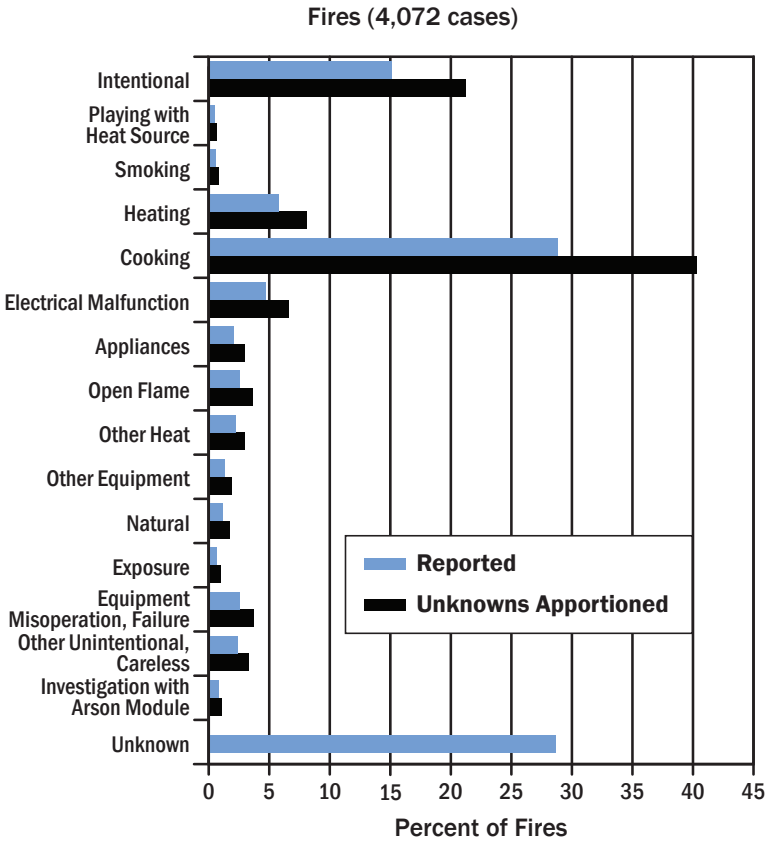
Year	Value
2004	$80
2005	$95
2006	$117
3-Year Trend (%)	**46.9**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

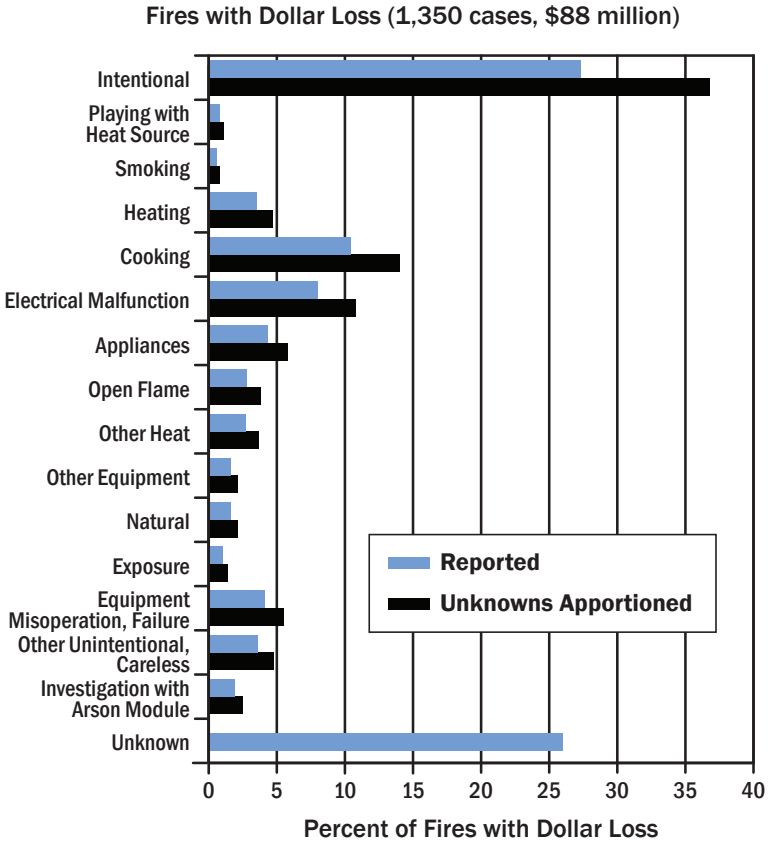
Causes

Forty percent of all fires in educational buildings are caused by cooking (Figure 33). Intentionally set (21 percent) and heating (8 percent) are the next leading causes of fires. Educational building fires with dollar loss are primarily caused by intentionally set fires (37 percent), cooking (14 percent), and electrical malfunctions (11 percent).

Figure 33. Fire Cause for Educational Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	15.1	21.2
Playing with Heat Source	0.5	0.7
Smoking	0.6	0.8
Heating	5.8	8.1
Cooking	28.8	40.3
Electrical Malfunction	4.7	6.6
Appliances	2.1	3.0
Open Flame	2.6	3.6
Other Heat	2.2	3.0
Other Equipment	1.3	1.9
Natural	1.2	1.7
Exposure	0.7	1.0
Equipment Misoperation, Failure	2.6	3.7
Other Unintentional, Careless	2.4	3.3
Investigation w/Arson Module	0.8	1.1
Unknown	28.7	



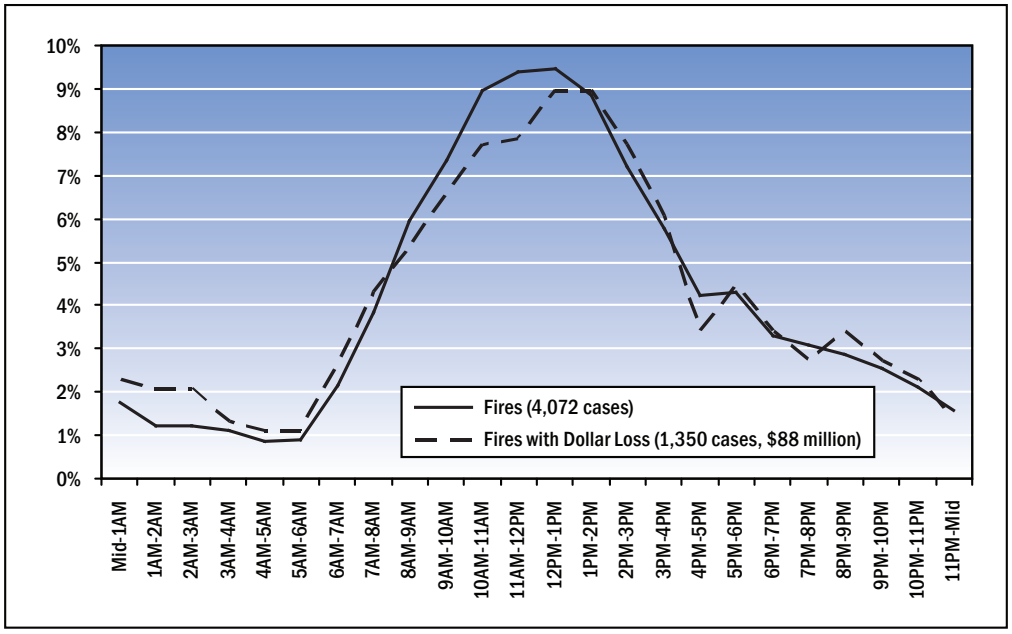
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	27.3	36.8
Playing with Heat Source	0.8	1.1
Smoking	0.6	0.8
Heating	3.5	4.7
Cooking	10.4	14.0
Electrical Malfunction	8.0	10.8
Appliances	4.3	5.8
Open Flame	2.8	3.8
Other Heat	2.7	3.7
Other Equipment	1.6	2.1
Natural	1.6	2.1
Exposure	1.0	1.4
Equipment Misoperation, Failure	4.1	5.5
Other Unintentional, Careless	3.6	4.8
Investigation w/Arson Module	1.9	2.5
Unknown	26.0	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in educational buildings are highest between noon and 1 p.m. and lowest between 4 a.m. and 6 a.m. (Figure 34). Fires with dollar loss reported closely mirror the incidence of fires. Fires with dollar loss are slightly above the fire incidence from midnight to 8 a.m. and slightly below the fire incidence from 8 a.m. to 1 p.m. and again between 4 p.m. and 5 p.m.

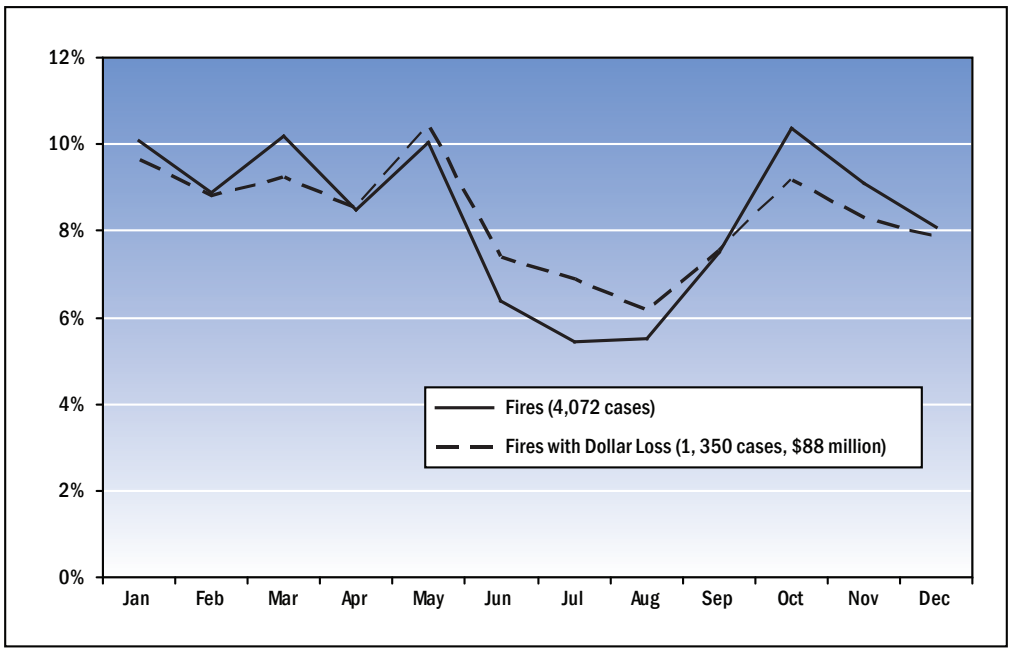
Figure 34. Time of Fire Alarm for Educational Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. The incidence of fires in educational buildings is more frequent in October while fires in educational buildings occur less often during the summer months of July and August (Figure 35). Fires with dollar loss are highest in May and lowest in August.

Figure 35. Month of Year of Educational Building Fires and Fires with Dollar Loss (2006)

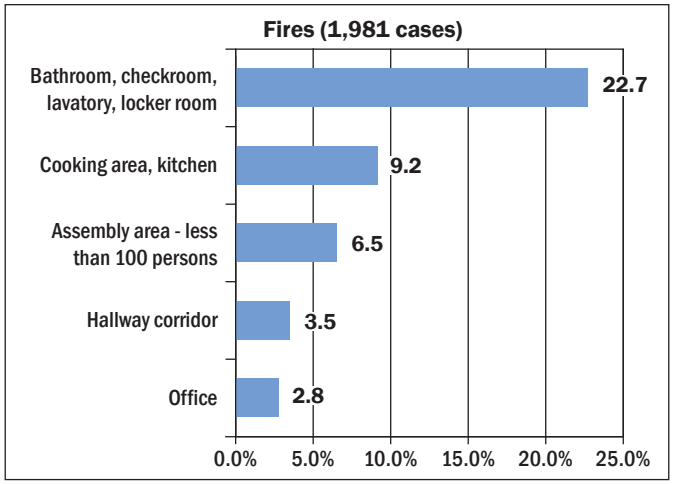


Source: 2006 NFIRS 5.0

Area of Fire Origin

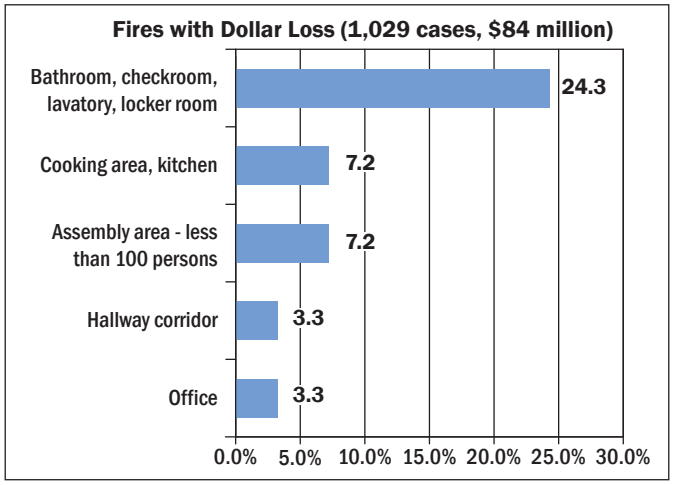
Figure 36 shows the leading areas where fires and fires with reported dollar loss originated in educational buildings in 2006. The top three areas reported for fires include bathrooms (23 percent), cooking areas (9 percent), and assembly areas (7 percent). In educational building fires with reported dollar loss, the leading areas of fire origin are the same as those for fire incidence. Twenty-four percent of educational building fires with loss start in bathrooms, the leading area of fire origin. An additional 14 percent of fires with loss start in educational assembly areas (7 percent) and cooking areas (7 percent).

Figure 36. Leading Areas of Fire Origin in Educational Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
4,072 total incidents
101 undetermined entries
1,990 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



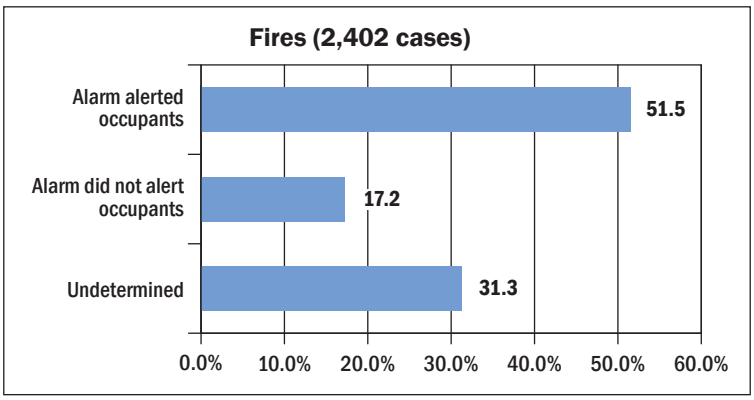
Source: 2006 NFIRS 5.0
1,350 total incidents
29 undetermined entries
292 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 52 percent of small, low-loss confined educational building fires. Occupants were not alerted by a smoke alarm in 17 percent of these confined fires. In 31 percent of confined educational building fires there is no information on the alert status and effectiveness of the smoke alarm (Figure 37).

Figure 37. Smoke Alarm Alert Status in Confined Educational Building Fires (2006)

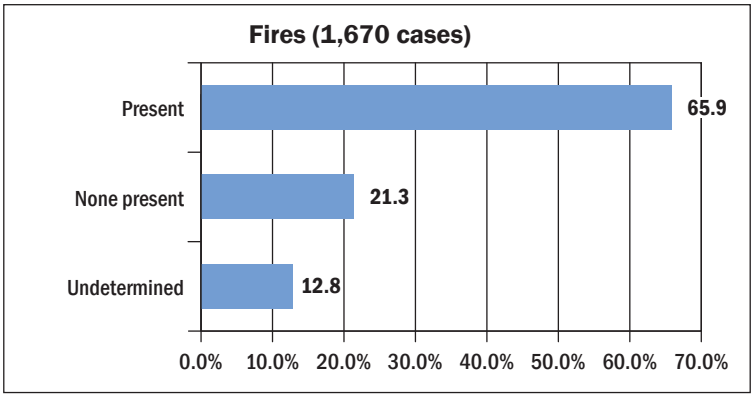


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 7.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 38, smoke alarms were present in 66 percent of nonconfined educational building fires. Smoke alarms in nonconfined educational building fires were not present 21 percent of the time. The presence or absence of alarms was not reported to NFIRS in 13 percent of nonconfined educational building fires.

Figure 38. Presence of Smoke Alarms in Nonconfined Educational Building Fires (2006)



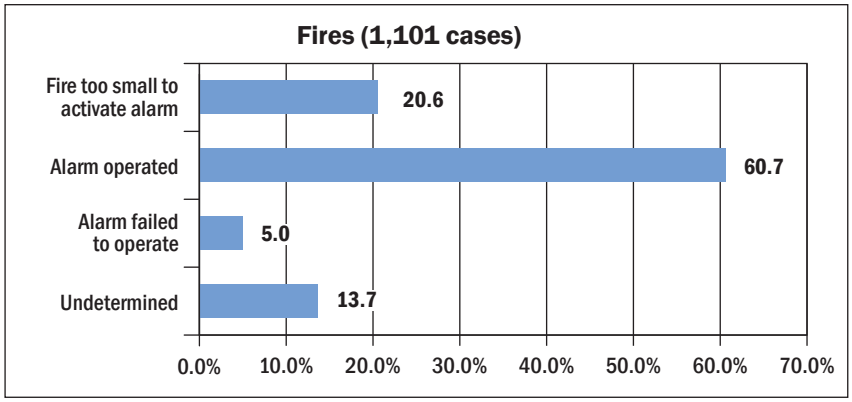
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 8.

When smoke alarms were present in nonconfined educational building fires, the alarms operated in 61 percent of the incidents. In the remaining 39 percent of incidents, smoke alarms failed to operate (5 percent), the fire was too small to activate the system (21 percent), or no information on smoke alarm operation was available (14 percent) (Figure 39).[31]

[31] Looking at the percentage of operational smoke alarms from another perspective, smoke alarms were known to be present and operated in 40 percent of all nonconfined educational building fires (present 65.9% x operated 60.7% = 40.0%).

Figure 39. Smoke Alarm Operation When Alarm was Present in Nonconfined Educational Building Fires (2006)

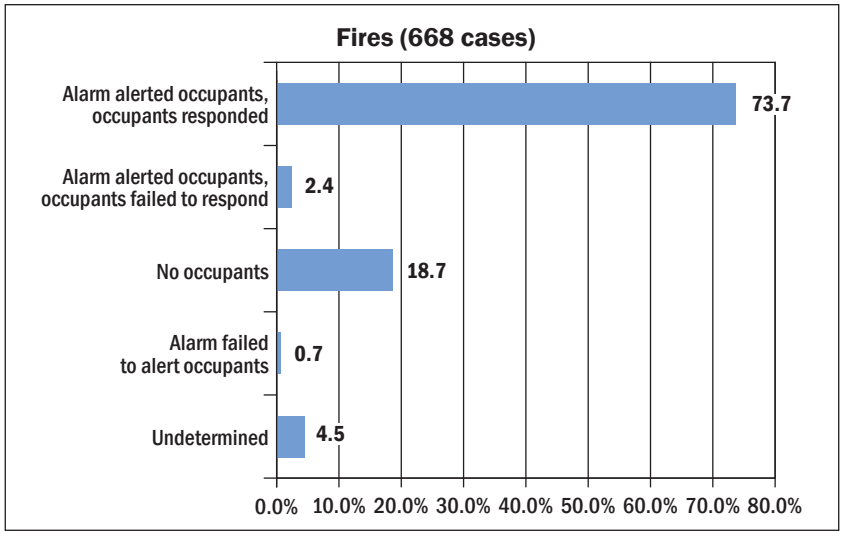


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 8.

The effectiveness of working smoke alarms in nonconfined educational building fires is shown in Figure 40. In approximately three-quarters of nonconfined educational building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 74 percent of occupants were alerted and were able to respond to the warning, and an additional 2 percent were alerted but did not respond to the warning. Occupants were not alerted in 1 percent of nonconfined educational building fires, and no occupants were in the building at the time of the fire in 19 percent of these incidents. Alarm alert effectiveness information was not available in 5 percent of nonconfined educational building fires.[32]

Figure 40. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Educational Building Fires (2006)



Source: 2006 NFIRS 5.0

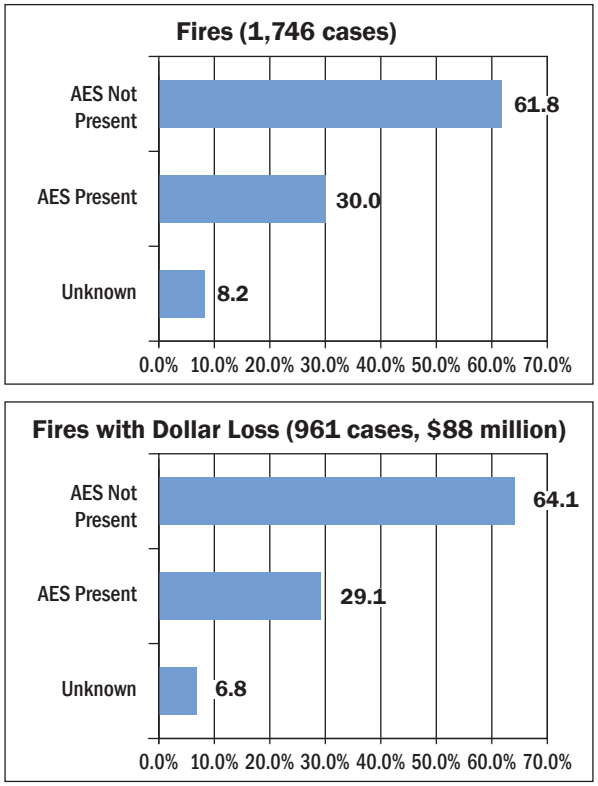
Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 8.

[32] Smoke alarms were effective at alerting occupants in 30 percent of all nonconfined educational building fires (present 65.9% x operated 60.7% x alerted occupants 76.0% = 30.4%).

Automatic Extinguishing Systems

AESs were present in 30 percent of fires in educational buildings in 2006 (Figure 41). AESs were not present in 62 percent of the incidents, and in 8 percent of incidents, no information on AESs was available. In 29 percent of educational building fires where dollar loss was reported, AESs were present. AESs were not present in 64 percent of fires with loss, and no information on AESs was available for 7 percent of these incidents.

Figure 41. Presence of Automatic Extinguishing Systems in Educational Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 28.

Institutional Buildings

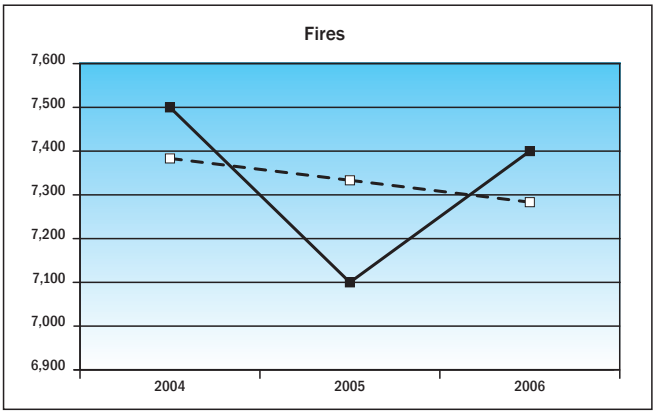
Institutional buildings make up seven percent of the fire profile for nonresidential buildings. Institutional buildings include health care, detention, and correctional facilities.[33]

[33] Institutional buildings include nursing homes; mental retardation/development disability facilities: alcohol or substance abuse recovery centers, asylums and mental institutions, hospitals; hospices, clinics and ambulatory care facilities: doctor's offices; hemodialysis units not part of a hospital: jails and prisons (not juvenile); juvenile detention centers; police stations; and other health care, detention, and correction facilities, which include animal care.

Trends

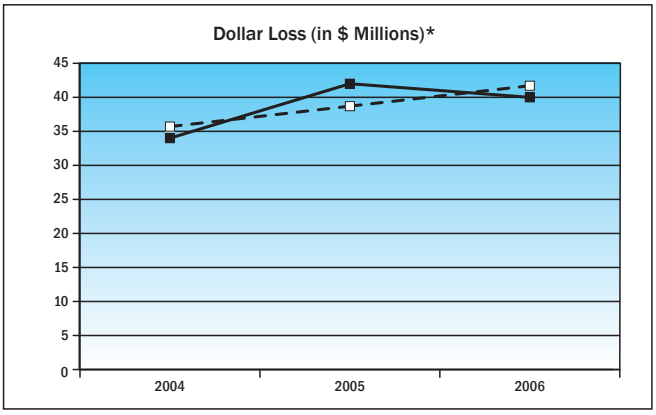
While there was variability in the number of institutional building fires during the 3-year period (2004 through 2006), overall they declined by 1 percent. Approximately 7,400 institutional building fires were estimated to have occurred in 2006. The trend for dollar loss increased 17 percent. (Figure 42).

Figure 42. Trends in Institutional Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	7,500
2005	7,100
2006	7,400
3-Year Trend (%)	**-1.4**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

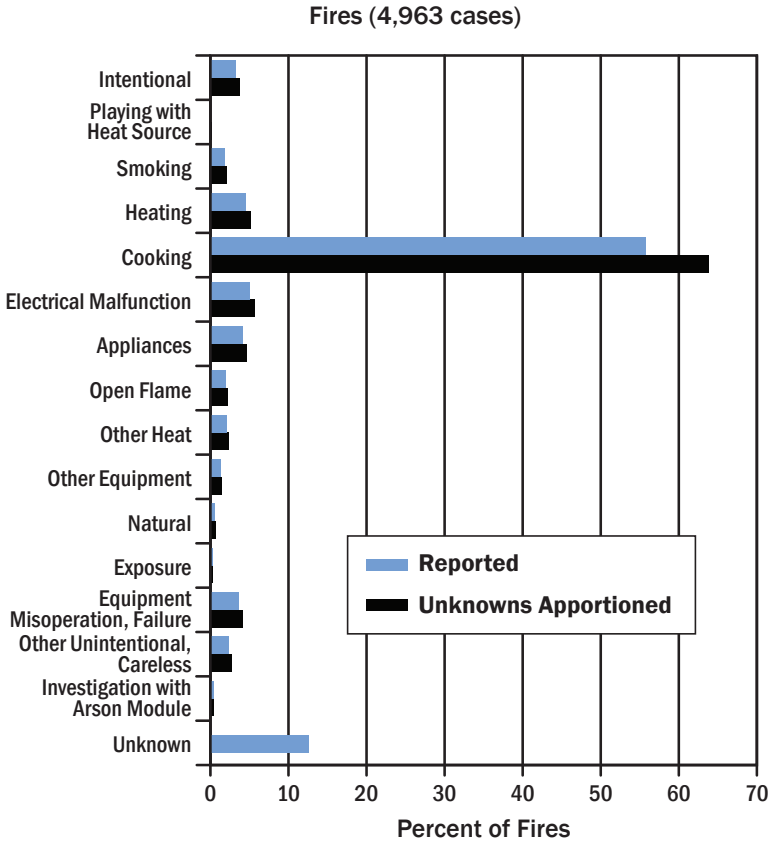
Year	Value
2004	$34
2005	$42
2006	$40
3-Year Trend (%)	**16.8**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

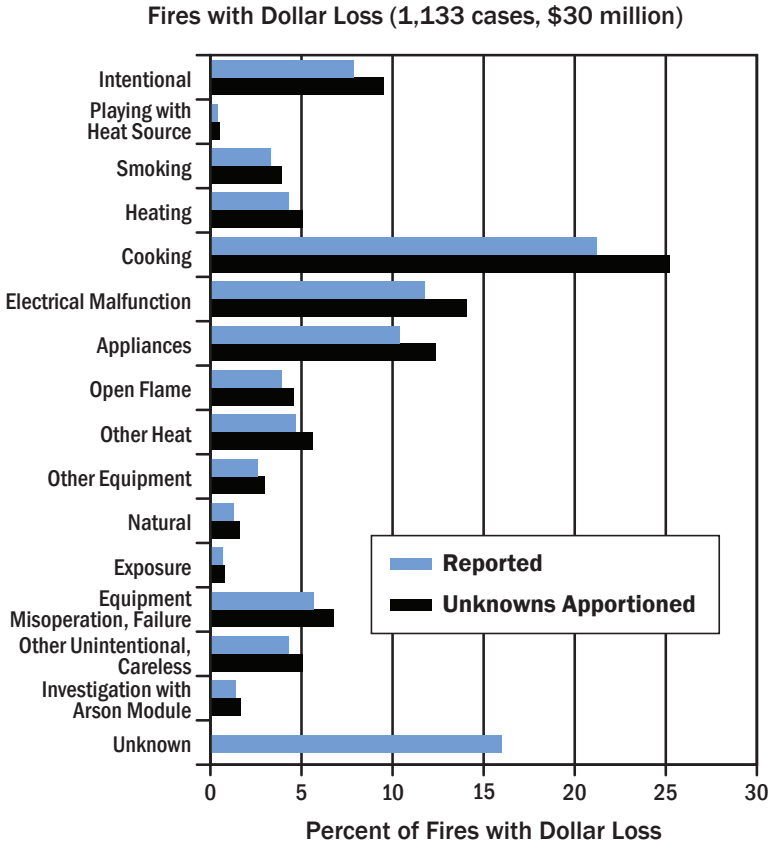
Causes

Cooking incidents result in 64 percent of all fires in institutional buildings (Figure 43). Electrical malfunctions (6 percent) and appliances (5 percent) are the next leading causes of fire incidents. Causes of institutional building fires with dollar loss result in the same three leading causes: cooking (25 percent), electrical malfunctions (14 percent), and appliances (12 percent).

Figure 43. Fire Cause for Institutional Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	3.3	3.8
Playing with Heat Source	0.1	0.2
Smoking	1.8	2.1
Heating	4.5	5.2
Cooking	55.8	63.9
Electrical Malfunction	5.0	5.7
Appliances	4.1	4.7
Open Flame	2.0	2.3
Other Heat	2.1	2.4
Other Equipment	1.3	1.5
Natural	0.6	0.7
Exposure	0.3	0.3
Equipment Misoperation, Failure	3.6	4.1
Other Unintentional, Careless	2.4	2.8
Investigation w/Arson Module	0.4	0.4
Unknown	12.6	



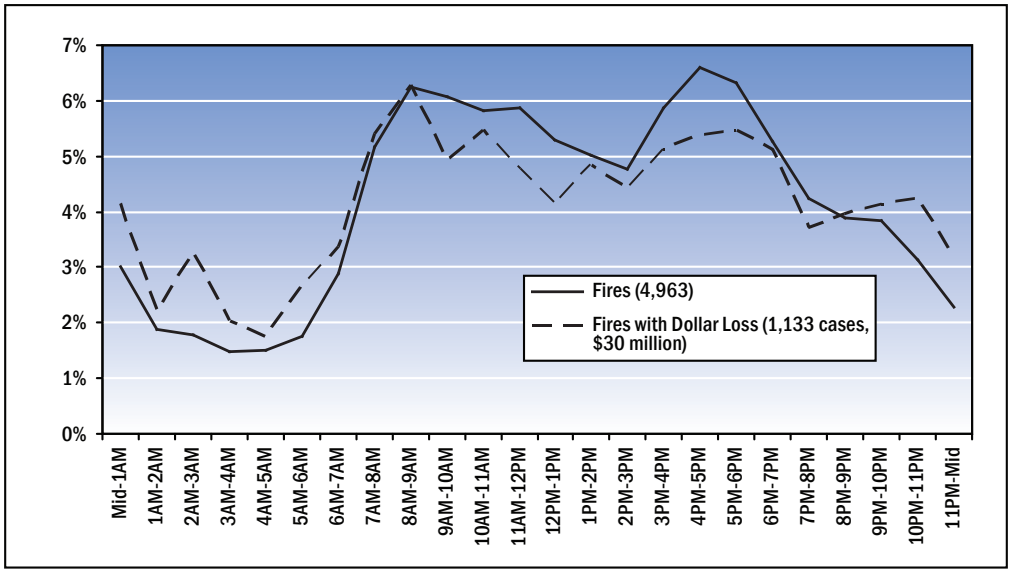
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	7.9	9.5
Playing with Heat Source	0.4	0.5
Smoking	3.3	3.9
Heating	4.3	5.1
Cooking	21.2	25.2
Electrical Malfunction	11.8	14.1
Appliances	10.4	12.4
Open Flame	3.9	4.6
Other Heat	4.7	5.6
Other Equipment	2.6	3.0
Natural	1.3	1.6
Exposure	0.7	0.8
Equipment Misoperation, Failure	5.7	6.8
Other Unintentional, Careless	4.3	5.1
Investigation w/Arson Module	1.4	1.7
Unknown	16.0	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in institutional buildings are highest between 4 p.m. and 5 p.m. and lowest between 3 a.m. and 5 a.m. (Figure 44). Fires with dollar loss reported are above the fire incidence from midnight to 9 a.m. and below the fire incidence from 9 a.m. to 8 p.m.

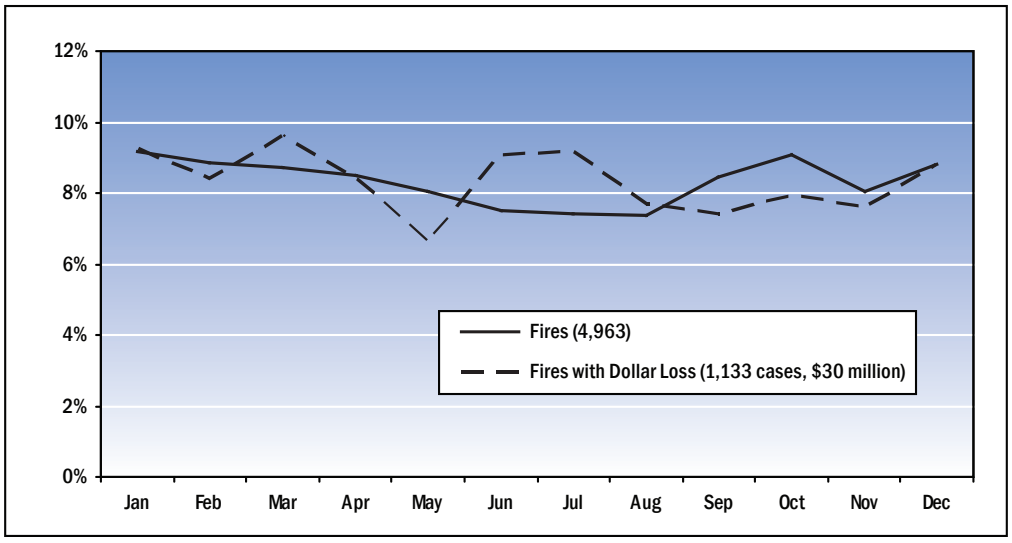
Figure 44. Time of Fire Alarm for Institutional Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. For 2006, fires in institutional buildings are more frequent in January but occur less often during the summer months of July and August (Figure 45). Fires with dollar loss are highest in March and lowest in May.

Figure 45. Month of Year of Institutional Building Fires and Fires with Dollar Loss (2006)

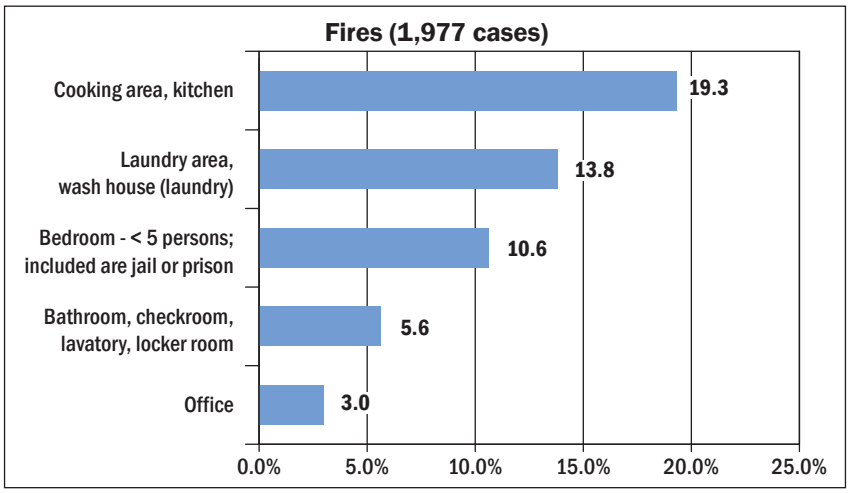


Source: 2006 NFIRS 5.0

Area of Fire Origin

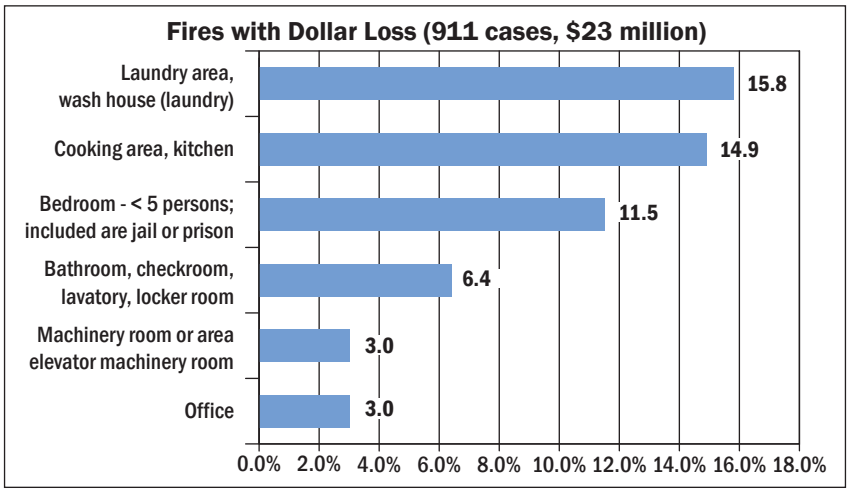
Figure 46 shows the leading areas where fires and fires with reported dollar loss originated in institutional buildings in 2006. The three leading areas of fire origin for reported institutional building fires are cooking areas (19 percent), laundry areas (14 percent), and bedrooms with less than five people (11 percent). In institutional building fires with reported dollar loss, the top three areas of fire origin are laundry areas (16 percent), cooking areas (15 percent), and bedrooms with less than five people (12 percent).

Figure 46. Leading Areas of Fire Origin in Institutional Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
4,963 total incidents
77 undetermined entries
2,909 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



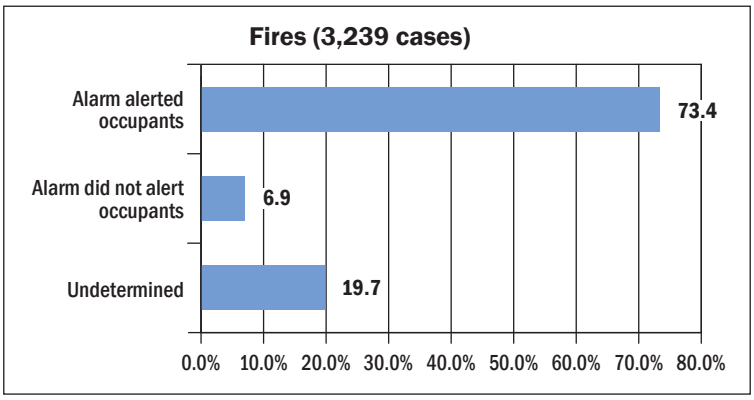
Source: 2006 NFIRS 5.0
1,133 total incidents
15 undetermined entries
207 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 73 percent of small, low-loss confined institutional building fires. Occupants were not alerted by a smoke alarm in 7 percent of these confined fires. In 20 percent of confined institutional building fires there is no information on the alert status and effectiveness of the smoke alarm. (Figure 47).

Figure 47. Smoke Alarm Alert Status in Confined Institutional Building Fires (2006)

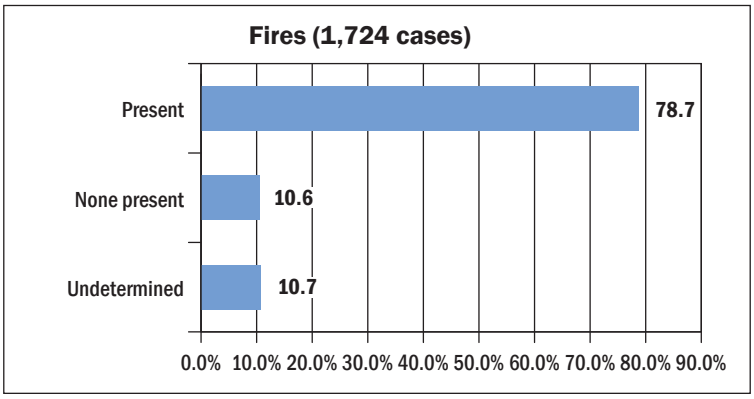


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 9.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 48, smoke alarms were present in 79 percent of nonconfined institutional building fires. Smoke alarms in nonconfined institutional building fires were not present 11 percent of the time. The presence or absence of alarms was not reported to NFIRS in 11 percent of nonconfined institutional building fires.

Figure 48. Presence of Smoke Alarms in Nonconfined Institutional Building Fires (2006)



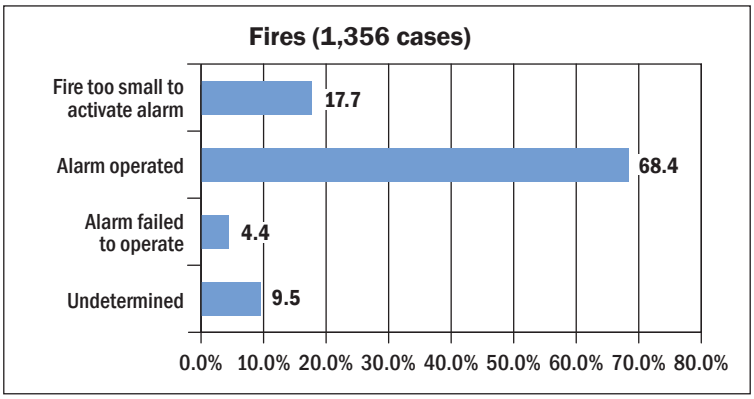
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 10.

When smoke alarms were present in nonconfined institutional building fires, the alarms operated in 68 percent of the incidents. In the remaining 32 percent of incidents, smoke alarms failed to operate (4 percent), the fire was too small to activate the system (18 percent), or no information on smoke alarm operation was available (10 percent) (Figure 49).[34]

[34] Looking at the percentage of operational smoke alarms from another perspective, smoke alarms were known to be present and operated in 54 percent of all nonconfined institutional building fires (present 78.7% x operated 68.4% = 53.8%).

Figure 49. Smoke Alarm Operation When Alarm was Present in Nonconfined Institutional Building Fires (2006)

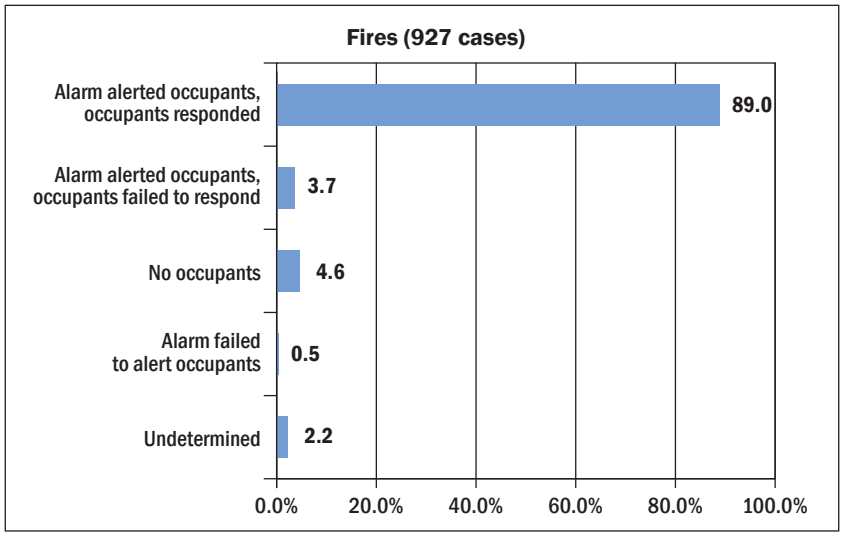


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 10.

The effectiveness of working smoke alarms in nonconfined institutional building fires is shown in Figure 50. In 93 percent of nonconfined institutional building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 89 percent of occupants were alerted and were able to respond to the warning, and an additional 4 percent were alerted but did not respond to the warning. Occupants were not alerted in 1 percent of nonconfined institutional fires, and no occupants were in the building at the time of the fire in 5 percent of these incidents. Alarm alert effectiveness information was not available in 2 percent of nonconfined institutional building fires.[35]

Figure 50. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Institutional Building Fires (2006)



Source: 2006 NFIRS 5.0

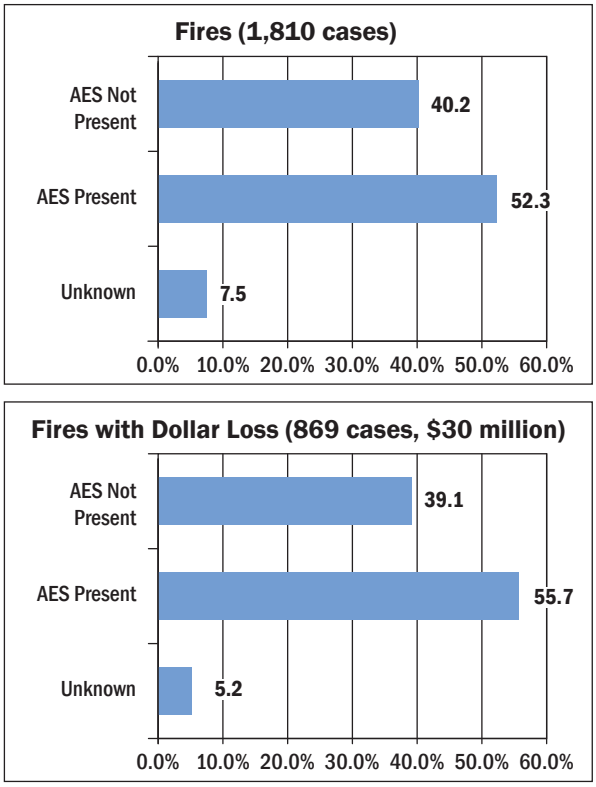
Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 10.

[35] Smoke alarms were effective at alerting occupants in 50 percent of all nonconfined institutional building fires (present 78.7% x operated 68.4% x alerted occupants 92.7% = 49.9%).

Automatic Extinguishing Systems

AESs were present in 52 percent of institutional building fires in 2006 (Figure 51). AESs were not present in 40 percent of the incidents, and in 8 percent of incidents, no information on AESs was available. In 56 percent of fires with dollar loss, AESs were present. There were no AESs present in 39 percent of fires with dollar loss, and no information on AESs was available in 5 percent of incidents.

Figure 51. Presence of Automatic Extinguishing Systems in Institutional Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 29.

Stores and Office Buildings

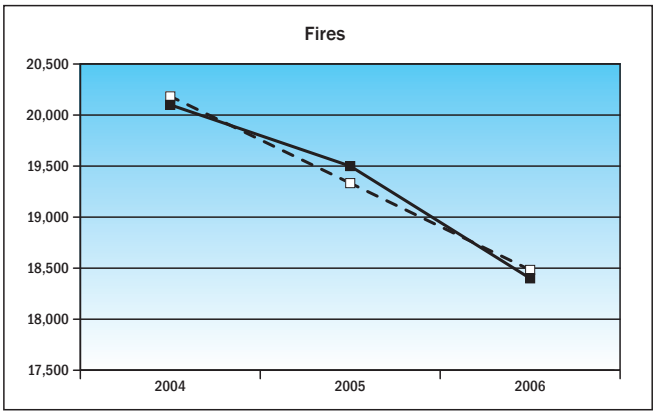
Stores and office buildings make up 19 percent of the fire profile for nonresidential buildings. These types of buildings include stores, specialty shops, personal services, and offices.[36]

[36] Stores and office buildings include convenience stores; food and beverage sales, grocery stores; textile, wearing apparel sales shops; household goods, sales, repairs; specialty shops; personal service; recreational stores; laundry, dry cleaning; professional supplies, services; service station, gas station; motor vehicle or boat sales, service, repair; department or discount store; general retail; other; bank; office: veterinary or research; post office or mailing firms; business office; and mercantile, business other.

Trends

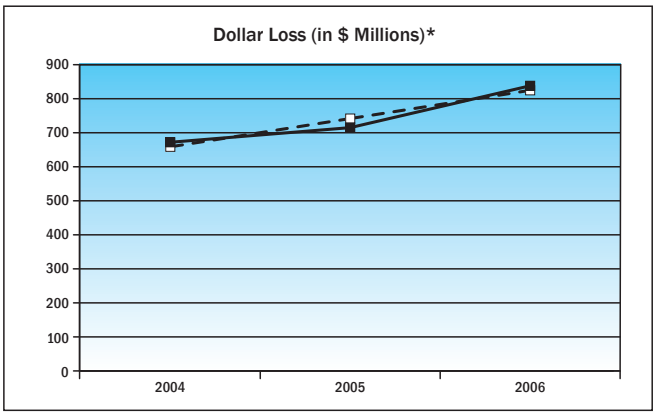
During the 3-year period (2004 through 2006), the trend for store and office building fires declined by 8 percent, and the trend for dollar loss increased by 25 percent (Figure 52). The number of fires decreased from 20,100 in 2004 to 18,400 in 2006, while dollar loss increased from $672 million to $838 million over the same three-year period.

Figure 52. Trends in Store and Office Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	20,100
2005	19,500
2006	18,400
3-Year Trend (%)	**-8.4**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

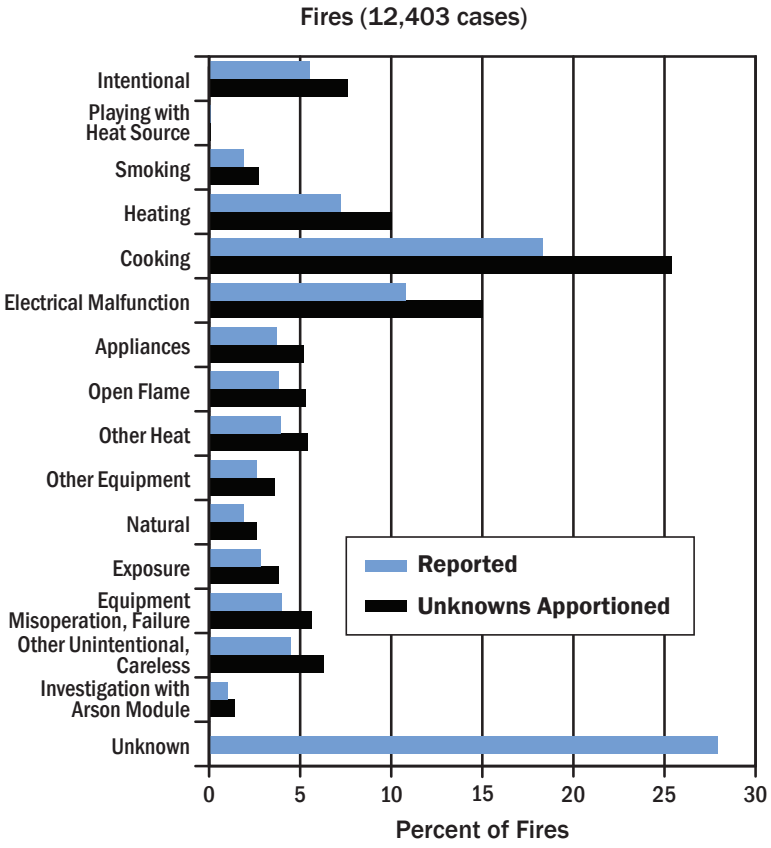
Year	Value
2004	$672
2005	$715
2006	$838
3-Year Trend (%)	**25.2**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

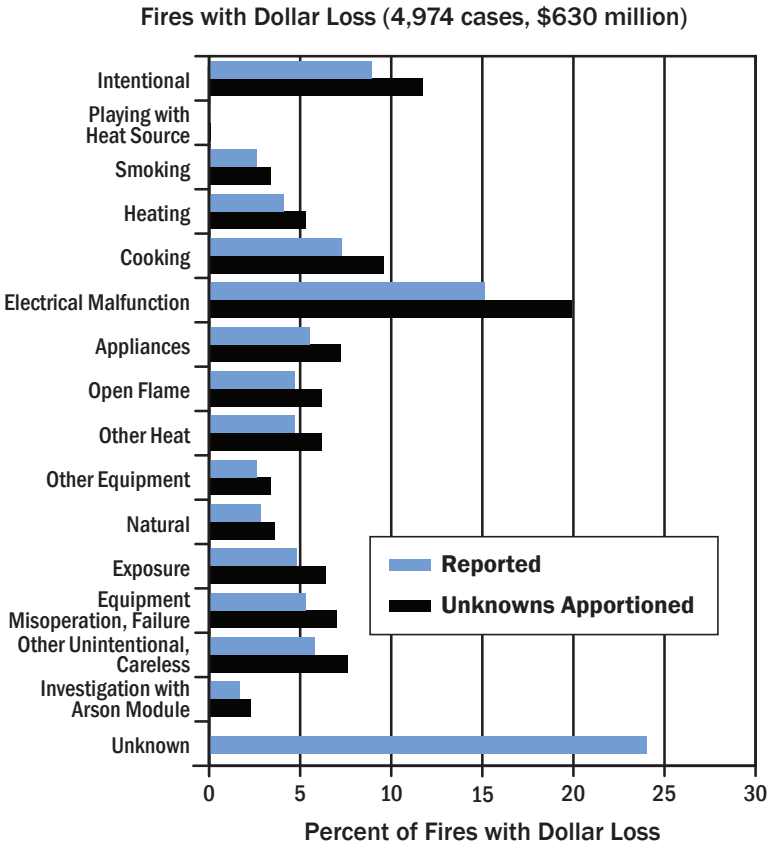
Causes

Twenty-five percent of all fires in stores and office buildings are caused by cooking (Figure 53), electrical malfunctions (15 percent), and heating (10 percent). The leading causes in store and office building fires with dollar loss are electrical malfunctions (20 percent), intentional (12 percent), and cooking (10 percent).

Figure 53. Fire Cause for Store and Office Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	5.5	7.6
Playing with Heat Source	0.1	0.1
Smoking	1.9	2.7
Heating	7.2	10.0
Cooking	18.3	25.4
Electrical Malfunction	10.8	15.0
Appliances	3.7	5.2
Open Flame	3.8	5.3
Other Heat	3.9	5.4
Other Equipment	2.6	3.6
Natural	1.9	2.6
Exposure	2.8	3.8
Equipment Misoperation, Failure	4.0	5.6
Other Unintentional, Careless	4.5	6.3
Investigation w/Arson Module	1.0	1.4
Unknown	27.9	



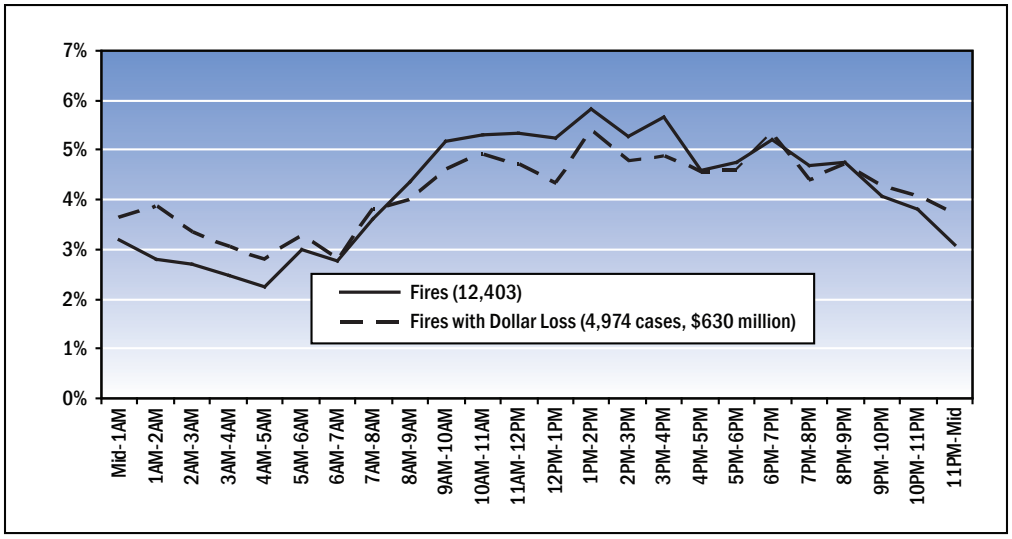
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	8.9	11.7
Playing with Heat Source	0.1	0.1
Smoking	2.6	3.4
Heating	4.1	5.3
Cooking	7.3	9.6
Electrical Malfunction	15.1	19.9
Appliances	5.5	7.2
Open Flame	4.7	6.2
Other Heat	4.7	6.2
Other Equipment	2.6	3.4
Natural	2.8	3.6
Exposure	4.8	6.4
Equipment Misoperation, Failure	5.3	7.0
Other Unintentional, Careless	5.8	7.6
Investigation w/Arson Module	1.7	2.3
Unknown	24.0	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in stores and office buildings are highest between 1 p.m. and 2 p.m. and lowest between 4 a.m. and 5 a.m. (Figure 54). Fires with reported dollar loss closely follow fire incidence. Fires with reported loss are highest between the hours of 1 p.m. and 2 p.m. and lowest between the hours of 4 a.m. and 5 a.m. and 6 a.m. and 7 a.m.

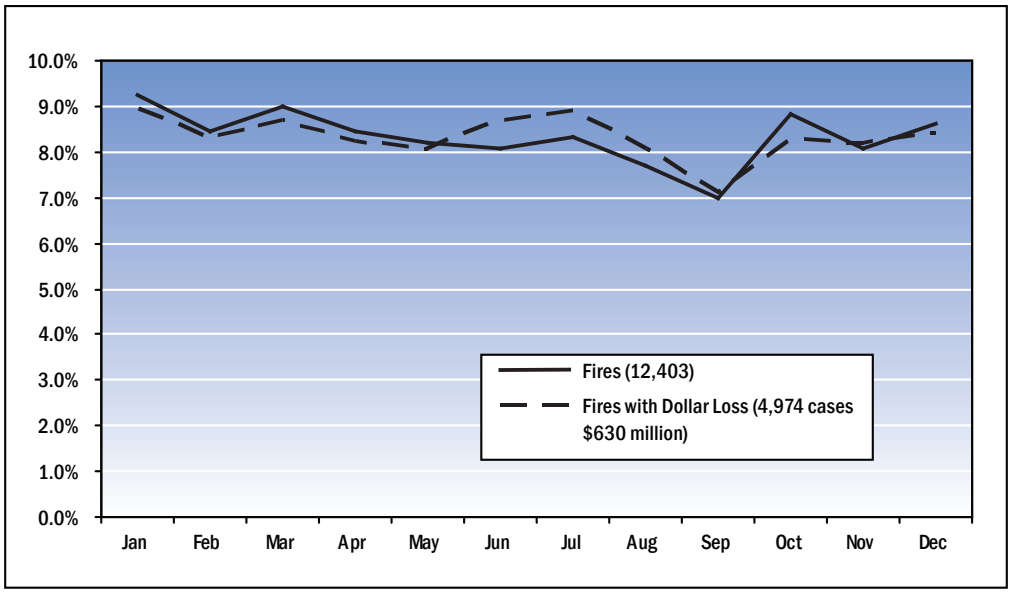
Figure 54. Time of Fire Alarm for Store and Office Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. Fires and fires with dollar loss in stores and office buildings are more frequent in January and less frequent in September (Figure 55).

Figure 55. Month of Year of Store and Office Building Fires and Fires with Dollar Loss (2006)

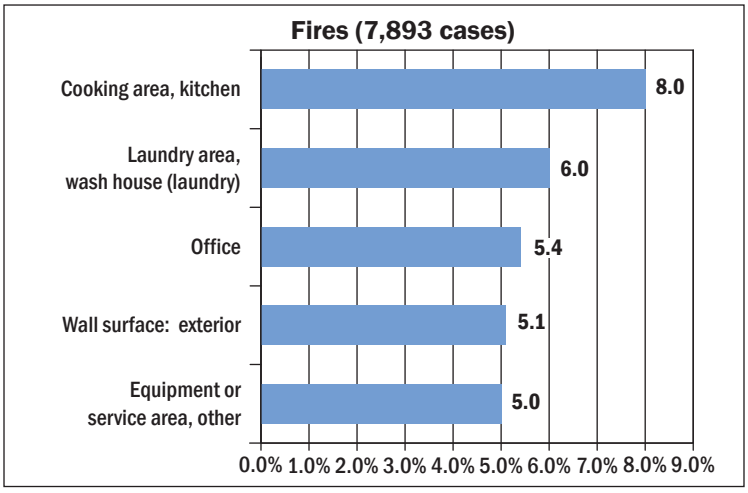


Source: 2006 NFIRS 5.0

Area of Fire Origin

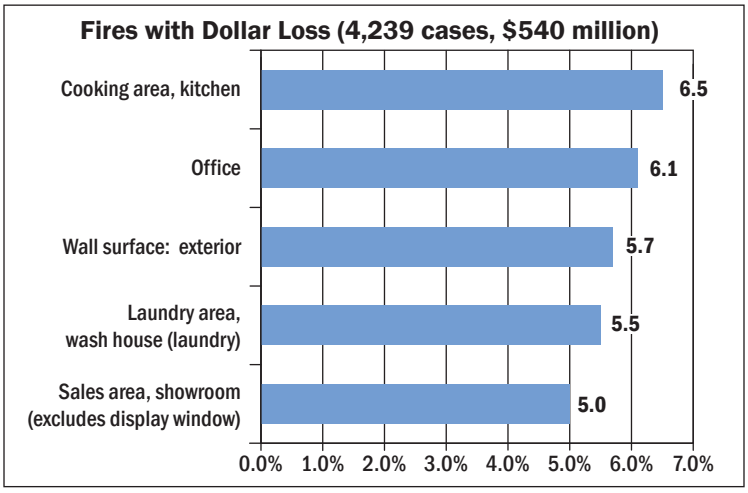
Figure 56 shows the leading areas where fires and fires with reported dollar loss originated in stores and office buildings in 2006. The three leading areas of fire origin for fires are cooking areas (8 percent), laundry areas (6 percent), and offices (5 percent). In store and office building fires with reported dollar loss, the top three areas of fire origin are cooking areas (7 percent), offices (6 percent), and exterior wall surfaces (6 percent).

Figure 56. Leading Areas of Fire Origin in Store and Office Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
12,403 total incidents
674 undetermined entries
3,836 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



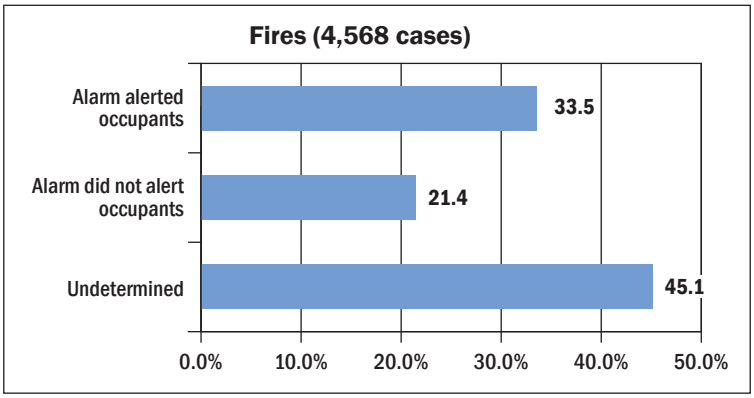
Source: 2006 NFIRS 5.0
4,974 total incidents
263 undetermined entries
472 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 34 percent of small, low-loss confined store and office building fires. Occupants were not alerted by a smoke alarm in 21 percent of these confined fires. In a large portion of store and office building fires (45 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 57).

Figure 57. Smoke Alarm Alert Status in Confined Store and Office Building Fires (2006)

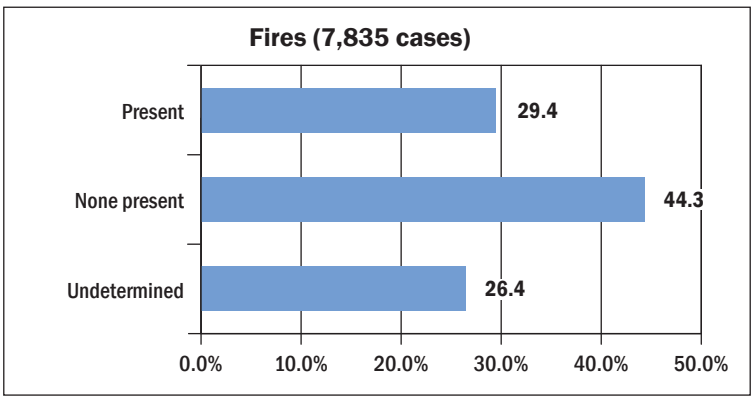


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 11.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 58, smoke alarms were present in 29 percent of nonconfined store and office building fires. Smoke alarms in nonconfined store and office building fires were not present 44 percent of the time. The presence or absence of alarms was not reported to NFIRS in 26 percent of nonconfined store and office building fires.

Figure 58. Presence of Smoke Alarms in Nonconfined Store and Office Building Fires (2006)



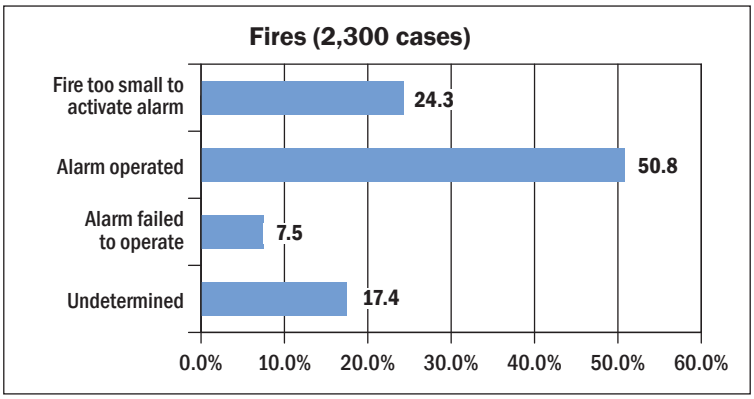
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 12.

When smoke alarms were present in nonconfined store and office building fires, the alarms operated in 51 percent of the incidents. In the remaining 49 percent of incidents, smoke alarms failed to operate (8 percent), the fire was too small to activate the system (24 percent), or no information on smoke alarm operation was available (17 percent) (Figure 59).[37]

[37] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 15 percent of all nonconfined store and office building fires (present 29.4% x operated 50.8% = 14.9%).

Figure 59. Smoke Alarm Operation When Alarm was Present in Nonconfined Store and Office Building Fires (2006)

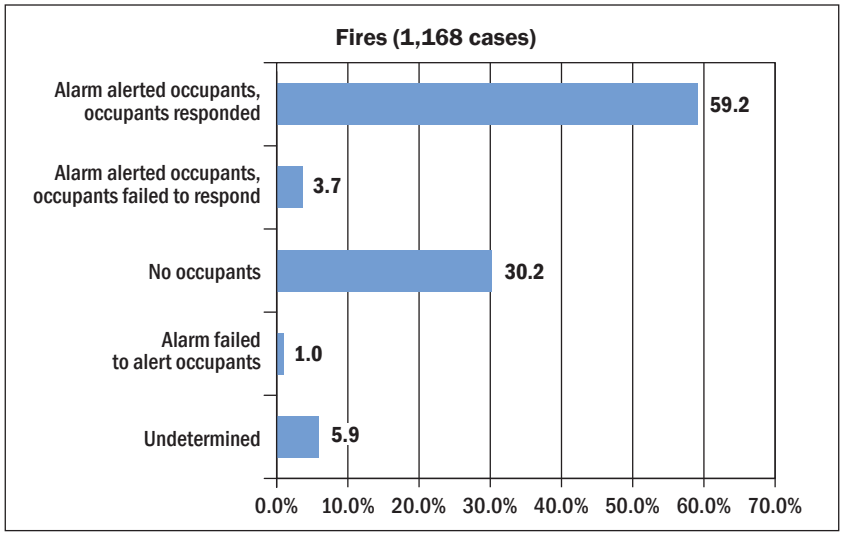


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 12.

The effectiveness of working smoke alarms in nonconfined store and office building fires is shown in Figure 60. In 63 percent of nonconfined store and office building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 59 percent of occupants were alerted and were able to respond to the warning, and an additional 4 percent were alerted but did not respond to the warning. Occupants were not alerted in 1 percent of nonconfined store and office fires, and no occupants were in the building at the time of the fire in 30 percent of these incidents. Alarm alert effectiveness information was not available in 6 percent of nonconfined store and office building fires.[38]

Figure 60. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Store and Office Building Fires (2006)



Source: 2006 NFIRS 5.0

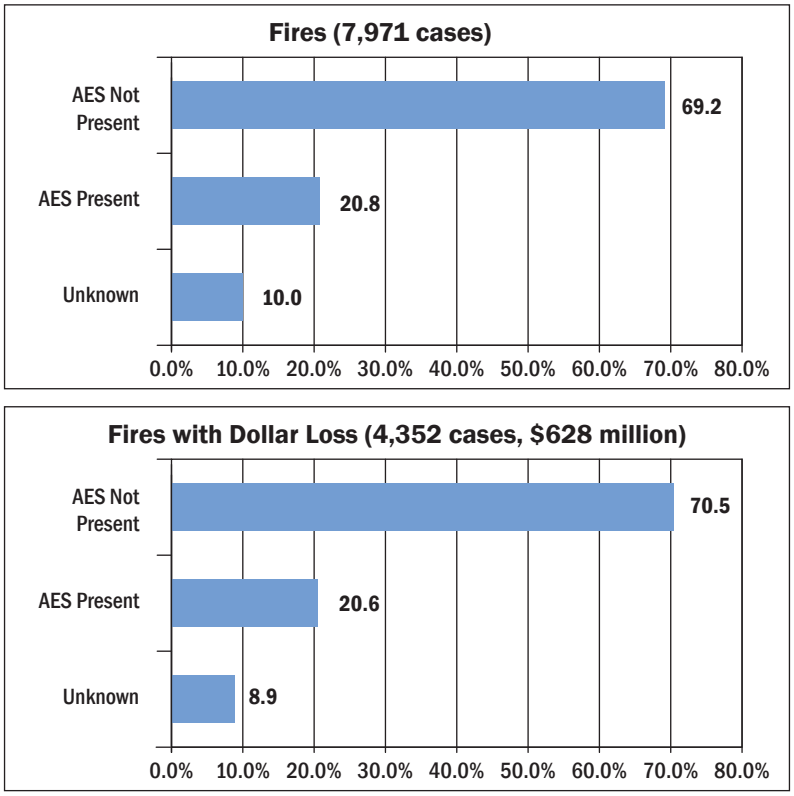
Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 12.

[38] Smoke alarms were effective at alerting occupants in 9 percent of all nonconfined store and office building fires (present 29.4% x operated 50.8% x alerted occupants 62.9% = 9.4%).

Automatic Extinguishing Systems

AESs were present in 21 percent of fires for store and office building fires in 2006 (Figure 61). AESs were not present in 69 percent of the incidents, and in 10 percent of incidents, no information on AESs was available. In 21 percent of fires with dollar loss, AESs were present. No AESs were present in 71 percent of fires with dollar loss, and no information on AESs was available in 9 percent of incidents.

Figure 61. Presence of Automatic Extinguishing Systems in Store and Office Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 30.

Basic Industrial Buildings

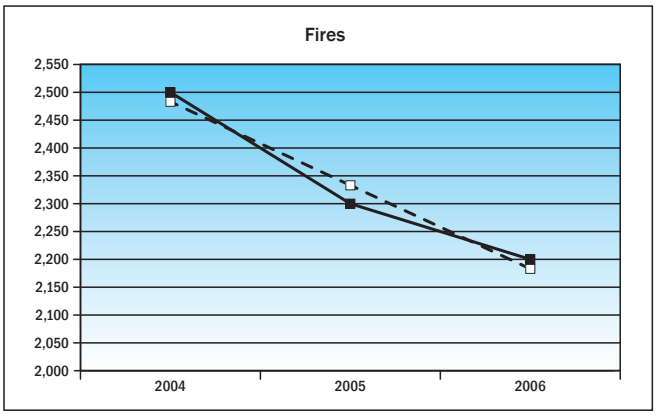
Basic industrial buildings make up two percent of the fire profile for nonresidential buildings. Basic industrial buildings include industrial, utility, defense, agriculture, and mining facilities.[39]

Trends

During the 3-year period (2004 through 2006), the trend for basic industrial building fires declined by 12 percent, down to 2,200 fires in 2006. The trend in dollar loss declined by 6 percent over the same 3-year period (Figure 62).

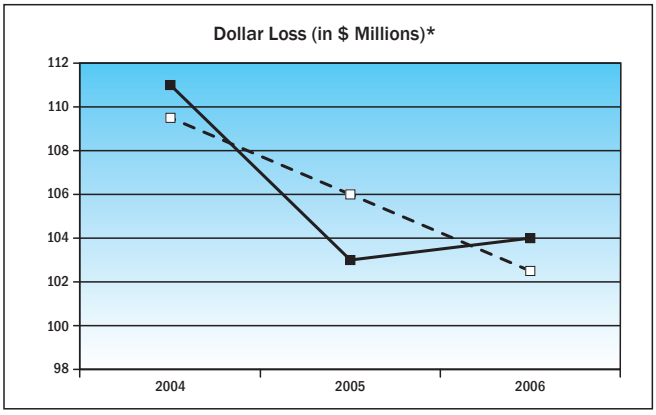
[39] Basic industry buildings include steam or heat plant; electric generating plant; laboratory or science lab; defense and military installation; computer center; communications center; electrical distribution; gas distribution; flammable liquid distribution; water utility; sanitation utility; utility or distribution system; crops or orchard; livestock production; forest or timberland; mine, quarry; and industrial utility, defense, agriculture, mining, other.

Figure 62. Trends in Basic Industrial Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	2,500
2005	2,300
2006	2,200
3-Year Trend (%)	**-12.1**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

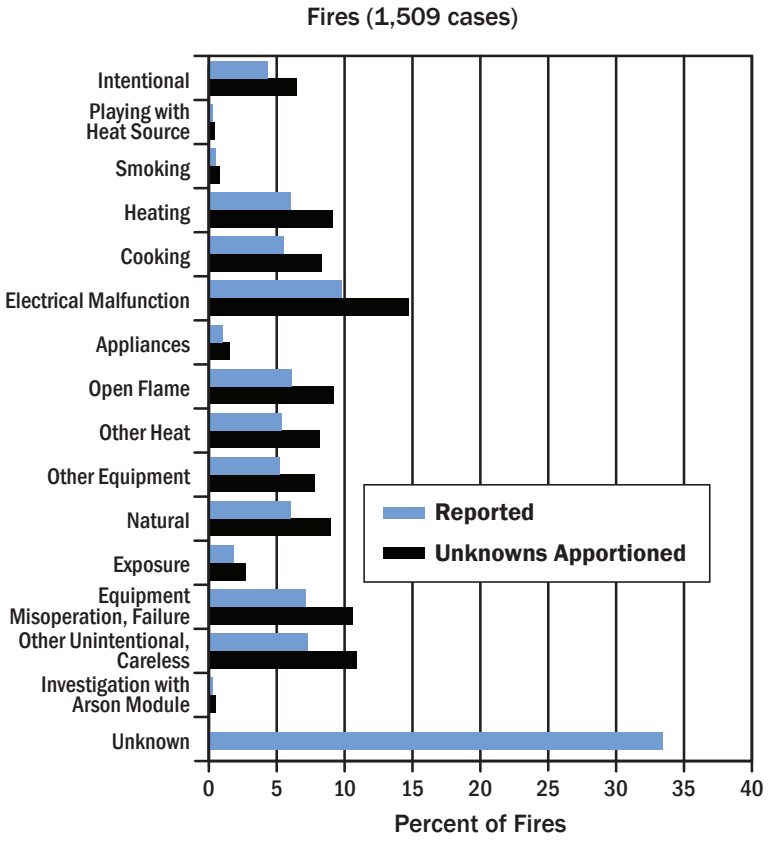
Year	Value
2004	$111
2005	$103
2006	$104
3-Year Trend (%)	**-6.4**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

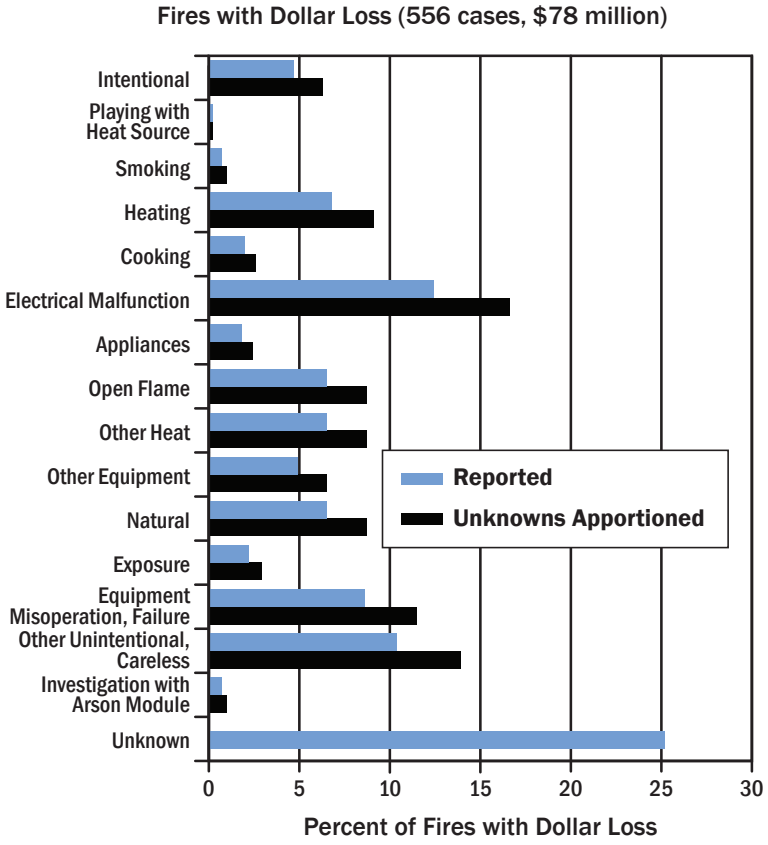
Causes

Fifteen percent of all fires in basic industrial buildings are caused by electrical malfunctions (Figure 63) followed by other unintentional or careless actions (11 percent) and the misoperation of equipment (11 percent). The three leading causes of basic industrial building fires with dollar loss are the same as those for fire incidence: electrical malfunctions (17 percent), other unintentional or careless actions (14 percent), and equipment misoperation (12 percent).

Figure 63. Fire Cause for Basic Industrial Building Fires and Fires with Losses (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	4.3	6.5
Playing with Heat Source	0.3	0.4
Smoking	0.5	0.8
Heating	6.0	9.1
Cooking	5.5	8.3
Electrical Malfunction	9.8	14.7
Appliances	1.0	1.5
Open Flame	6.1	9.2
Other Heat	5.4	8.2
Other Equipment	5.2	7.8
Natural	6.0	9.0
Exposure	1.8	2.7
Equipment Misoperation, Failure	7.1	10.6
Other Unintentional, Careless	7.3	10.9
Investigation w/Arson Module	0.3	0.5
Unknown	33.4	



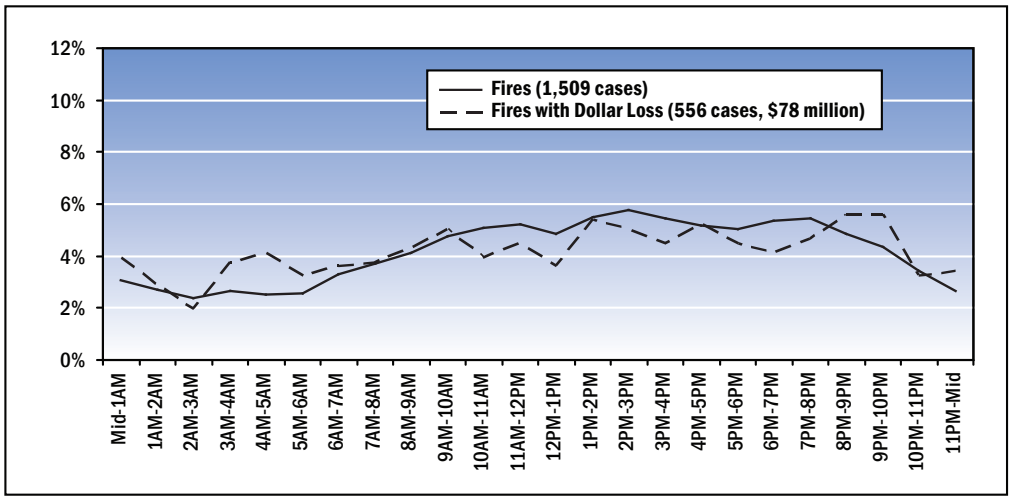
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	4.7	6.3
Playing with Heat Source	0.2	0.2
Smoking	0.7	1.0
Heating	6.8	9.1
Cooking	2.0	2.6
Electrical Malfunction	12.4	16.6
Appliances	1.8	2.4
Open Flame	6.5	8.7
Other Heat	6.5	8.7
Other Equipment	4.9	6.5
Natural	6.5	8.7
Exposure	2.2	2.9
Equipment Misoperation, Failure	8.6	11.5
Other Unintentional, Careless	10.4	13.9
Investigation w/Arson Module	0.7	1.0
Unknown	25.2	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in basic industrial buildings are highest between 2 p.m. and 3 p.m. and lowest between 2 a.m. and 3 a.m. (Figure 64). Fires with dollar loss are highest between 8 p.m. and 10 p.m. and lowest between 2 a.m. and 3 a.m.

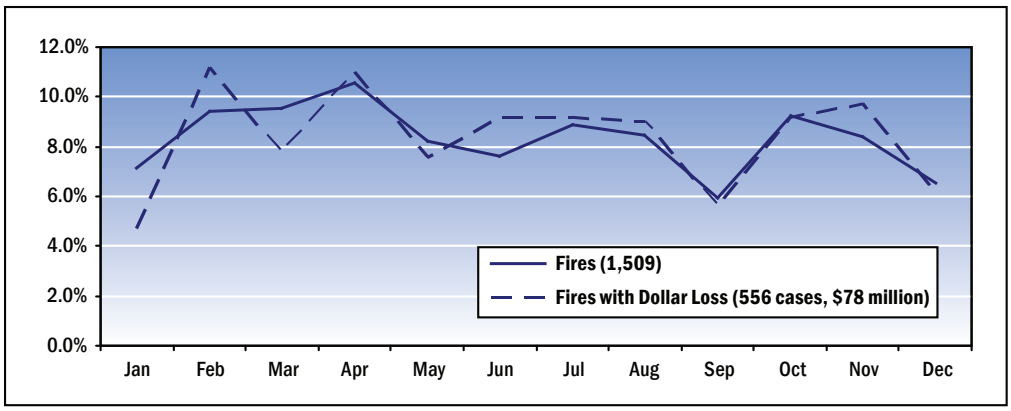
Figure 64. Time of Fire Alarm for Basic Industrial Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. For 2006, fires in basic industrial buildings are more frequent in April and less frequent in September. Fires with dollar loss are highest in February and April and lowest in January (Figure 65).

Figure 65. Month of Year of Basic Industrial Building Fires and Fires with Dollar Loss (2006)

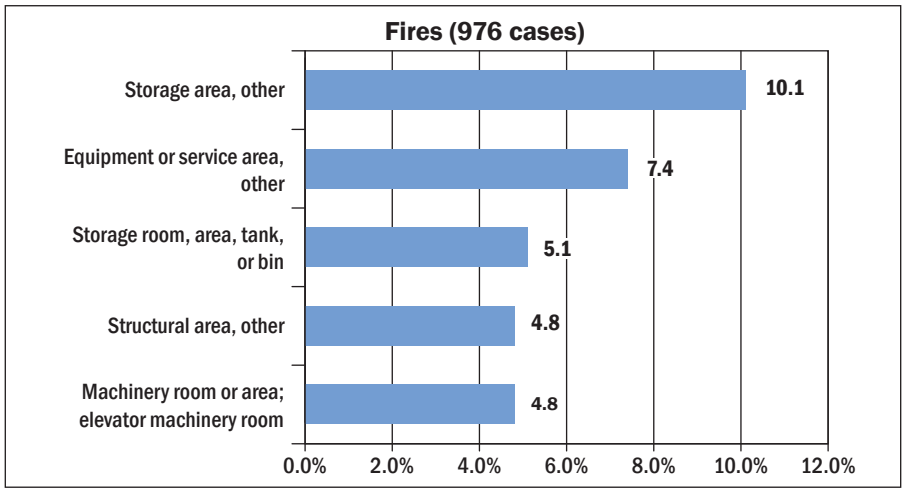


Source: 2006 NFIRS 5.0

Area of Fire Origin

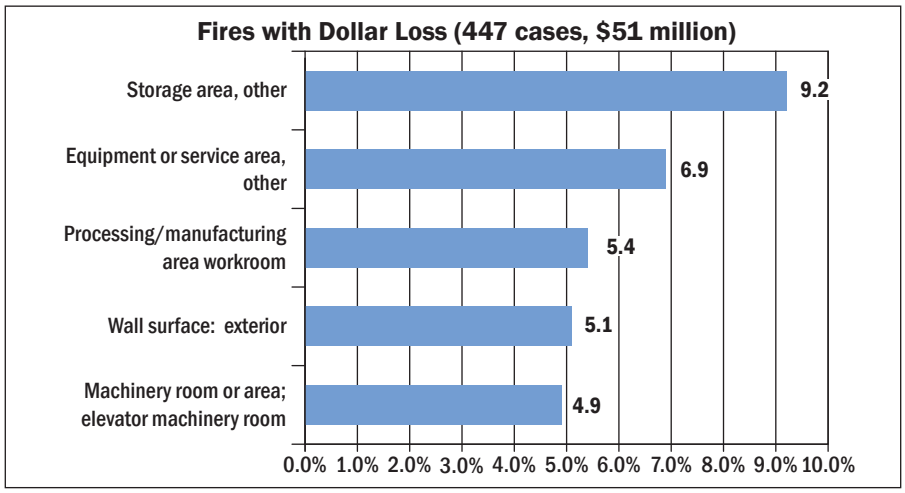
Figure 66 shows the leading areas where fires and fires with reported dollar loss originated in basic industrial buildings in 2006. The three leading areas of fire origin for industrial buildings are storage area, other (10 percent); equipment or service area, other (7 percent); and storage room, area, tank, or bin (5 percent). In basic industrial building fires where dollar loss is reported, the top three areas of fire origin are storage area, other (9 percent); equipment or service area, other (7 percent); and processing/manufacturing area, workroom (5 percent).

Figure 66. Leading Areas of Fire Origin in Basic Industrial Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
1,509 total incidents
175 undetermined entries
358 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



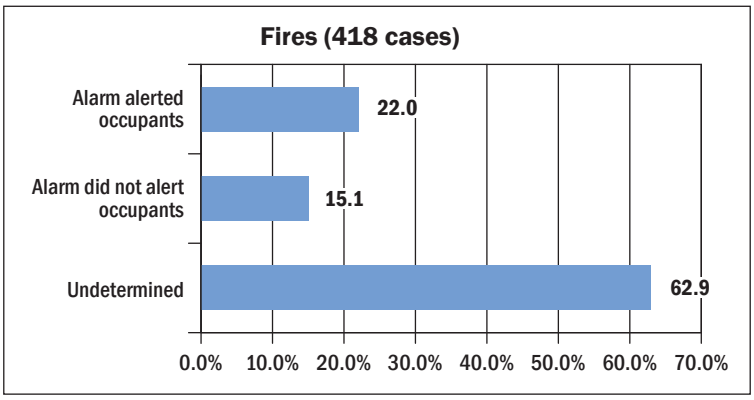
Source: 2006 NFIRS 5.0
556 total incidents
76 undetermined entries
33 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 22 percent of small, low-loss confined basic industrial building fires. Occupants were not alerted by a smoke alarm in 15 percent of these confined fires. In a large portion of confined basic industrial building fires (63 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 67).

Figure 67. Smoke Alarm Alert Status in Confined Basic Industrial Building Fires (2006)

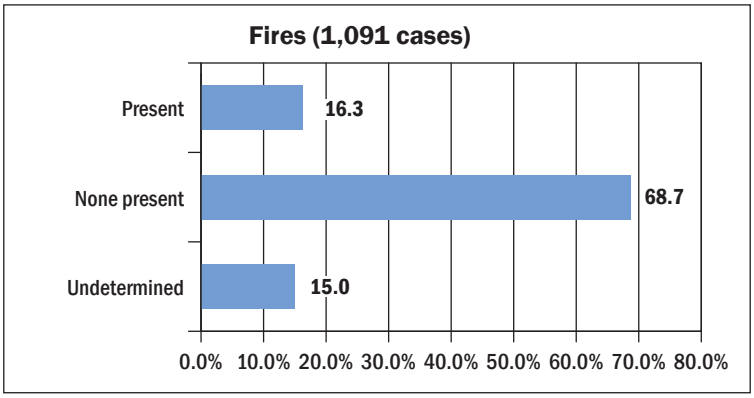


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 13.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 68, smoke alarms were present in 16 percent of nonconfined basic industrial building fires. Smoke alarms in nonconfined basic industrial building fires were not present 69 percent of the time. The presence of or absence of alarms was not reported to NFIRS in 15 percent of nonconfined basic industrial building fires.

Figure 68. Presence of Smoke Alarms in Nonconfined Basic Industrial Building Fires (2006)



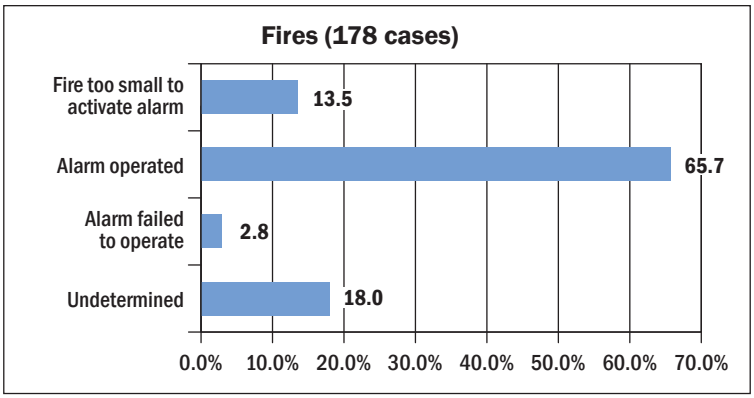
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 14.

When smoke alarms were present in nonconfined basic industrial building fires, the alarms operated in 66 percent of the incidents. In the remaining 34 percent of incidents, smoke alarms failed to operate (3 percent), the fire was too small to activate the system (14 percent), or no information on smoke alarm operation was available (18 percent) (Figure 69).[40]

[40] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 11 percent of all nonconfined basic industrial building fires (present 16.3% x operated 65.7% = 10.7%).

Figure 69. Smoke Alarm Operation When Alarm was Present in Nonconfined Basic Industrial Building Fires (2006)

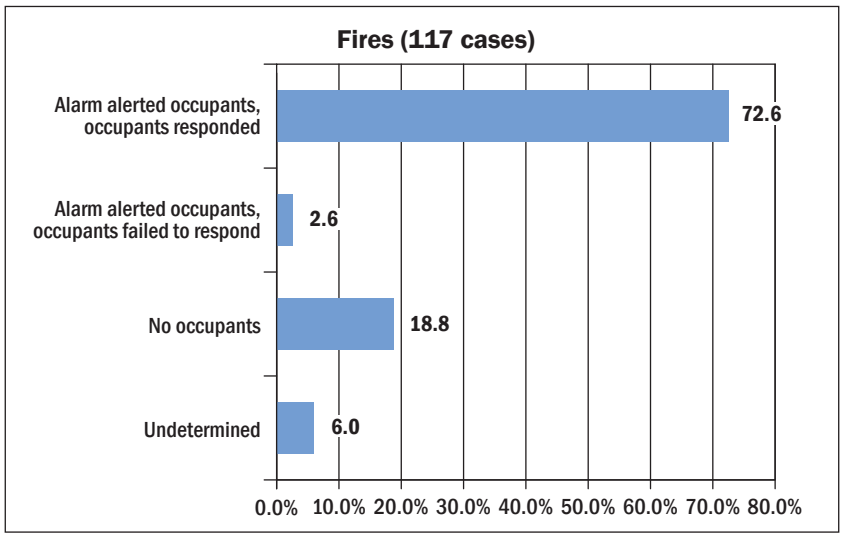


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 14.

The effectiveness of working smoke alarms in nonconfined basic industrial building fires is shown in Figure 70. In approximately three-quarters of the nonconfined basic industrial building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 73 percent of occupants were alerted and were able to respond to the warning, and an additional 3 percent were alerted but did not respond to the warning. There were no occupants in the building at the time of the fire in 19 percent of these incidents. Alarm alert effectiveness information was not available in 6 percent of nonconfined basic industrial building fires.[41]

Figure 70. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Basic Industrial Building Fires (2006)



Source: 2006 NFIRS 5.0

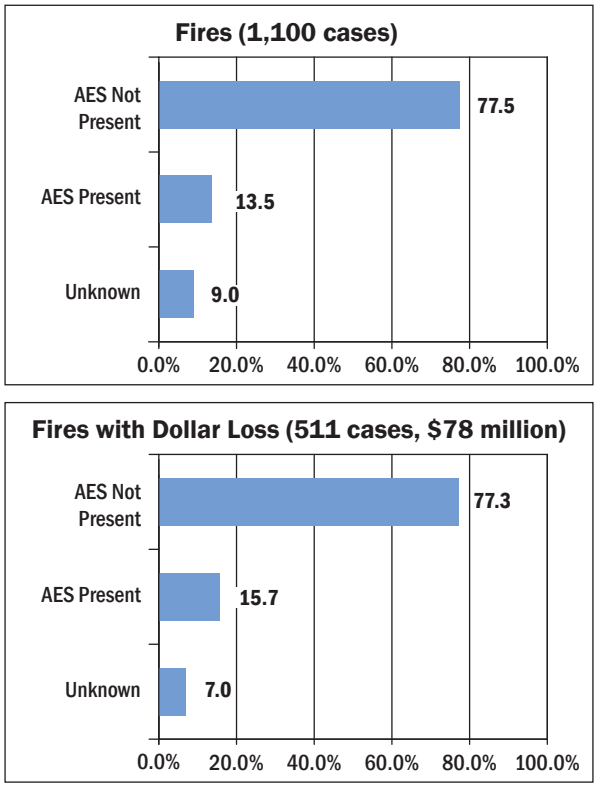
Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 14.

[41] Smoke alarms were effective at alerting occupants in 8 percent of all nonconfined basic industrial building fires (present 16.3% x operated 65.7% x alerted occupants 75.2% = 8.1%).

Automatic Extinguishing Systems

AESs were present in 14 percent of basic industrial building fires in 2006 (Figure 71). AESs were not present in 78 percent of the incidents, and in 9 percent of incidents, no information on AESs was available. In 16 percent of fires with dollar loss, AESs were present. There were no AESs present in 77 percent of fires with dollar loss, and no information on AESs was available in 7 percent of incidents.

Figure 71. Presence of Automatic Extinguishing Systems in Basic Industrial Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 31.

Manufacturing Buildings

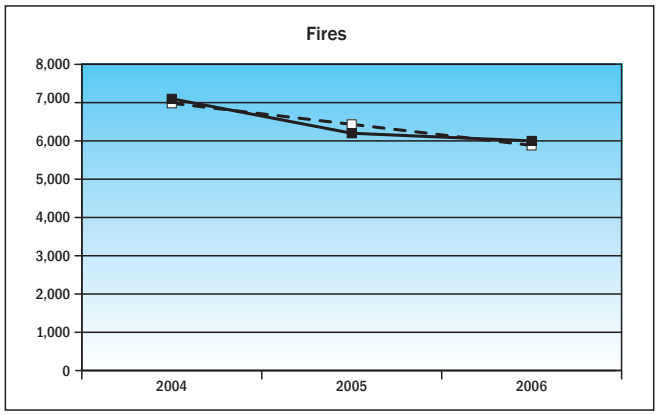
Manufacturing buildings make up six percent of the fire profile for nonresidential buildings. Manufacturing buildings include manufacturing and processing facilities.[42]

Trends

During the 3-year period (2004 through 2006), trends for manufacturing building fires and dollar loss declined by 16 percent and 34 percent respectively (Figure 72). Fires declined from 7,100 in 2004 to 6,000 in 2006. Dollar loss declined from $424 million in 2004 to $283 million in 2006.

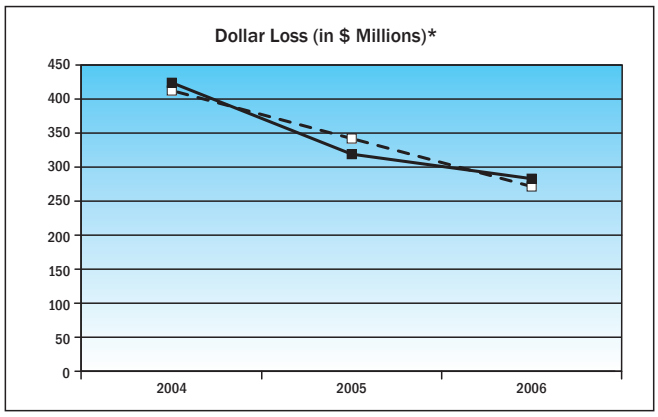
[42] Manufacturing and processing buildings include properties where there is a mechanical or chemical transformation of inorganic substances into new products. Includes factories making products of all kinds and properties devoted to operations such as processing, assemblies, mixing, packing, finishing or decorating, and repairing.

Figure 72. Trends in Manufacturing Building Fires and Fire Losses (2004–2006)



FIRES

Year	Value
2004	7,100
2005	6,200
2006	6,000
3-Year Trend (%)	**-15.8**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

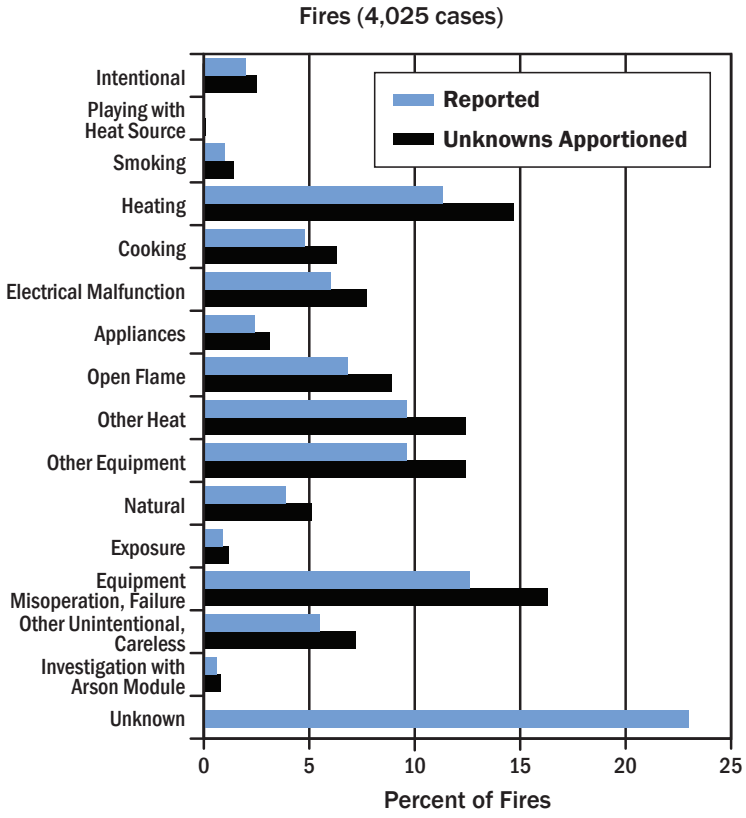
Year	Value
2004	$424
2005	$319
2006	$283
3-Year Trend (%)	**-34.2**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

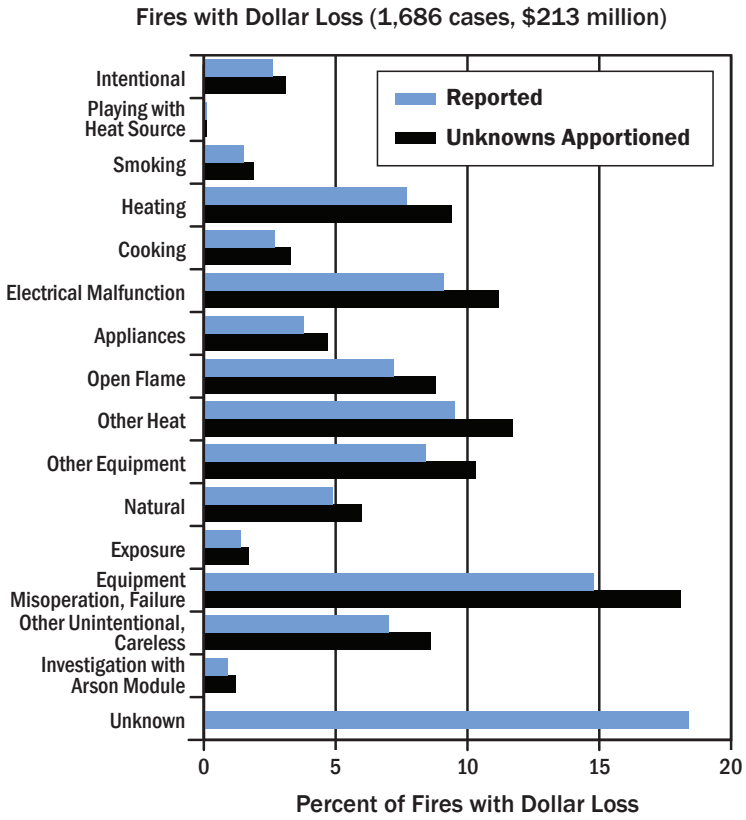
Causes

Sixteen percent of all fires in manufacturing buildings are caused by equipment misoperation or failures (Figure 73), followed by heating (15 percent), other equipment (12 percent), and other heat (12 percent). The leading causes for fires with dollar loss are equipment misoperation or failures (18 percent), other heat (12 percent), and electrical malfunctions (11 percent).

Figure 73. Fire Cause for Manufacturing Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	2.0	2.5
Playing with Heat Source	0.0	0.1
Smoking	1.0	1.4
Heating	11.3	14.7
Cooking	4.8	6.3
Electrical Malfunction	6.0	7.7
Appliances	2.4	3.1
Open Flame	6.8	8.9
Other Heat	9.6	12.4
Other Equipment	9.6	12.4
Natural	3.9	5.1
Exposure	0.9	1.2
Equipment Misoperation, Failure	12.6	16.3
Other Unintentional, Careless	5.5	7.2
Investigation w/Arson Module	0.6	0.8
Unknown	23.0	



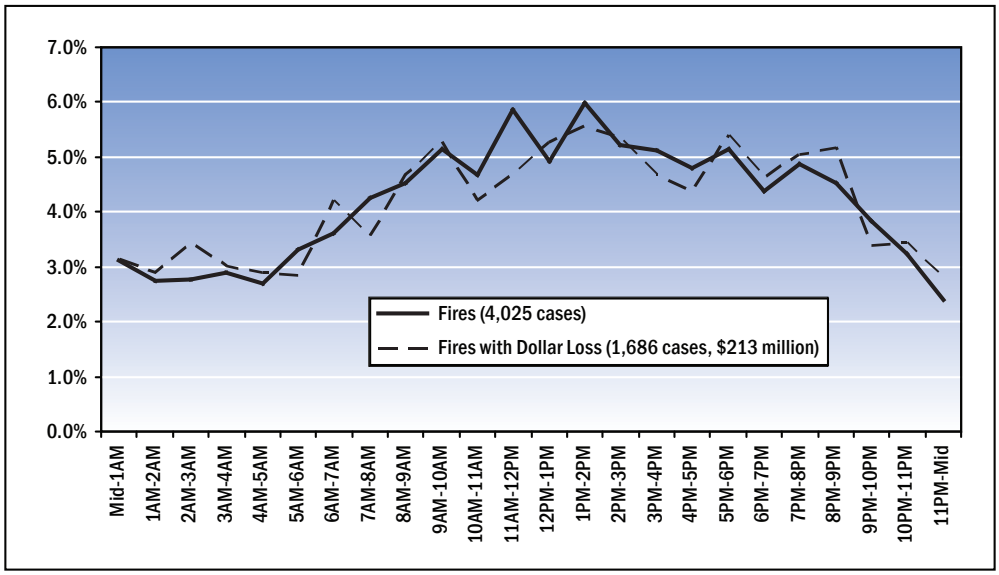
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	2.6	3.1
Playing with Heat Source	0.1	0.1
Smoking	1.5	1.9
Heating	7.7	9.4
Cooking	2.7	3.3
Electrical Malfunction	9.1	11.2
Appliances	3.8	4.7
Open Flame	7.2	8.8
Other Heat	9.5	11.7
Other Equipment	8.4	10.3
Natural	4.9	6.0
Exposure	1.4	1.7
Equipment Misoperation, Failure	14.8	18.1
Other Unintentional, Careless	7.0	8.6
Investigation w/Arson Module	0.9	1.2
Unknown	18.4	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in manufacturing buildings are highest between 1 p.m. and 2 p.m. and lowest between 11 p.m. and midnight, Figure 74. Fires with reported dollar loss are also highest between 1 p.m. and 2 p.m. However, the incidence of fires with dollar loss is lowest during the late evening and early morning hours.

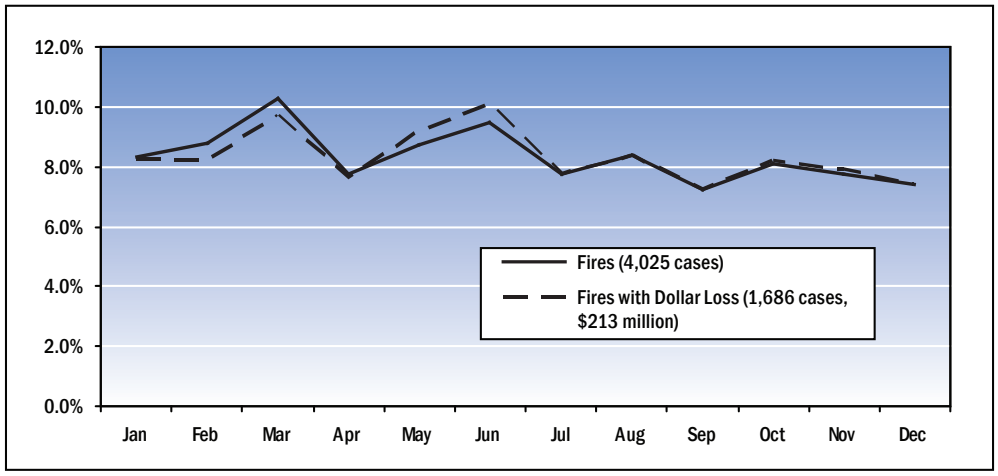
Figure 74. Time of Fire Alarm for Manufacturing Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. For 2006, fires in manufacturing buildings are more frequent in March and occur less often in September (Figure 75). Fires with dollar loss are highest in June and lowest in September.

Figure 75. Month of Year of Manufacturing Building Fires and Fires with Dollar Loss (2006)

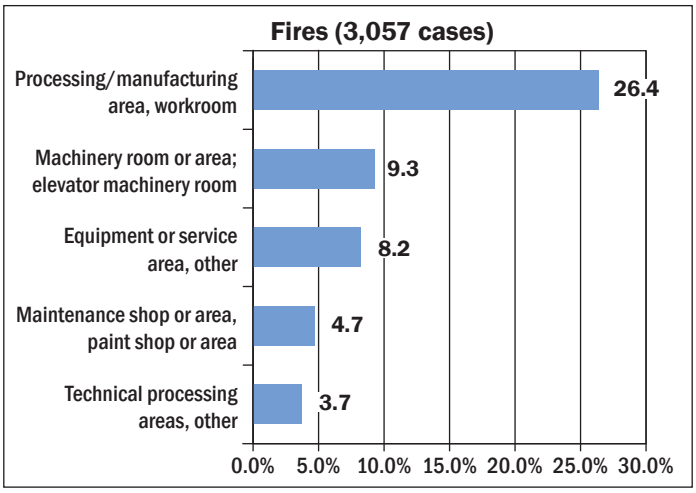


Source: 2006 NFIRS 5.0

Area of Fire Origin

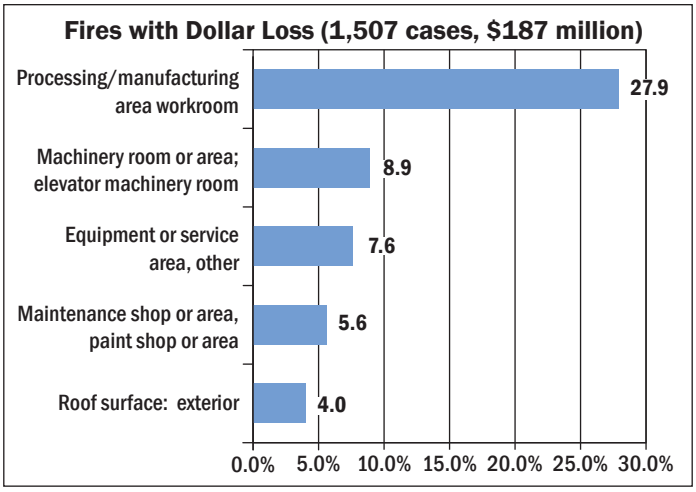
Figure 76 shows the leading areas where fires and fires with reported dollar loss originated in manufacturing buildings in 2006. The three leading areas of fire origin for fires are processing, manufacturing, or workrooms (26 percent), machinery or elevator rooms (9 percent), and equipment or service area, other (8 percent). In manufacturing building fires with reported dollar loss, the top three areas of fire origin are also processing, manufacturing, or workrooms (28 percent), machinery or elevator rooms (9 percent), and equipment or service area, other (8 percent).

Figure 76. Leading Areas of Fire Origin in Manufacturing Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
4,025 total incidents
166 undetermined entries
802 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



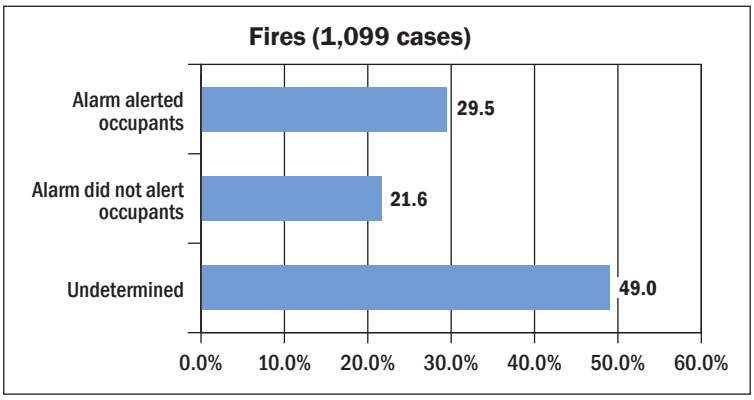
Source: 2006 NFIRS 5.0
1,686 total incidents
55 undetermined entries
124 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 30 percent of small, low-loss confined manufacturing building fires. Occupants were not alerted by a smoke alarm in 22 percent of these confined fires. In a large portion of confined manufacturing building fires (49 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 77).

Figure 77. Smoke Alarm Alert Status in Confined Manufacturing Building Fires (2006)

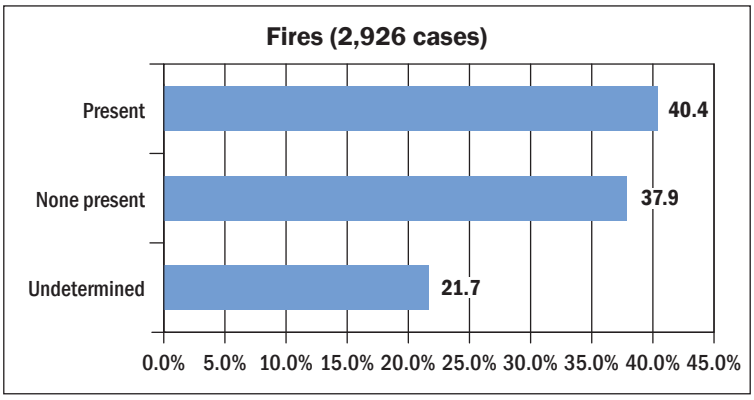


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 15.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 78, smoke alarms were present in 40 percent of nonconfined manufacturing building fires. Smoke alarms in nonconfined manufacturing building fires were not present 38 percent of the time. The presence or absence of alarms was not reported to NFIRS in 22 percent of nonconfined manufacturing building fires.

Figure 78. Presence of Smoke Alarms in Nonconfined Manufacturing Building Fires (2006)



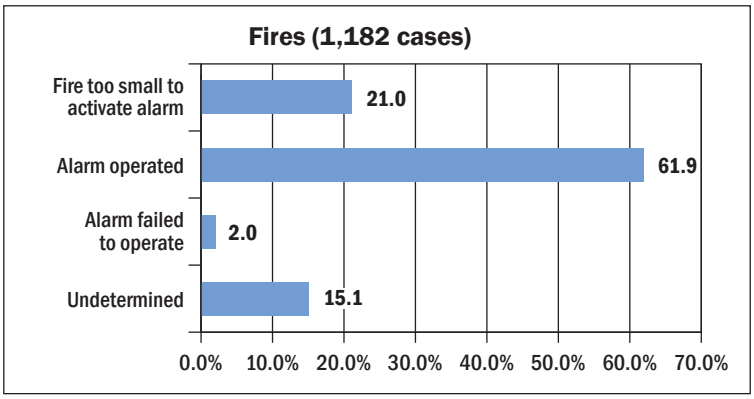
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 16.

When smoke alarms were present in nonconfined manufacturing building fires, the alarms operated in 62 percent of the incidents. In the remaining 38 percent of incidents, smoke alarms failed to operate (2 percent), the fire was too small to activate the system (21 percent), or no information on smoke alarm operation was available (15 percent) (Figure 79).[43]

[43] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 25 percent of all nonconfined manufacturing building fires (present 40.4% x operated 61.9% = 25.0%).

Figure 79. Smoke Alarm Operation When Alarm was Present in Nonconfined Manufacturing Building Fires (2006)

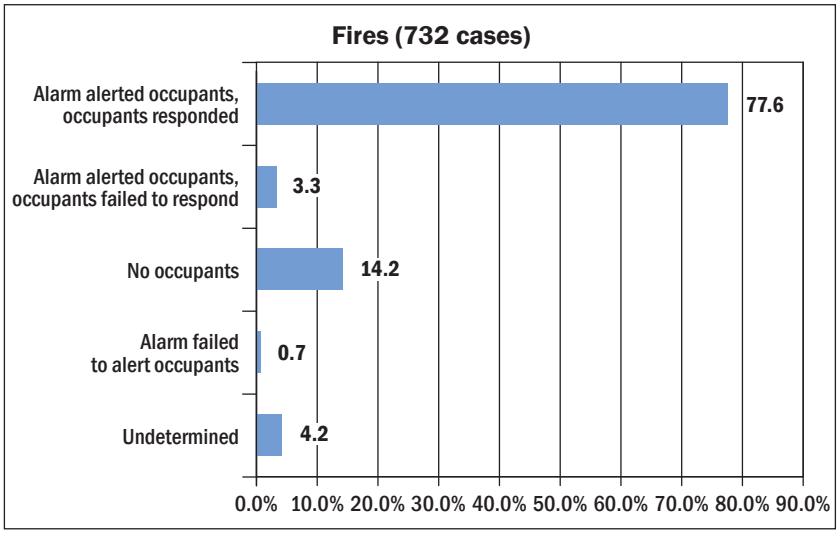


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 16.

The effectiveness of working smoke alarms in nonconfined manufacturing building fires is shown in Figure 80. In 81 percent of nonconfined manufacturing building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 78 percent of occupants were alerted and were able to respond to the warning, and an additional 3 percent were alerted but did not respond to the warning. Occupants were not alerted in 1 percent of nonconfined manufacturing fires, and no occupants were in the building at the time of the fire in 14 percent of these incidents. Alarm alert effectiveness information was not available in 4 percent of nonconfined manufacturing building fires.[44]

Figure 80. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Manufacturing Building Fires (2006)



Source: 2006 NFIRS 5.0

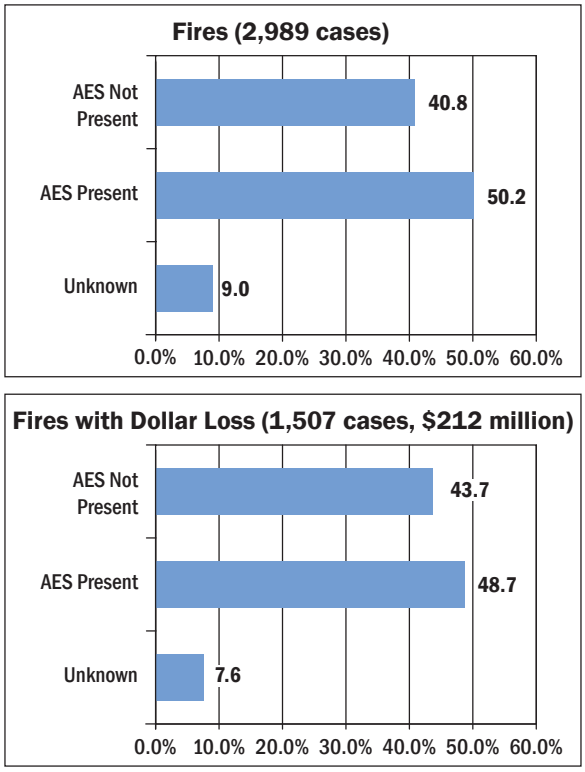
Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 16.

Automatic Extinguishing Systems

AESs were present in 50 percent of manufacturing building fires in 2006 (Figure 81). AESs were not present in 41 percent of the incidents, and in 9 percent of incidents, no information on AESs was available. In 49 percent of fires with dollar loss, AESs were present. There were no AESs present in 44 percent of fires with dollar loss, and no information on AESs was available in 8 percent of incidents.

[44] Smoke alarms were effective at alerting occupants in 20 percent of all nonconfined manufacturing building fires (present 40.4% x operated 61.9% x alerted occupants 80.9% = 20.2%).

Figure 81. Presence of Automatic Extinguishing Systems in Manufacturing Building Fires and Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 32.

Storage Buildings

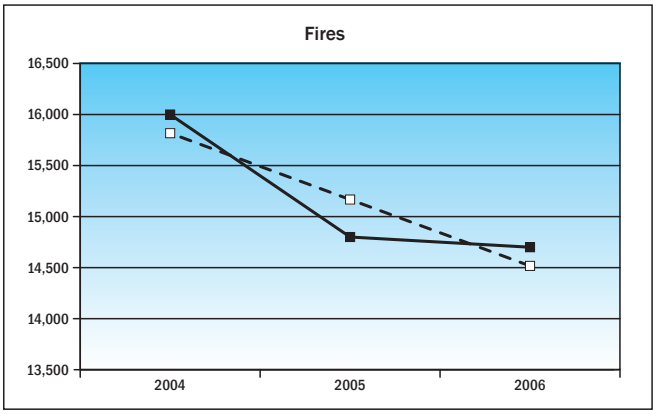
Storage buildings make up 15 percent of the fire profile for nonresidential buildings. Storage buildings include such facilities as outside material storage areas, livestock and poultry storage, and warehouses.[45] In this report, storage buildings do not include detached residential garages, which include parking garages associated with multifamily housing. Detached garages are discussed in the next section of this report.

Trends

During the 3-year period (2004 through 2006), trends for storage building fires decreased by 8 percent and dollar loss decreased by 26 percent (Figure 82). Fires decreased from 16,000 in 2004 to 14,700 in 2006. Dollar loss also decreased from $419 million in 2004 to $312 million in 2006.

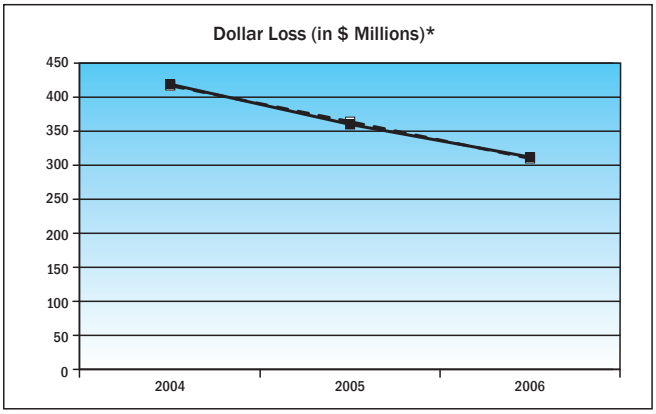
[45] Storage areas include outside material storage area; outbuilding or shed; grain elevator, silo; livestock, poultry storage; refrigerated storage; outside storage tank; vehicle storage, other; parking garage, general vehicle storage; fire station; warehouse; dock, marina, pier, wharf; residential storage or self-storage units; and other storage.

Figure 82. Trends in Storage Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	16,000
2005	14,800
2006	14,700
3-Year Trend (%)	**-8.2**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

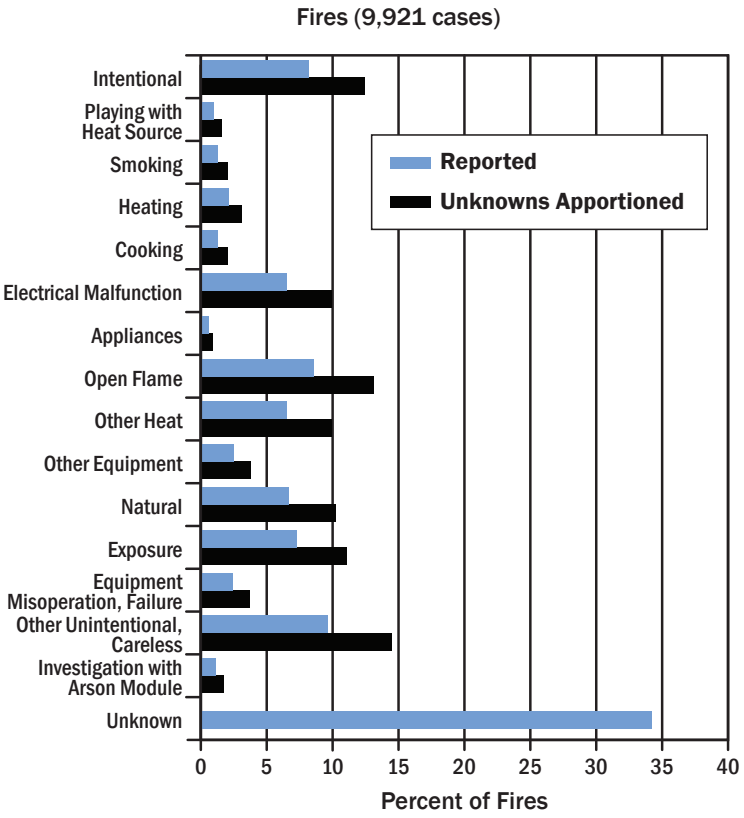
Year	Value
2004	$419
2005	$360
2006	$312
3-Year Trend (%)	**-25.6**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

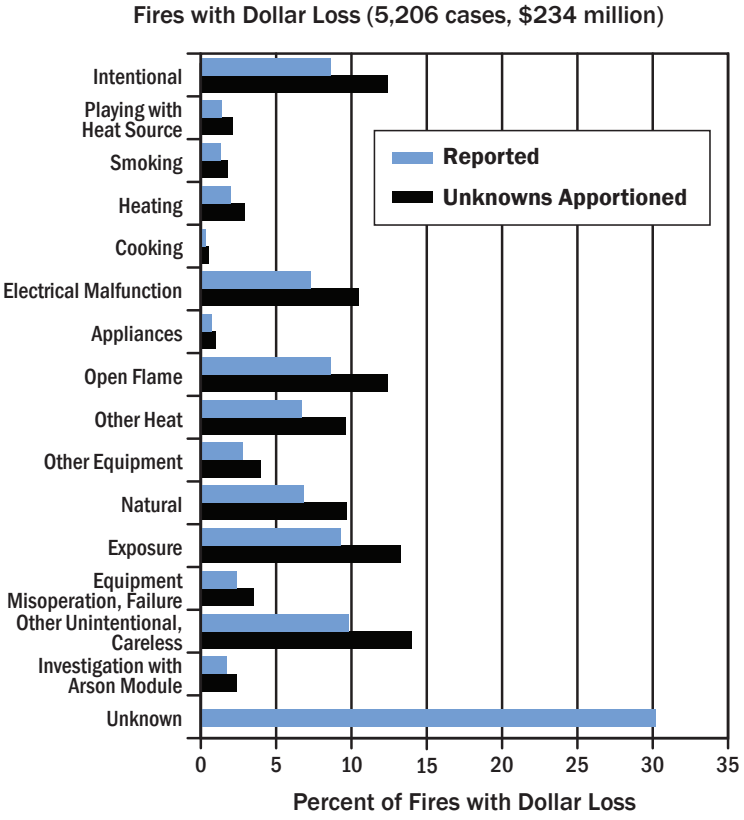
Causes

Fifteen percent of all fires in storage buildings are caused by other unintentional or careless actions (Figure 83). Open flame (13 percent) and intentional (12 percent) are the next leading causes of fires. The leading causes for storage building fires with dollar loss are other unintentional or careless actions (14 percent), exposures (13 percent), open flame (12 percent), and intentional (12 percent).

Figure 83. Fire Cause for Storage Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	8.2	12.4
Playing with Heat Source	1.0	1.6
Smoking	1.3	2.0
Heating	2.1	3.1
Cooking	1.3	2.0
Electrical Malfunction	6.5	9.9
Appliances	0.6	0.9
Open Flame	8.6	13.1
Other Heat	6.5	9.9
Other Equipment	2.5	3.8
Natural	6.7	10.2
Exposure	7.3	11.1
Equipment Misoperation, Failure	2.4	3.7
Other Unintentional, Careless	9.6	14.5
Investigation w/Arson Module	1.1	1.7
Unknown	34.2	



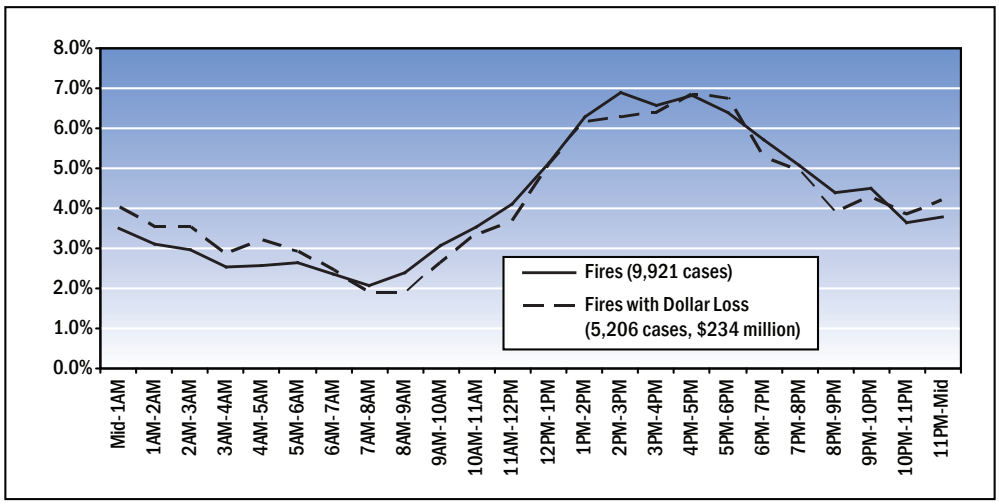
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	8.6	12.4
Playing with Heat Source	1.4	2.1
Smoking	1.3	1.8
Heating	2.0	2.9
Cooking	0.3	0.5
Electrical Malfunction	7.3	10.5
Appliances	0.7	1.0
Open Flame	8.6	12.4
Other Heat	6.7	9.6
Other Equipment	2.8	4.0
Natural	6.8	9.7
Exposure	9.3	13.3
Equipment Misoperation, Failure	2.4	3.5
Other Unintentional, Careless	9.8	14.0
Investigation w/Arson Module	1.7	2.4
Unknown	30.2	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in storage buildings are highest between 2 p.m. and 3 p.m., and lowest between 7 a.m. and 8 a.m. (Figure 84). Fires with dollar loss closely follow the incidence of fires in storage buildings. Fires with dollar loss are highest between 4 p.m. and 5 p.m. and lowest between 7 a.m. and 9 a.m.

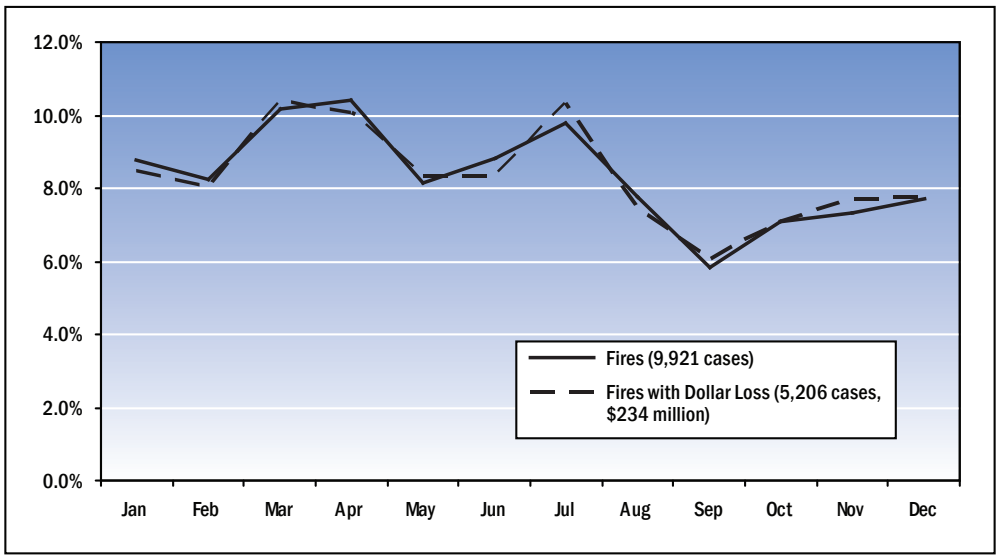
Figure 84. Time of Fire Alarm for Storage Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. For 2006, the incidence of fires in storage buildings is highest in March and April and lowest in September (Figure 85). Fires with dollar loss peak in March, April, and July and are lowest in September.

Figure 85. Month of Year of Storage Building Fires and Fires with Dollar Loss (2006)

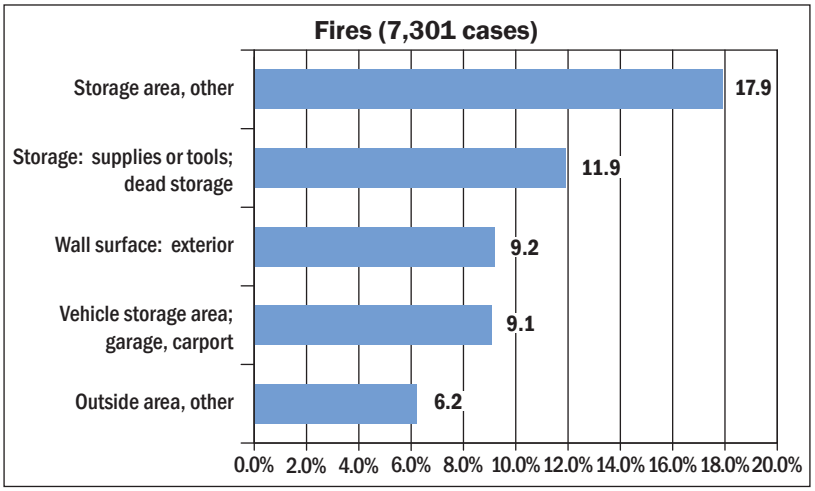


Source: 2006 NFIRS 5.0

Area of Fire Origin

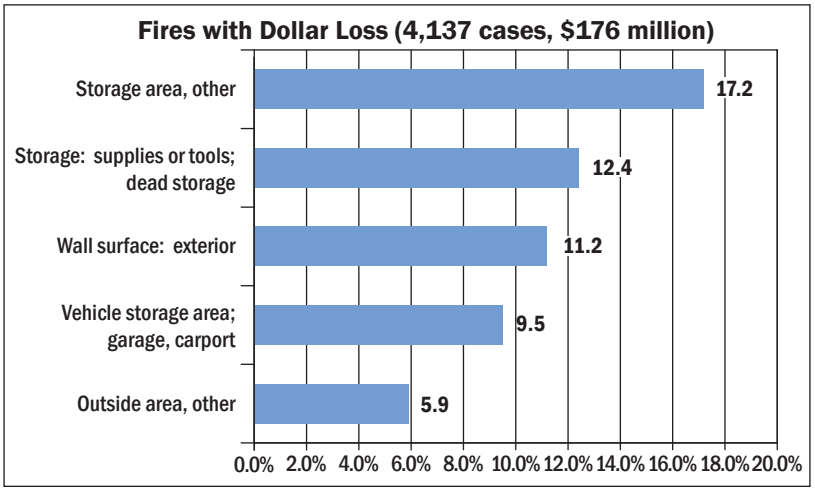
Figure 86 shows the leading areas where fires and fires with reported dollar loss originated in storage buildings in 2006. The three leading areas of fire origin are storage area, other (18 percent); storage: supplies or tools; dead storage (12 percent); and exterior wall surface (9 percent). In storage building fires with dollar loss, the leading areas of fire origin are the same as those for all fires in storage buildings. The top three areas of fire origin for fires with loss are storage area, other (17 percent); storage: supplies or tools; dead storage (12 percent); and exterior wall surface (11 percent).

Figure 86. Leading Areas of Fire Origin in Storage Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
9,921 total incidents
1,894 undetermined entries
726 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



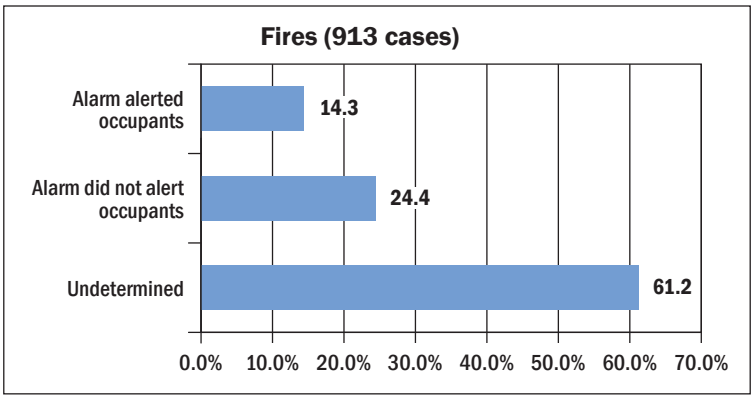
Source: 2006 NFIRS 5.0
5,206 total incidents
976 undetermined entries
93 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 14 percent of small, low-loss confined storage building fires. Occupants were not alerted by a smoke alarm in 24 percent of these confined fires. In a large portion of confined storage building fires (61 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 87).

Figure 87. Smoke Alarm Alert Status in Confined Storage Building Fires (2006)

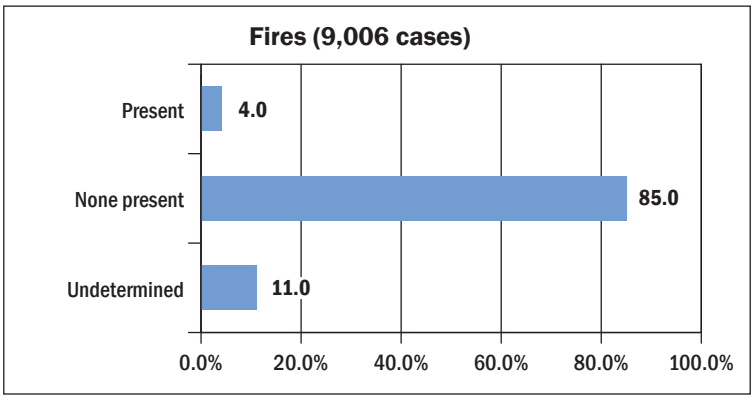


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 17.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 88, smoke alarms were present in 4 percent of nonconfined storage building fires. Smoke alarms in nonconfined storage building fires were not present 85 percent of the time. The presence or absence of alarms was not reported to NFIRS in 11 percent of nonconfined storage building fires.

Figure 88. Presence of Smoke Alarms in Nonconfined Storage Building Fires (2006)



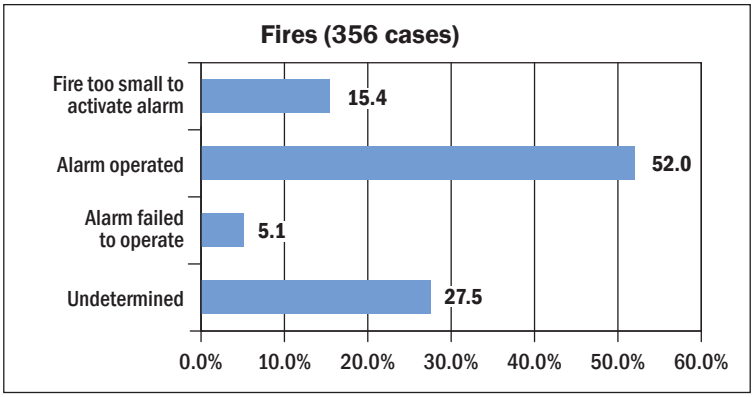
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 18.

When smoke alarms were present in nonconfined storage building fires, the alarms operated in 52 percent of the incidents. In the remaining 48 percent of incidents, smoke alarms failed to operate (5 percent), the fire was too small to activate the system (15 percent), or no information on smoke alarm operation was available (28 percent) (Figure 89).[46]

[46] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 2 percent of all nonconfined storage building fires (present 4.0% x operated 52.0% = 2.1%).

Figure 89. Smoke Alarm Operation When Alarm was Present in Nonconfined Storage Building Fires (2006)

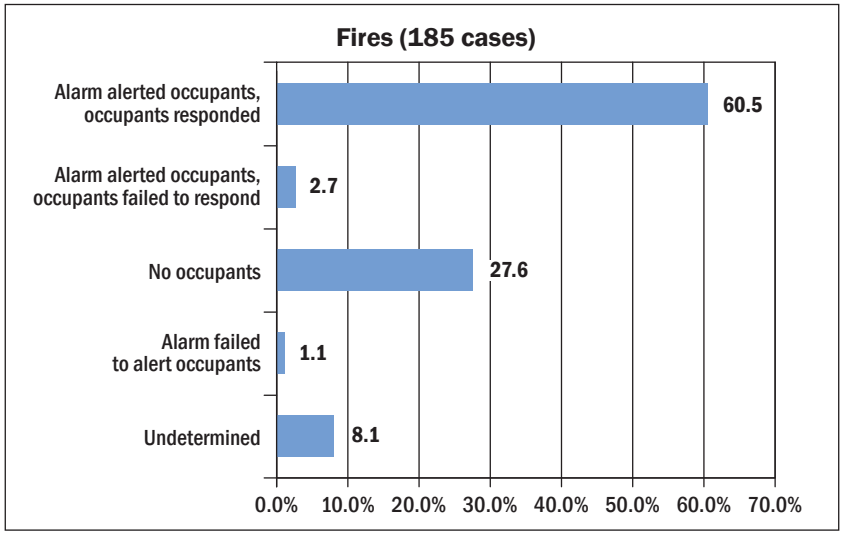


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 18.

The effectiveness of working smoke alarms in nonconfined storage building fires is shown in Figure 90. In 63 percent of nonconfined basic storage building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 61 percent of occupants were alerted and were able to respond to the warning, and an additional 3 percent were alerted but did not respond to the warning.[47] Occupants were not alerted in 1 percent of nonconfined storage building fires, and no occupants were in the building at the time of the fire in 28 percent of these incidents. Alarm alert effectiveness information was not available in 8 percent of nonconfined storage building fires.[48]

Figure 90. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Storage Building Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 18.

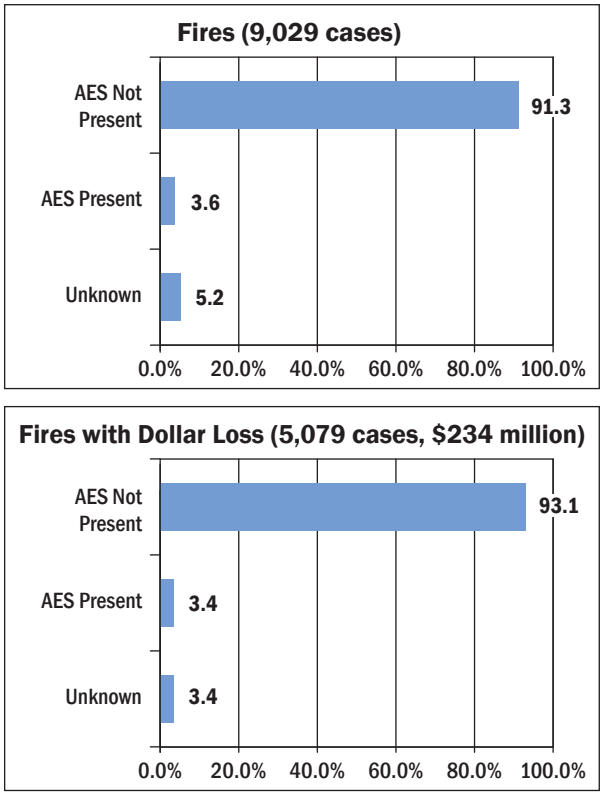
[47] Totals cited in the text do not add due to rounding.

[48] Smoke alarms were effective at alerting occupants in 1 percent of all nonconfined storage building fires (present 4.0% x operated 52.0% x alerted occupants 63.2% = 1.3%).

Automatic Extinguishing Systems

AESs were present in 4 percent of storage building fires in 2006 (Figure 91). AESs were not present in 91 percent of the incidents, and in 5 percent of incidents, no information on AESs was available. The overall pattern for AES presence was similar to that of fires. In 3 percent of fires with dollar loss, AESs were present. There were no AESs present in 93 percent of fires with dollar loss, and no information on AESs was available in 3 percent of incidents.

Figure 91. Presence of Automatic Extinguishing Systems in Storage Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 33.

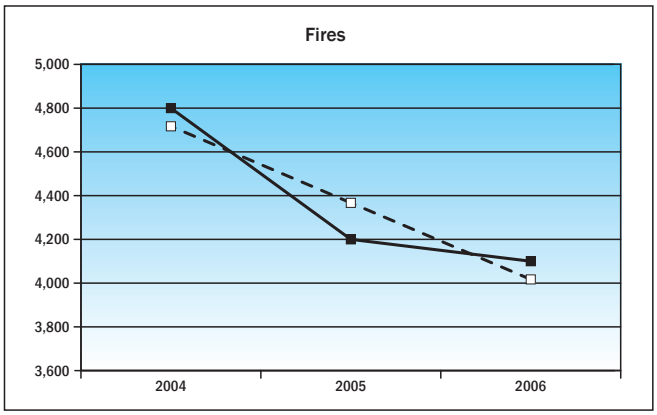
Detached Garages

Parking garages or detached residential garages also include detached parking structures associated with multifamily housing. Detached garages make up four percent of the fire profile for nonresidential buildings.

Trends

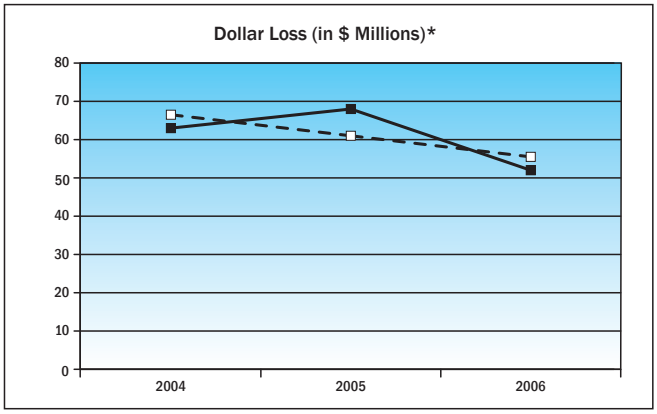
During the 3-year period (2004 through 2006), the trend for detached garage fires declined by 15 percent and dollar loss decreased by 17 percent (Figure 92). Fires declined from 4,800 in 2004 to 4,100 in 2006. Dollar loss decreased from $63 million in 2004 to $52 million in 2006.

Figure 92. Trends in Detached Garage Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	4,800
2005	4,200
2006	4,100
3-Year Trend (%)	**-14.8**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

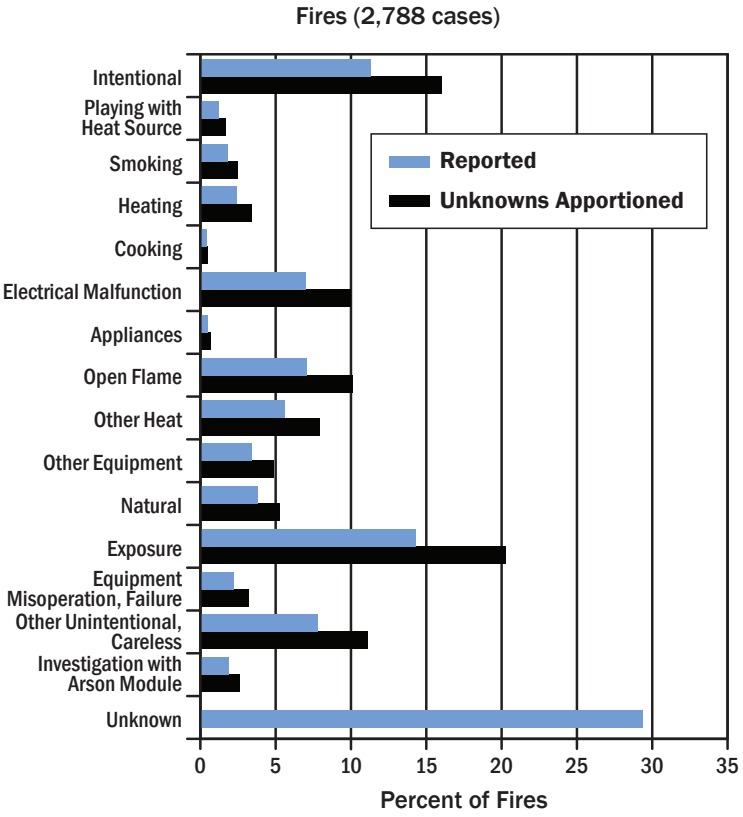
Year	Value
2004	$63
2005	$68
2006	$52
3-Year Trend (%)	**-16.5**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

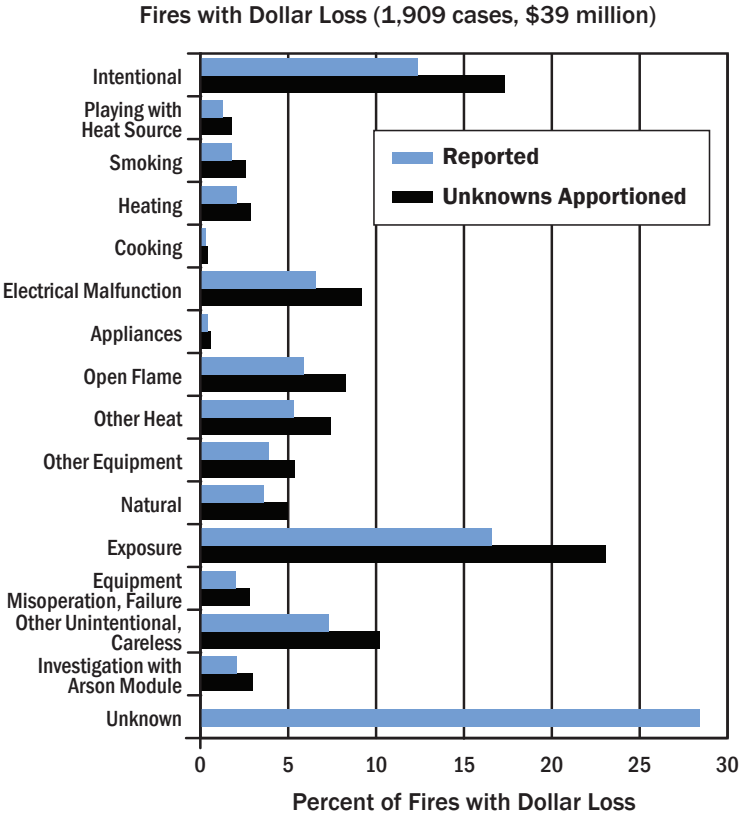
Causes

Exposure fires account for 20 percent of all fires in detached garages (Figure 93). Intentionally set fires account for 16 percent of fire causes, and other unintentional or careless actions cause an additional 11 percent of fires. The three leading causes of detached garage fires with dollar loss are the same as those for fire incidence: exposures (23 percent), intentional (17 percent), and other unintentional or careless actions (10 percent).

Figure 93. Fire Cause for Detached Garage Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	11.3	16.0
Playing with Heat Source	1.2	1.7
Smoking	1.8	2.5
Heating	2.4	3.4
Cooking	0.4	0.5
Electrical Malfunction	7.0	10.0
Appliances	0.5	0.7
Open Flame	7.1	10.1
Other Heat	5.6	7.9
Other Equipment	3.4	4.9
Natural	3.8	5.3
Exposure	14.3	20.3
Equipment Misoperation, Failure	2.2	3.2
Other Unintentional, Careless	7.8	11.1
Investigation w/Arson Module	1.9	2.6
Unknown	29.4	



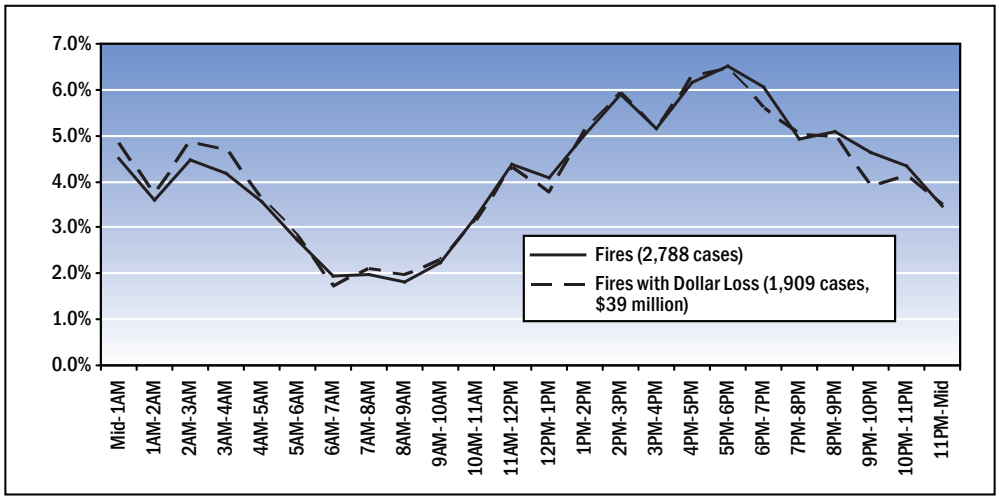
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	12.4	17.3
Playing with Heat Source	1.3	1.8
Smoking	1.8	2.6
Heating	2.1	2.9
Cooking	0.3	0.4
Electrical Malfunction	6.6	9.2
Appliances	0.4	0.6
Open Flame	5.9	8.3
Other Heat	5.3	7.4
Other Equipment	3.9	5.4
Natural	3.6	5.0
Exposure	16.6	23.1
Equipment Misoperation, Failure	2.0	2.8
Other Unintentional, Careless	7.3	10.2
Investigation w/Arson Module	2.1	3.0
Unknown	28.4	

Source: 2006 NFIRS 5.0

When Fires Occur

Time Of Fire Alarm. Fires in detached garages are highest between 5 p.m. and 6 p.m. and lowest between 8 a.m. and 9 a.m. (Figure 94). Fires with dollar loss are highest between 5 p.m. and 6 p.m. and lowest between 6 a.m. and 7 a.m.

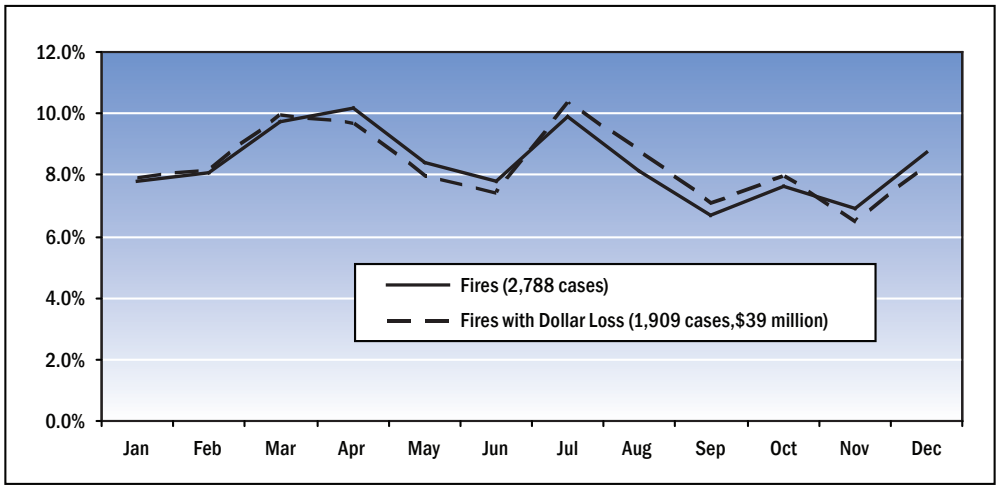
Figure 94. Time of Fire Alarm for Detached Garage Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. The highest incidence of fires in detached garages occurs in April, while fires are less frequent in September. Fires with dollar loss are highest in July and lowest in November (Figure 95).

Figure 95. Month of Year of Detached Garage Fires and Fires with Losses (2006)

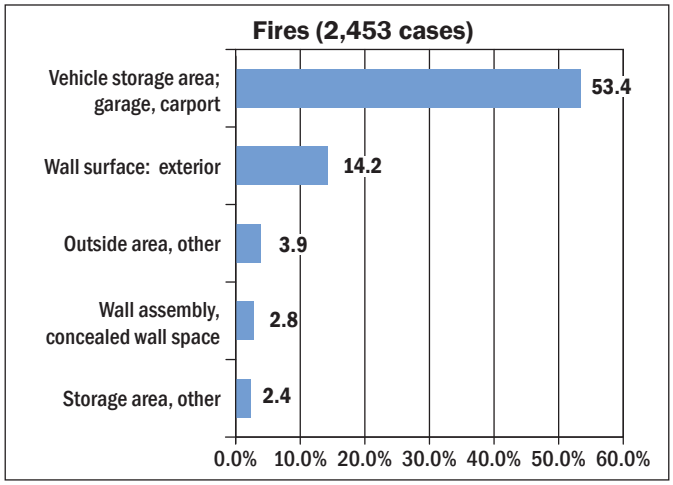


Source: 2006 NFIRS 5.0

Area of Fire Origin

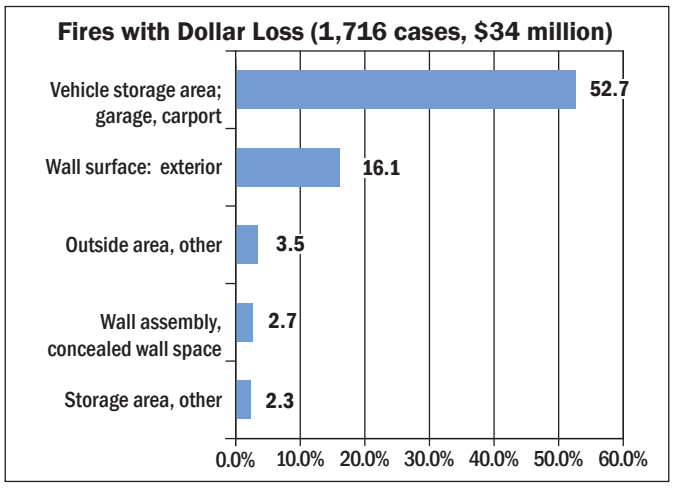
Figure 96 shows the leading areas where fires and fires with reported dollar loss originated in detached garages in 2006. In detached garage fires, the leading areas of fire origin are the same as those for garage fires with dollar loss. The three leading areas of fire origin for detached garage fires are vehicle storage area; garage, carport (53 percent); exterior wall surface (14 percent); and outside area, other (4 percent). In detached garage fires with dollar loss, the top three areas of fire origin are vehicle storage area; garage, carport (53 percent); exterior wall surface (16 percent); and outside area, other (4 percent).

Figure 96. Leading Areas of Fire Origin in Detached Garage Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
2,788 total incidents
273 undetermined entries
62 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



Source: 2006 NFIRS 5.0
1,909 total incidents
179 undetermined entries
14 entries with no data

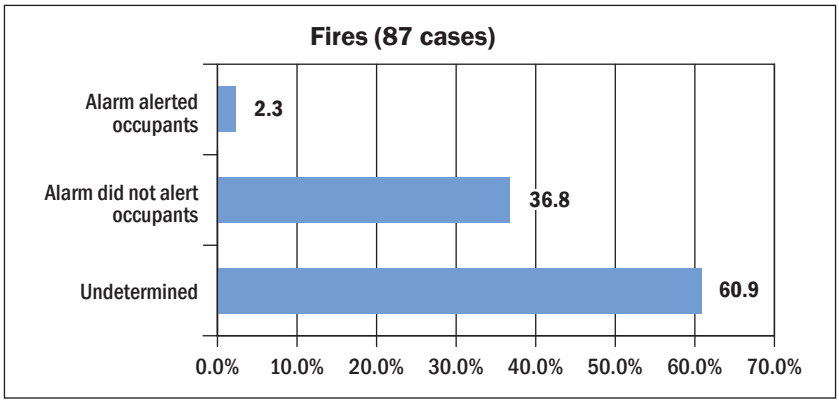
Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Detached garages include only a small number of fires with smoke alarm operation and effectiveness data. The analyses below present preliminary findings only, and no definitive conclusions concerning the operation or effectiveness of smoke alarms should be drawn.

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 2 percent of small, low-loss confined detached garage fires. Occupants were not alerted by a smoke alarm in 37 percent of these confined fires. In a large portion of confined detached garage fires (61 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 97).

Figure 97. Smoke Alarm Alert Status in Confined Detached Garage Fires (2006)

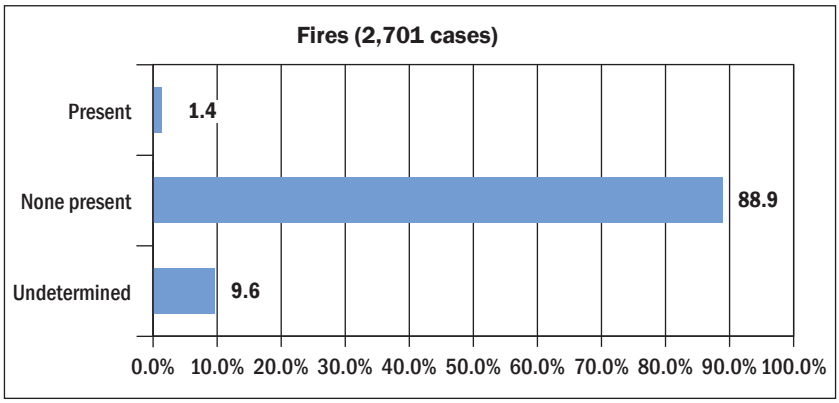


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 19.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 98, smoke alarms were present in 1 percent of nonconfined detached garage fires. Smoke alarms in nonconfined detached garage fires were not present 89 percent of the time. The presence of or absence of alarms was not reported to NFIRS in 10 percent of nonconfined detached garage fires.

Figure 98. Presence of Smoke Alarms in Nonconfined Detached Garage Fires (2006)

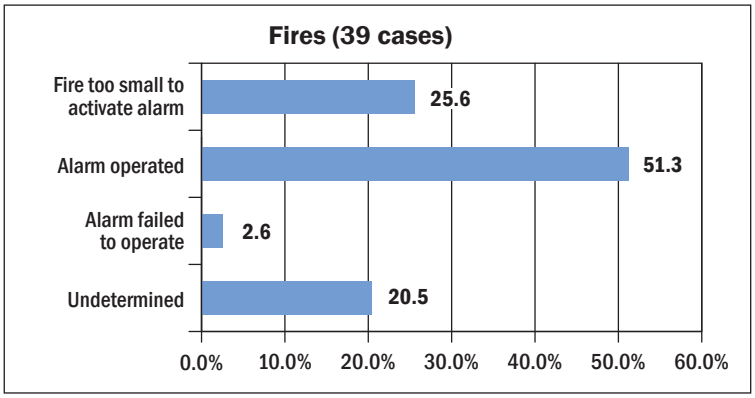


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 20.

When smoke alarms were present in nonconfined detached garage fires, the alarms operated in 51 percent of the incidents. In the remaining 49 percent of incidents, smoke alarms failed to operate (3 percent), the fire was too small to activate the system (26 percent), or no information on smoke alarm operation was available (21 percent) (Figure 99).[49]

Figure 99. Smoke Alarm Operation When Alarm was Present in Nonconfined Detached Garage Fires (2006)

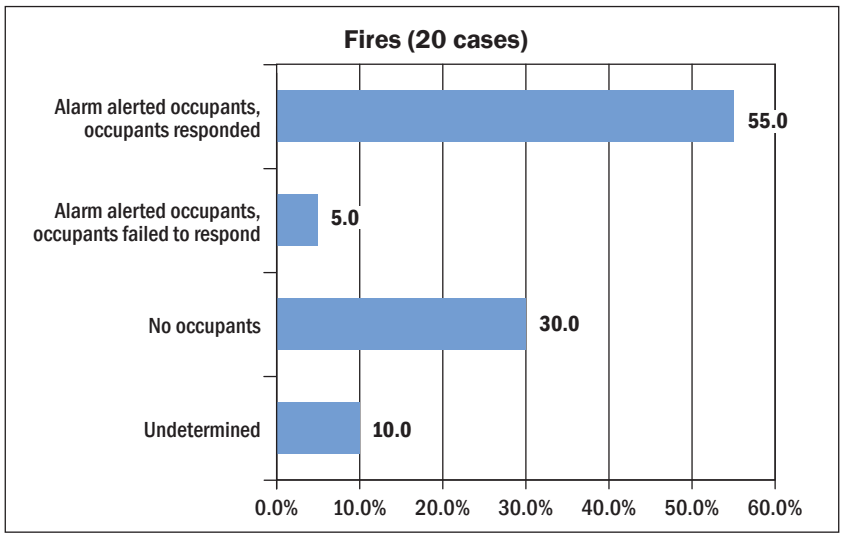


Source: 2006 NFIRS 5.0

Notes: Because the number of cases is small, the analysis is presented as a preliminary finding only, and no definitive conclusions concerning the operation of smoke alarms should be drawn. Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 20.

The effectiveness of working smoke alarms in nonconfined detached garage fires is shown in Figure 100. In 60 percent of nonconfined detached garage fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 55 percent of occupants were alerted and were able to respond to the warning, and an additional 5 percent were alerted but did not respond to the warning. There were no occupants in the building at the time of the fire in 30 percent of these incidents. Alarm alert effectiveness information was not available in 10 percent of nonconfined detached garage fires.[50]

Figure 100. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Detached Garage Fires (2006)



Source: 2006 NFIRS 5.0

Notes: Because the number of cases is small, the analysis is presented as a preliminary finding only, and no definitive conclusions concerning the operational effectiveness of smoke alarms should be drawn. Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 20.

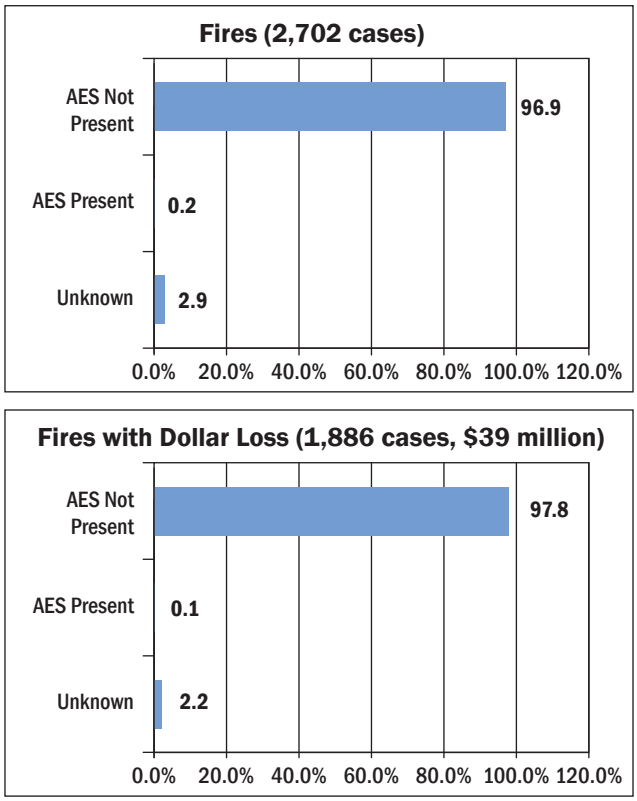
[49] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 1 percent of all nonconfined detached garage fires (present 1.4% x operated 51.3% = 0.7%).

[50] Smoke alarms were effective at alerting occupants in less than 1 percent of all nonconfined detached garage fires (present 1.4% x operated 51.3% x alerted occupants 60.0% = 0.4%).

Automatic Extinguishing Systems

AESs were present in less than 1 percent of detached garage fires in 2006 (Figure 101). AESs were not present in 97 percent of the incidents, and in 3 percent of incidents, no information on AESs was available. The overall pattern for AES presence for detached garage fires with dollar loss was similar to that of fires. In less than one percent of fires with dollar loss, AESs were present. There were no AESs present in 98 percent of fires with dollar loss, and no information on AESs was available in 2 percent of incidents.

Figure 101. Presence of Automatic Extinguishing Systems in Detached Garage Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 34.

Outside and Special Property Buildings

Outside and special property buildings make up 18 percent of the fire profile for nonresidential buildings.[51] Examples of these types of buildings are guard posts, outside kiosks, and the like. Thirty-two percent of nonconfined building fires on outside and special properties are mobile properties used as fixed buildings (e.g., portable buildings and mobile properties such as trailers) compared to only 6 percent across all nonresidential properties.

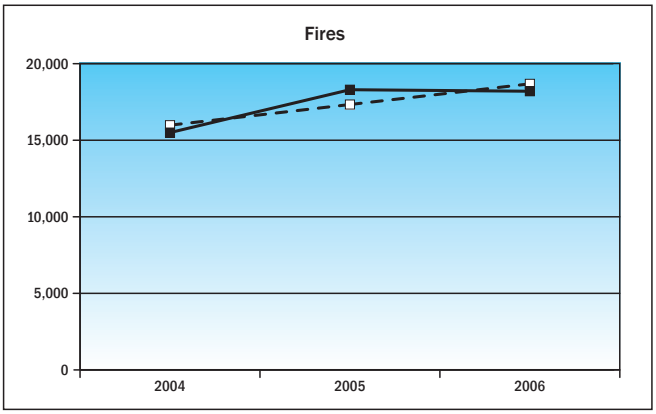
[51] Outside and Special property buildings include dump, sanitary landfill; bridge, trestle; tunnel; outbuilding, protective shelter; open land or field; campsite with utilities; vacant lot; beach; graded and cared-for-plots of land; open ocean sea, or tidal waters; lake, river, stream; water area, other; railroad right-of-way; railroad yard, switch or classification area; highway or divided highway; residential street, road, or residential driveway; street or road in commercial area; vehicle parking area; street, other; aircraft runway; aircraft taxiway; aircraft loading area; construction site; oil or gas field; pipeline, power line, or other utility right-of-way; industrial plant yard area, not outdoor storage; and outside or special property, other.

Confined fires play a large role in outside property building fires. As noted previously, confined fires account for 45 percent of all nonresidential building fires, while confined fires account for 78 percent of outside and special property building fires. Ninety one percent of these confined incidents are trash or rubbish fires. Due to the limited fire information available for confined fires, further investigation is needed to determine if these trash fires are properly coded as building fires on outside properties or whether they are outside rubbish fires.

Trends

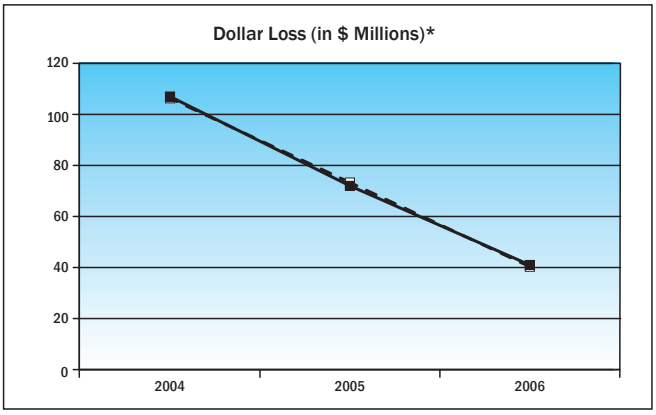
During the 3-year period (2004 through 2006), trends for outside and special property fires increased by 17 percent and dollar loss decreased by 62 percent (Figure 102). Fires increased from 15,500 in 2004 to 18,200 in 2006. Dollar loss, however, decreased from $107 million in 2004 to $41 million in 2006.

Figure 102. Trends in Outside and Special Property Building Fires and Dollar Loss (2004–2006)



FIRES

Year	Value
2004	15,500
2005	18,300
2006	18,200
3-Year Trend (%)	**16.9**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

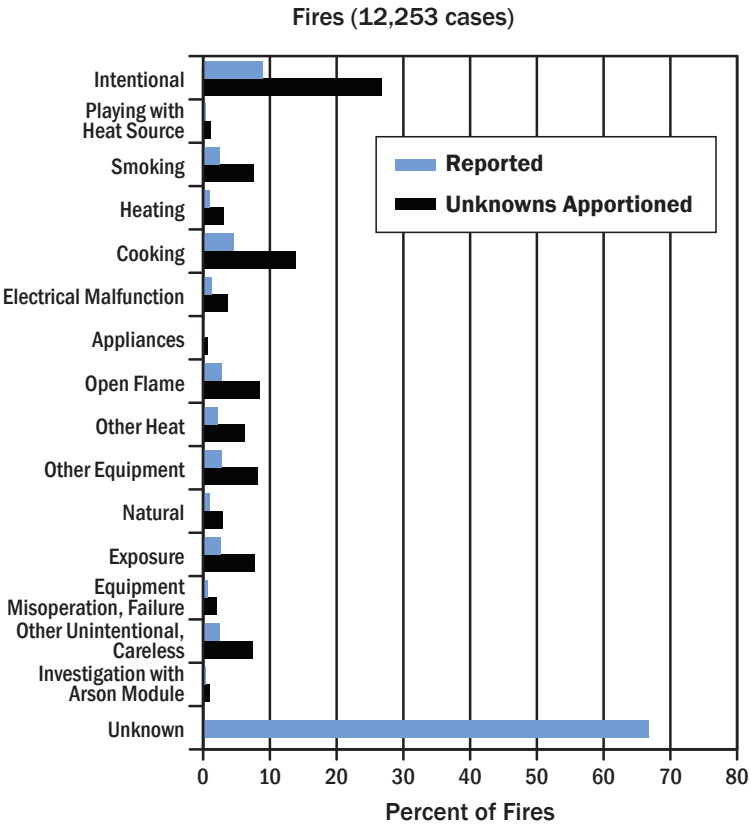
Year	Value
2004	$107
2005	$72
2006	$41
3-Year Trend (%)	**-62.1**

Sources: 2004-2006 NFIRS 5.0, NFPA, and Consumer Price Index

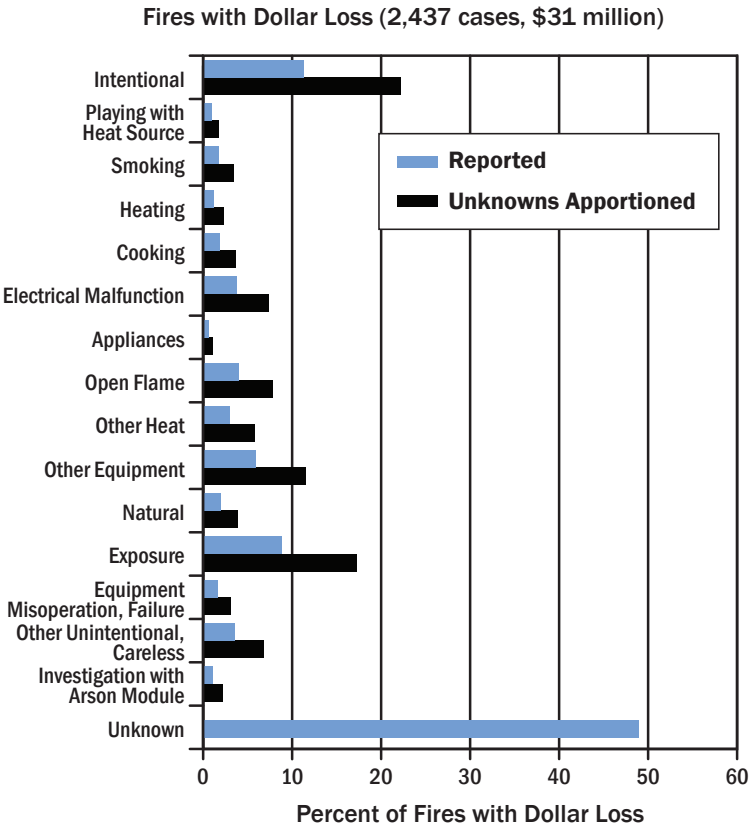
Causes

Twenty-seven percent of all fires in outside and special property buildings are caused intentionally (Figure 103), and an additional 14 percent are caused by cooking. The leading causes of outside property building fires with dollar loss are intentional (22 percent), exposures (17 percent), and other equipment (12 percent).

Figure 103. Fire Cause for Outside and Special Property Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	8.9	26.7
Playing with Heat Source	0.4	1.1
Smoking	2.5	7.5
Heating	1.0	3.1
Cooking	4.6	13.9
Electrical Malfunction	1.2	3.6
Appliances	0.2	0.6
Open Flame	2.8	8.4
Other Heat	2.1	6.2
Other Equipment	2.7	8.1
Natural	1.0	2.9
Exposure	2.6	7.7
Equipment Misoperation, Failure	0.7	2.0
Other Unintentional, Careless	2.5	7.4
Investigation w/Arson Module	0.3	0.9
Unknown	66.8	



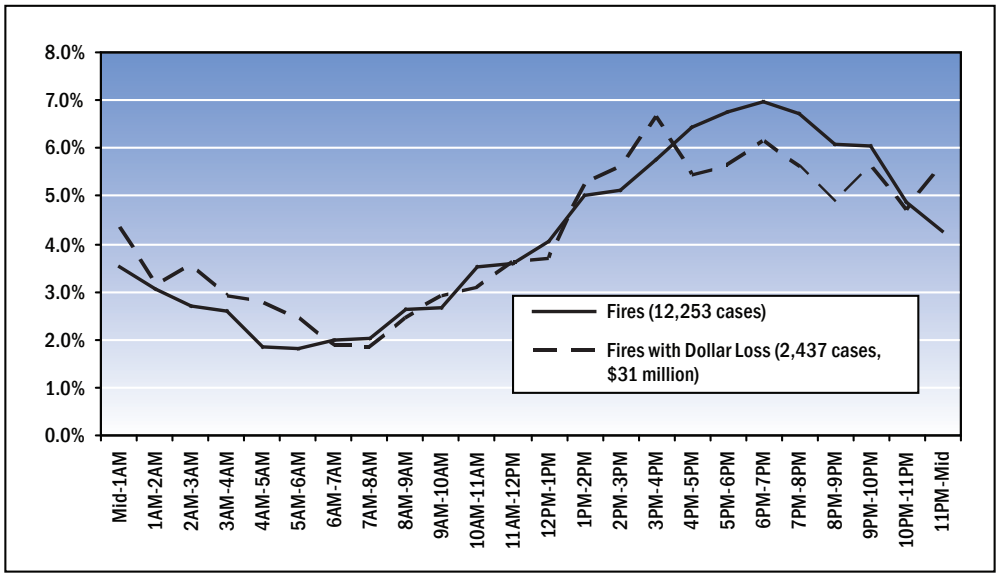
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	11.3	22.2
Playing with Heat Source	0.9	1.7
Smoking	1.7	3.4
Heating	1.2	2.3
Cooking	1.9	3.7
Electrical Malfunction	3.8	7.4
Appliances	0.6	1.1
Open Flame	4.0	7.8
Other Heat	3.0	5.8
Other Equipment	5.9	11.5
Natural	2.0	3.9
Exposure	8.8	17.2
Equipment Misoperation, Failure	1.6	3.1
Other Unintentional, Careless	3.5	6.8
Investigation w/Arson Module	1.1	2.2
Unknown	48.9	

Source: 2006 NFIRS 5.0

When Fires Occur

Time of Fire Alarm. Fires in outside or special properties are highest between 6 p.m. and 7 p.m. (Figure 104). Fires with dollar loss are highest between 3 p.m. and 4 p.m. and lowest between 6 a.m. and 8 a.m.

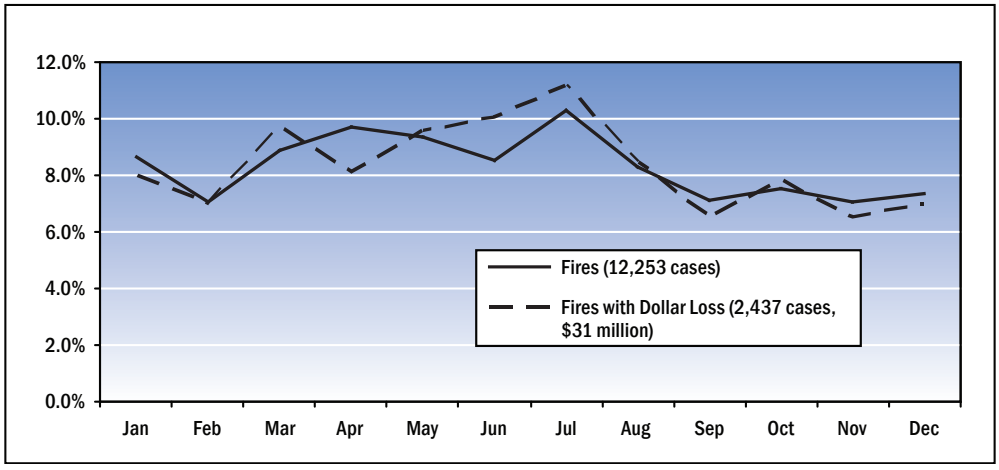
Figure 104. Time of Fire Alarm for Outside and Special Property Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month of Year. For 2006, fires in outside and special property buildings are highest in July and lowest in February, September, and November (Figure 105). Fires with dollar loss are also highest in July and lowest in September and November.

Figure 105. Month of Year of Outside and Special Property Building Fires and Fires with Dollar Loss (2006)

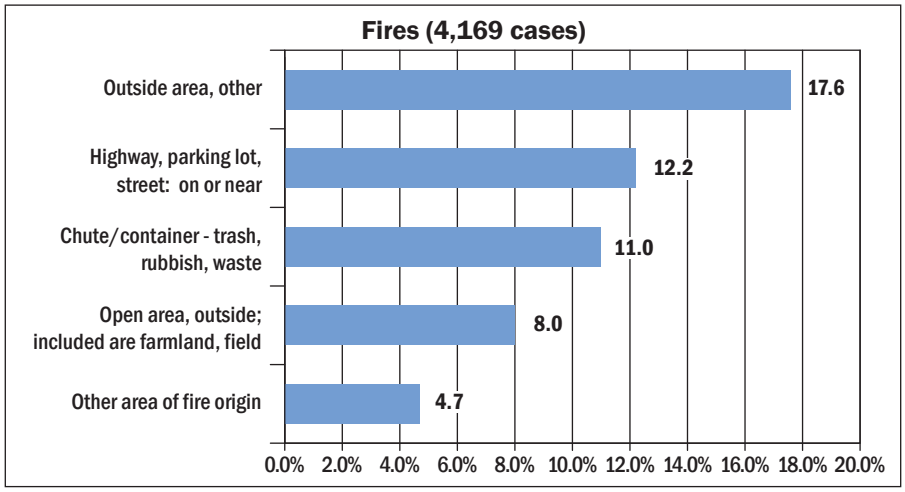


Source: 2006 NFIRS 5.0

Area of Fire Origin

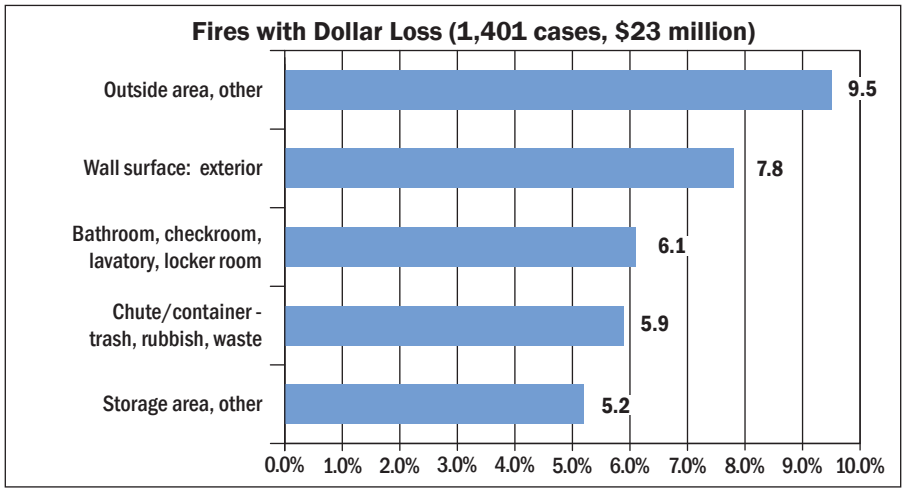
Figure 106 shows the leading areas where fires and fires with reported dollar loss originated in outside and special properties in 2006. The three leading areas of fire origin for fires are outside area, other (18 percent), highway, parking lot, street on or near (12 percent), and chute/container, trash, rubbish, waste (11 percent). In outside and special property fires with dollar loss, the top three areas of fire origin are outside area, other (10 percent), exterior wall surface (8 percent) and bathroom, checkroom, lavatory or locker room (6 percent).

Figure 106. Leading Areas of Fire Origin in Outside and Special Property Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
12,253 total incidents
756 undetermined entries
7,328 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



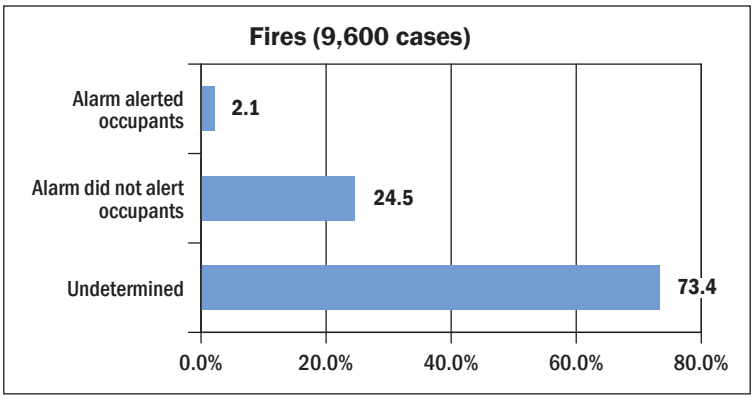
Source: 2006 NFIRS 5.0
2,437 total incidents
279 undetermined entries
757 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 2 percent of small, low-loss confined outside and special property building fires. Occupants were not alerted by a smoke alarm in 25 percent of these confined fires. In a large portion of confined outside and special property building fires (73 percent) there is no information on the alert status and effectiveness of the smoke alarm (Figure 107).

Figure 107. Smoke Alarm Alert Status in Confined Outside and Special Property Building Fires (2006)

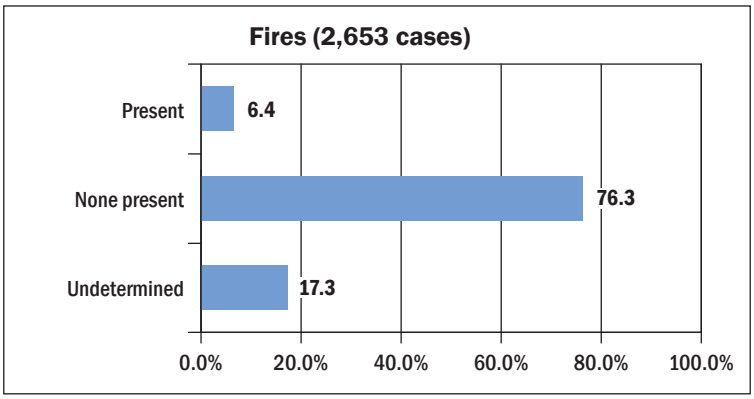


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 21.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 108, smoke alarms were present in 6 percent of nonconfined outside and special property building fires. Smoke alarms in nonconfined outside and special property fires were not present 76 percent of the time. The presence or absence of alarms was not reported to NFIRS in 17 percent of nonconfined outside and special property building fires.

Figure 108. Presence of Smoke Alarms in Nonconfined Outside and Special Property Building Fires (2006)

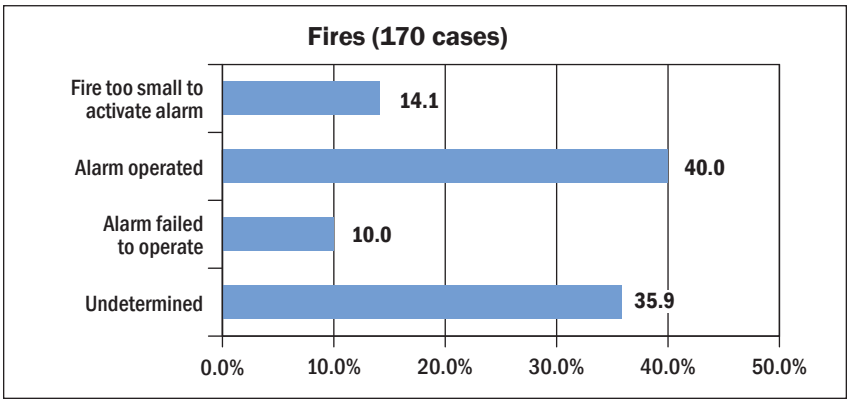


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 22.

When smoke alarms were present in nonconfined outside and special property building fires, the alarms operated in 40 percent of the incidents. In the remaining 60 percent of incidents, smoke alarms failed to operate (10 percent), the fire was too small to activate the system (14 percent), or no information on smoke alarm operation was available (36 percent) (Figure 109).[52]

Figure 109. Smoke Alarm Operation When Alarm was Present in Nonconfined Outside and Special Property Building Fires (2006)

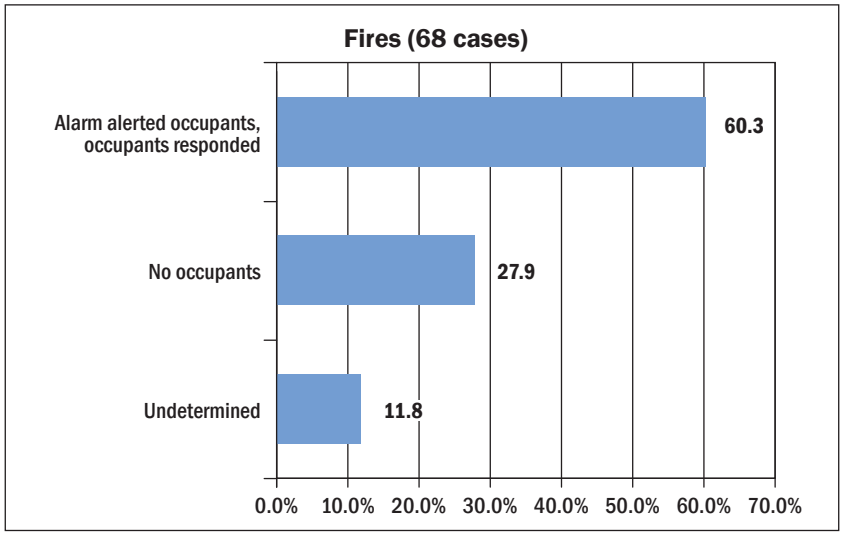


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 22.

The effectiveness of working smoke alarms in nonconfined outside and special property building fires is shown in Figure 110. In 60 percent of nonconfined outside and special property building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm and were able to respond to the warning. There were no occupants in the building at the time of the fire in 28 percent of these incidents. Alarm alert effectiveness information was not available in 12 percent of nonconfined outside and special property building fires.[53]

Figure 110. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Outside and Special Property Building Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 22.

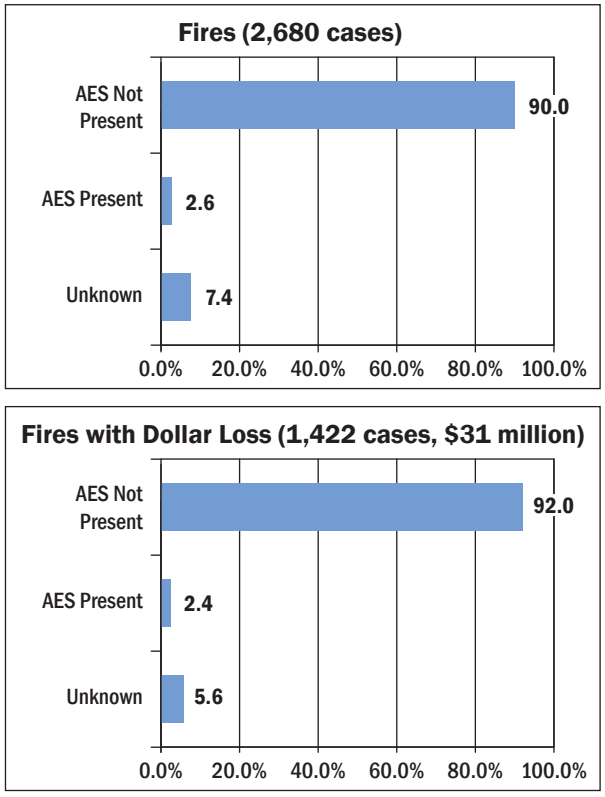
[52] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 3 percent of all nonconfined outside and special property building fires (present 6.4% x operated 40.0% = 2.6%).

[53] Smoke alarms were effective at alerting occupants in 2 percent of all nonconfined outside and special property building fires (present 6.4% x operated 40.0% x alerted occupants 60.3% = 1.5%).

Automatic Extinguishing Systems

AESs were present in 3 percent of fires for outside and special property building fires in 2006 (Figure 111). AESs were not present in 90 percent of the incidents, and in 7 percent of incidents, no information on AESs was available. The overall pattern for AES presence was similar to that of fires. In 2 percent of fires with dollar loss, AESs were present. There were no AESs present in 92 percent of fires with dollar loss, and no information on AESs was available in 6 percent of incidents.

Figure 111. Presence of Automatic Extinguishing Systems in Outside and Special Property Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 35.

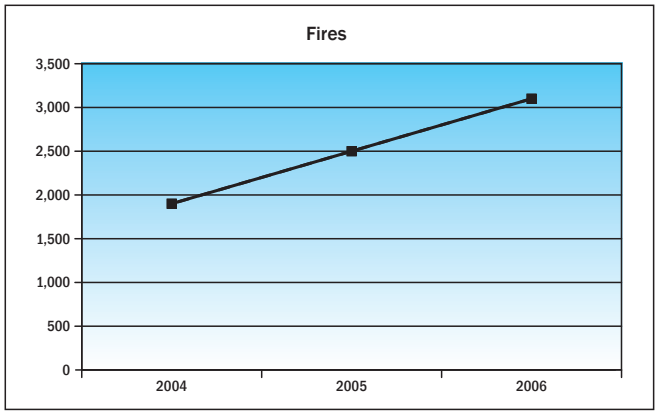
Other Buildings

Buildings not classified with a property use but are nonresidential are discussed as "other" nonresidential buildings. Buildings classified as "other" consist of three percent of the fire profile for nonresidential buildings.

Trends

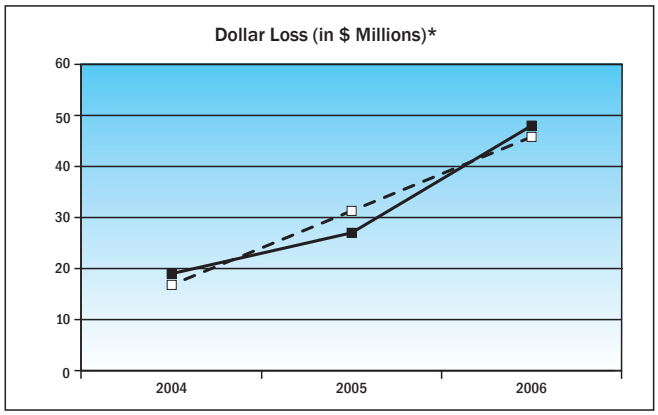
During the 3-year period (2004 through 2006), trends for other nonresidential building fires increased 63 percent and dollar loss increased 172 percent (Figure 112). There were an estimated 1,900 fires in 2004, which increased to 3,100 fires in 2006. Dollar loss also increased from $19 million to $48 million from 2004 to 2006.

Figure 112. Trends in Other Nonresidential Building Fires and Fire Losses (2003–2006)



FIRES

Year	Value
2004	1,900
2005	2,500
2006	3,100
3-Year Trend (%)	**63.2**



DOLLAR LOSS (in $ millions)
*Adjusted to 2006 Dollars

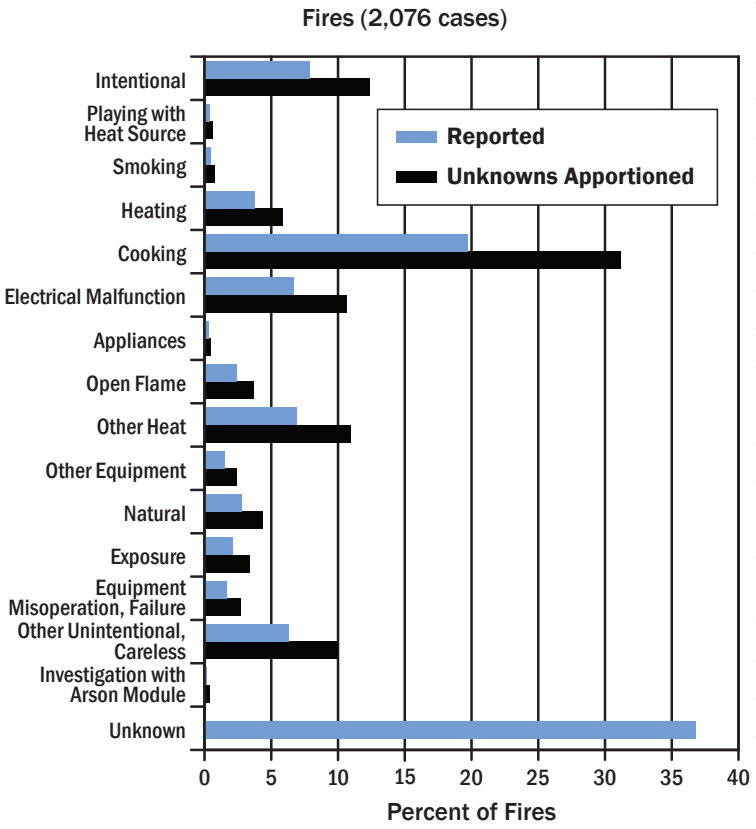
Year	Value
2004	$19
2005	$27
2006	$48
3-Year Trend (%)	**172.3**

Sources: 2004 -2006 NFIRS 5.0, NFPA, and Consumer Price Index

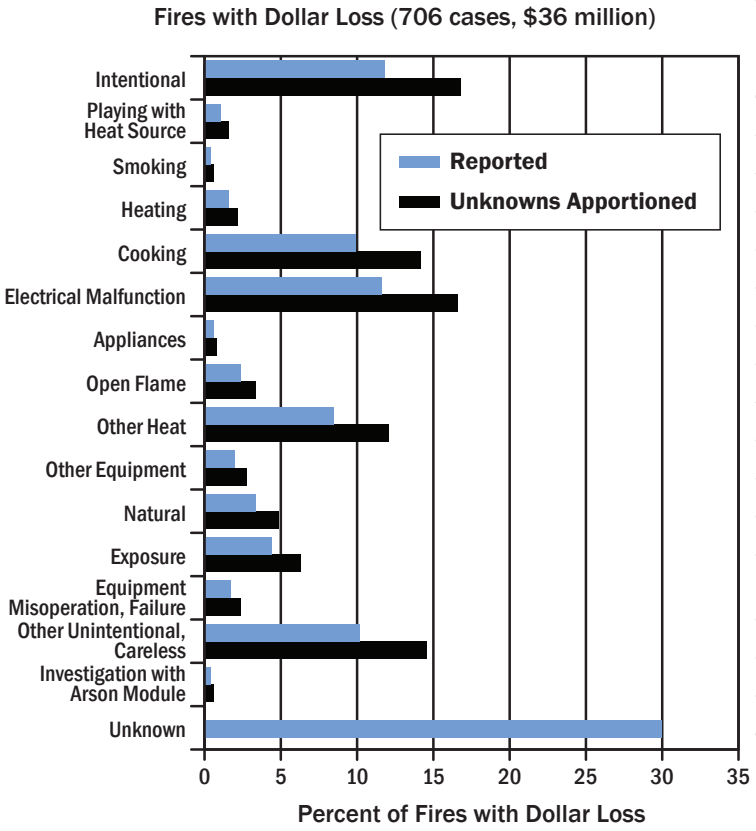
Causes

Cooking, at 31 percent, is the leading cause of all fires in other nonresidential buildings (Figure 113). Intentionally set fires (12 percent), other heat (11 percent), and electrical malfunctions (11 percent) are the next leading causes of fires. The leading causes of other nonresidential building fires with dollar loss are intentional (17 percent), electrical malfunctions (17 percent), and other unintentional or careless actions (15 percent).

Figure 113. Fire Cause for Other Nonresidential Building Fires and Fires with Dollar Loss (2006)



Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	7.9	12.4
Playing with Heat Source	0.4	0.6
Smoking	0.5	0.8
Heating	3.8	5.9
Cooking	19.7	31.2
Electrical Malfunction	6.7	10.7
Appliances	0.3	0.5
Open Flame	2.4	3.7
Other Heat	6.9	11.0
Other Equipment	1.5	2.4
Natural	2.8	4.4
Exposure	2.1	3.4
Equipment Misoperation, Failure	1.7	2.7
Other Unintentional, Careless	6.3	10.0
Investigation w/Arson Module	0.2	0.4
Unknown	36.8	



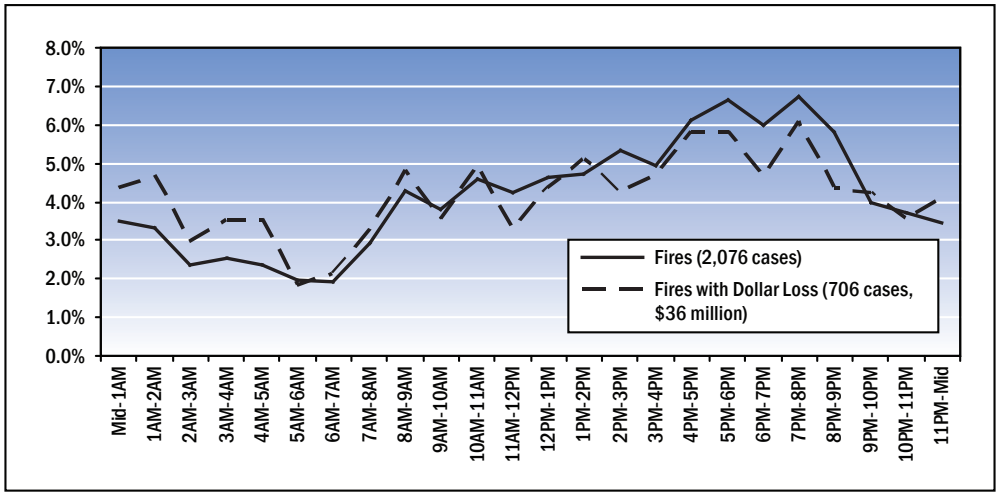
Cause	Reported (Percent)	Unknowns Apportioned (Percent)
Intentional	11.8	16.8
Playing with Heat Source	1.1	1.6
Smoking	0.4	0.6
Heating	1.6	2.2
Cooking	9.9	14.2
Electrical Malfunction	11.6	16.6
Appliances	0.6	0.8
Open Flame	2.4	3.4
Other Heat	8.5	12.1
Other Equipment	2.0	2.8
Natural	3.4	4.9
Exposure	4.4	6.3
Equipment Misoperation, Failure	1.7	2.4
Other Unintentional, Careless	10.2	14.6
Investigation w/Arson Module	0.4	0.6
Unknown	30.0	

Source: 2006 NFIRS 5.0

When Fires Occur

Time Of Fire Alarm. Fires in other nonresidential buildings are highest between 7 p.m. and 8 p.m. and lowest between 6 a.m. and 7 a.m. Fires with dollar loss are also highest between 7 p.m. and 8 p.m. and lowest between 5 a.m. and 6 a.m. (Figure 114).

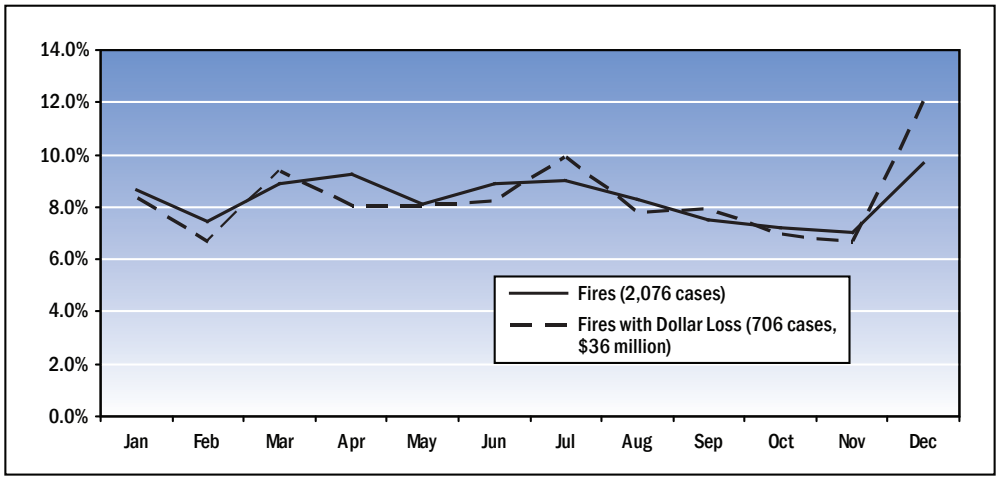
Figure 114. Time of Fire Alarm for Other Nonresidential Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0

Month Of Year. For 2006, fires in other nonresidential buildings are lowest in November and then immediately peak the next month in December. Fires with dollar loss are also highest in December and lowest in February and November (Figure 115).

Figure 115. Month of Year of Other Nonresidential Building Fires and Fires with Dollar Loss (2006)

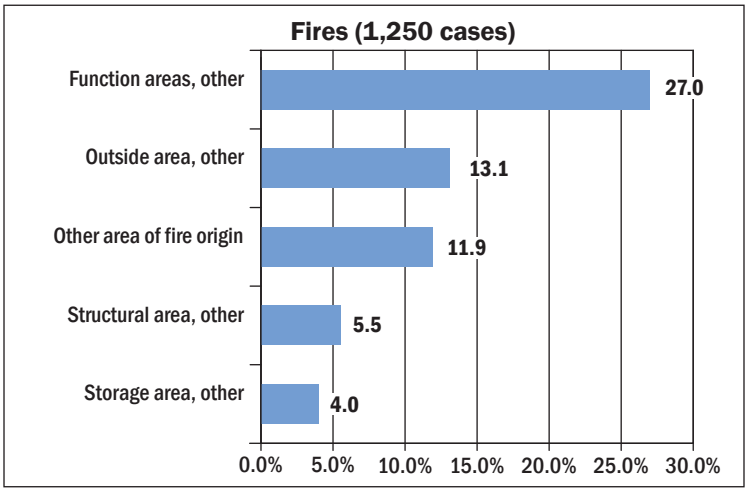


Source: 2006 NFIRS 5.0

Area of Fire Origin

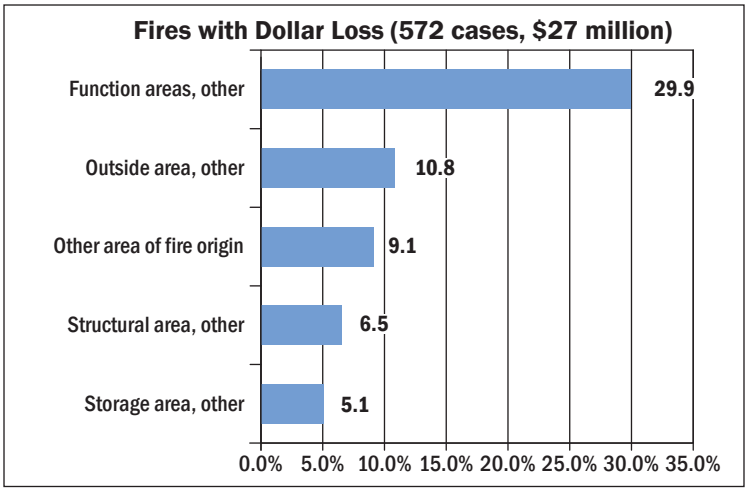
Figure 116 shows the leading areas where fires and fires with reported dollar loss originated in other nonresidential buildings in 2006. In other nonresidential building fires, the leading areas of fire origin are the same as those for fires with reported dollar loss. The three leading areas of fire origin for other nonresidential building fires are other function areas[54] (27 percent), other outside areas (13 percent), and other areas of fire origin (12 percent). In other nonresidential building fires with reported dollar loss, the top three areas of fire origin are also other function areas (30 percent), other outside areas (11 percent), and other areas of fire origin (9 percent).

Figure 116. Leading Areas of Fire Origin in Other Nonresidential Building Fires and Fires with Dollar Loss (2006)



Source: 2006 NFIRS 5.0
2,076 total incidents
293 undetermined entries
533 entries with no data

Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.



Source: 2006 NFIRS 5.0
706 total incidents
72 undetermined entries
62 entries with no data

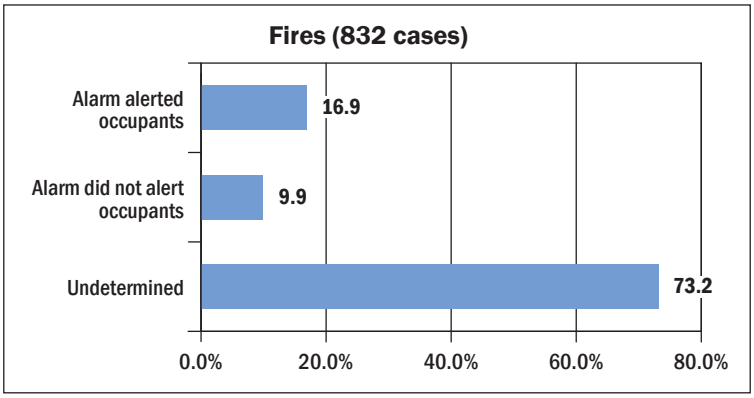
Note: Percentages reflect distribution of those incidents where area of fire origin was unknown.

[54] Function areas include bedrooms; cooking areas; bathrooms; laundry areas; offices; personal service areas: barber/beauty salon areas; exercise/health clubs; and other function areas.

Smoke Alarm Performance

Smoke Alarm Effectiveness in Confined Fires. Smoke alarms were present and effective in alerting the building occupants in 17 percent of small, low-loss confined other nonresidential building fires. Occupants were not alerted by a smoke alarm in 10 percent of these confined fires. In a large portion of confined other nonresidential building fires (73 percent), there is no information on the alert status and effectiveness of the smoke alarm (Figure 117).

Figure 117. Smoke Alarm Alert Status in Confined Other Nonresidential Building Fires (2006)

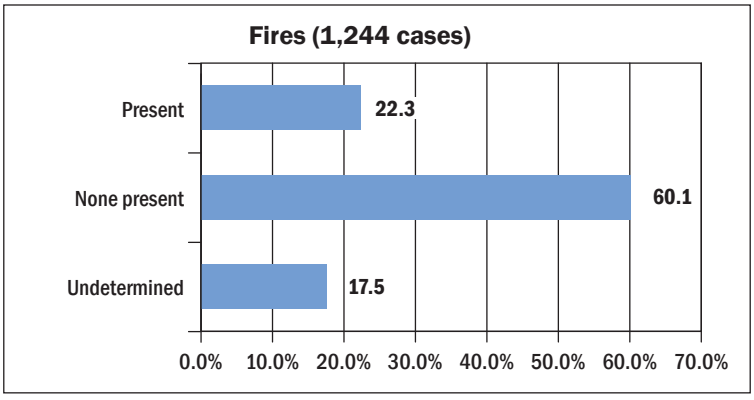


Source: 2006 NFIRS 5.0

Notes: 1) The category "Alarm did not alert occupants" does not indicate the presence of a smoke alarm. It only indicates that the occupants were not alerted by an alarm, for whatever reason.
2) Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 23.

Smoke Alarm Effectiveness in Nonconfined Fires. Alarms must be present and must operate to determine effectiveness. As shown in Figure 118, smoke alarms were present in 22 percent of nonconfined other nonresidential building fires. Smoke alarms in nonconfined other nonresidential building fires were not present 60 percent of the time. The presence or absence of alarms was not reported to NFIRS in 18 percent of nonconfined other nonresidential building fires.

Figure 118. Presence of Smoke Alarms in Nonconfined Other Nonresidential Building Fires (2006)



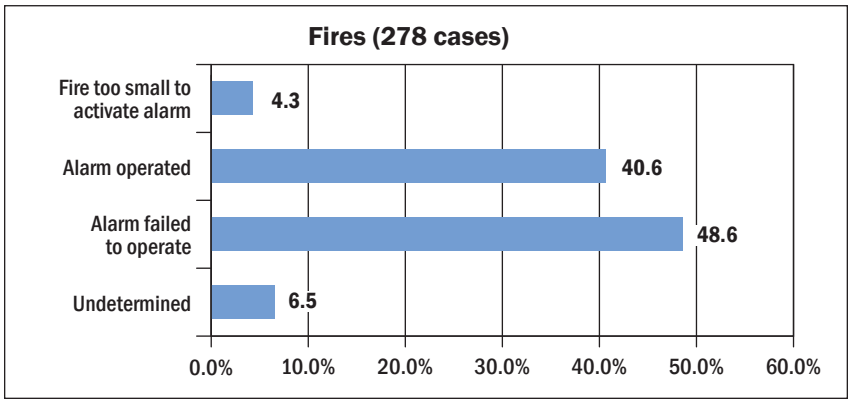
Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 24.

When smoke alarms were present in nonconfined other nonresidential building fires, the alarms operated in 41 percent of the incidents. In the remaining 59 percent of incidents, smoke alarms failed to operate (49 percent), the fire was too small to activate the system (4 percent), or no information on smoke alarm operation was available (7 percent) (Figure 119).[55]

[55] Looking at the percentage of operational smoke alarms from another perspective, at a minimum, smoke alarms were known to be present and operated in 9 percent of all nonconfined other nonresidential building fires (present 22.3% x operated 40.6% = 9.1%).

Figure 119. Smoke Alarm Operation When Alarm was Present in Nonconfined Other Nonresidential Building Fires (2006)

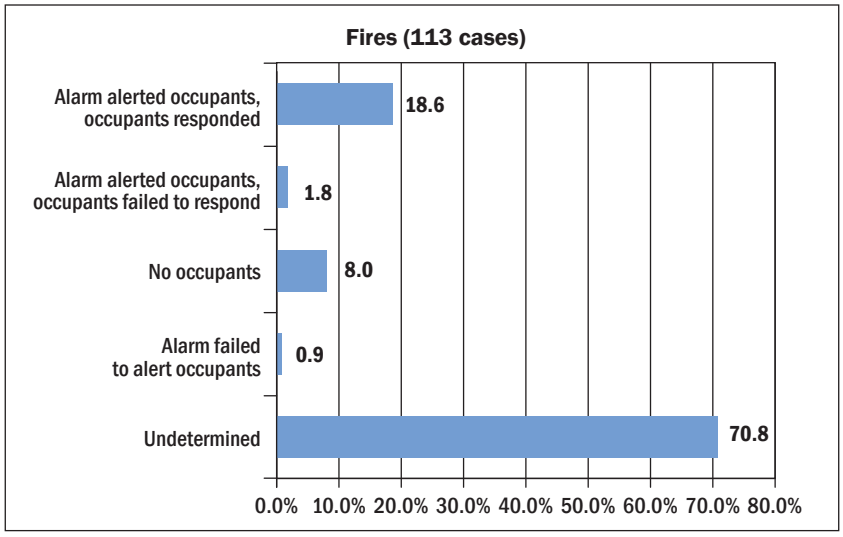


Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 24.

The effectiveness of working smoke alarms in nonconfined other nonresidential building fires is shown in Figure 120. In 20 percent of nonconfined other nonresidential building fires where alarms were present and operated, occupants were alerted to the fire by the smoke alarm: 19 percent of occupants were alerted and were able to respond to the warning, and an additional 2 percent were alerted but did not respond to the warning.[56] Occupants were not alerted in 1 percent of nonconfined other nonresidential building fires, and no occupants were in the building at the time of the fire in 8 percent of these incidents. Alarm alert effectiveness information was not available in 71 percent of nonconfined other nonresidential building fires.[57]

Figure 120. Smoke Alarm Effectiveness When Alarm was Operational in Nonconfined Other Nonresidential Building Fires (2006)



Source: 2006 NFIRS 5.0

Note: Raw NFIRS 5.0 counts for smoke alarm data are contained in Appendix Table 24.

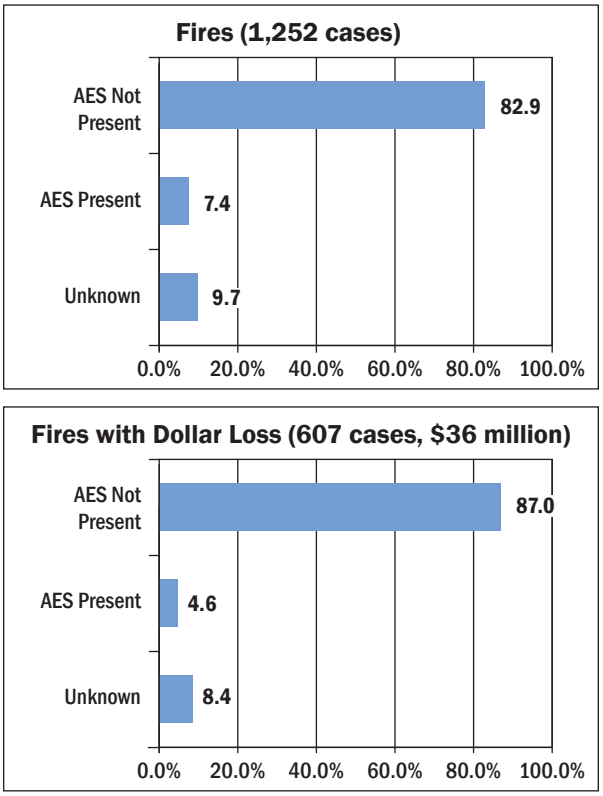
[56] Totals cited in the text do not add due to rounding.

[57] Smoke alarms were effective at alerting occupants in 2 percent of all nonconfined other nonresidential building fires (present 22.3% x operated 40.6% x alerted occupants 20.4% = 1.8%).

Automatic Extinguishing Systems

AESs were present in 7 percent of other nonresidential building fires in 2006 (Figure 121). AESs were not present in 83 percent of the incidents, and in 10 percent of incidents, no information on AESs was available. In 5 percent of fires with dollar loss, AESs were present. There were no AESs present in 87 percent of fires with reported dollar loss, and no information on AESs was available in 8 percent of incidents.

Figure 121. Presence of Automatic Extinguishing Systems in Other Nonresidential Building Fires (2006)



Source: 2006 NFIRS 5.0

Notes: 1) Percentages reflect only those incidents with structure types 1 (enclosed building) or 2 (fixed portable or mobile structures).
2) Raw NFIRS 5.0 counts for AES are contained in Appendix Table 36.

APPENDIX

NFIRS Raw Smoke Alarm Data

ALL NONRESIDENTIAL BUILDINGS

Appendix Table 1. All Nonresidential Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	7,787
Smoke alarm did not alert occupants	6,128
Unknown	16,142
Null or blank	1
Total Incidents	**30,058**

Source: 2006 NFIRS 5.0

Appendix Table 2. All Nonresidential Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		1,888
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	3,452
		Smoke alarm alerted occupants, occupants failed to respond	173
		No occupants	970
		Smoke alarm failed to alert occupants	49
		Undetermined	323
	Smoke alarm failed to operate		628
	Undetermined		1,440
None present			20,846
Undetermined			6,873
Null or blank			2
Total incidents			**36,664**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL ASSEMBLY BUILDINGS

Appendix Table 3. Nonresidential Assembly Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	706
Smoke alarm did not alert occupants	700
Unknown	1,463
Total Incidents	**2,869**

Source: 2006 NFIRS 5.0

Appendix Table 4. Nonresidential Assembly Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		137
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	246
		Smoke alarm alerted occupants, occupants failed to respond	17
		No occupants	107
		Smoke alarm failed to alert occupants	8
		Undetermined	16
	Smoke alarm failed to operate		49
	Undetermined		118
None present			739
Undetermined			430
Total incidents			**1,867**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL EATING AND DRINKING ESTABLISHMENTS

Appendix Table 5. Nonresidential Eating and Drinking Establishments—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	779
Smoke alarm did not alert occupants	699
Unknown	1,125
Total Incidents	**2,603**

Source: 2006 NFIRS 5.0

Appendix Table 6. Nonresidential Eating and Drinking Establishments—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		316
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	244
		Smoke alarm alerted occupants, occupants failed to respond	24
		No occupants	111
		Smoke alarm failed to alert occupants	9
		Undetermined	34
	Smoke alarm failed to operate		64
	Undetermined		186
None present			779
Undetermined			638
Total incidents			**2,405**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL EDUCATIONAL BUILDINGS

Appendix Table 7. Nonresidential Educational Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	1,237
Smoke alarm did not alert occupants	412
Unknown	753
Total Incidents	**2,402**

Source: 2006 NFIRS 5.0

Appendix Table 8. Nonresidential Educational Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		227
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	492
		Smoke alarm alerted occupants, occupants failed to respond	16
		No occupants	125
		Smoke alarm failed to alert occupants	5
		Undetermined	30
	Smoke alarm failed to operate		55
	Undetermined		151
None present			356
Undetermined			213
Total incidents			**1,670**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL INSTITUTIONAL BUILDINGS

Appendix Table 9. Nonresidential Institutional Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	2,378
Smoke alarm did not alert occupants	223
Unknown	638
Total Incidents	**3,239**

Source: 2006 NFIRS 5.0

Appendix Table 10. Nonresidential Institutional Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		240
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	825
		Smoke alarm alerted occupants, occupants failed to respond	34
		No occupants	43
		Smoke alarm failed to alert occupants	5
		Undetermined	20
	Smoke alarm failed to operate		60
	Undetermined		129
None present			183
Undetermined			185
Total incidents			**1,724**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL STORES AND OFFICE BUILDINGS

Appendix Table 11. Nonresidential Stores and Office Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	1,530
Smoke alarm did not alert occupants	979
Unknown	2,059
Total Incidents	**4,568**

Source: 2006 NFIRS 5.0

Appendix Table 12. Nonresidential Stores and Office Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		559
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	691
		Smoke alarm alerted occupants, occupants failed to respond	43
		No occupants	353
		Smoke alarm failed to alert occupants	12
		Undetermined	69
	Smoke alarm failed to operate		172
	Undetermined		401
None present			3,469
Undetermined			2,066
Total incidents			**7,835**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL BASIC INDUSTRY BUILDINGS

Appendix Table 13. Nonresidential Basic Industry Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	92
Smoke alarm did not alert occupants	63
Unknown	263
Total Incidents	**418**

Source: 2006 NFIRS 5.0

Appendix Table 14. Nonresidential Basic Industry Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		24
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	85
		Smoke alarm alerted occupants, occupants failed to respond	3
		No occupants	22
		Smoke alarm failed to alert occupants	0
		Undetermined	7
	Smoke alarm failed to operate		5
	Undetermined		32
None present			749
Undetermined			164
Total incidents			**1,091**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL MANUFACTURING BUILDINGS

Appendix Table 15. Nonresidential Manufacturing Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	324
Smoke alarm did not alert occupants	237
Unknown	538
Total Incidents	**1,099**

Source: 2006 NFIRS 5.0

Appendix Table 16. Nonresidential Manufacturing Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		248
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	568
		Smoke alarm alerted occupants, occupants failed to respond	24
		No occupants	104
		Smoke alarm failed to alert occupants	5
		Undetermined	31
	Smoke alarm failed to operate		24
	Undetermined		178
None present			1,109
Undetermined			635
Total incidents			**2,926**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL STORAGE BUILDINGS

Appendix Table 17. Nonresidential Storage Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	131
Smoke alarm did not alert occupants	223
Unknown	559
Total Incidents	**913**

Source: 2006 NFIRS 5.0

Appendix Table 18. Nonresidential Storage Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		55
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	112
		Smoke alarm alerted occupants, occupants failed to respond	5
		No occupants	51
		Smoke alarm failed to alert occupants	2
		Undetermined	15
	Smoke alarm failed to operate		18
	Undetermined		98
None present			7,657
Undetermined			993
Null or Blank			2
Total incidents			**9,008**

Source: 2006 NFIRS 5.0

DETACHED GARAGES

Appendix Table 19. Detached Garages—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	2
Smoke alarm did not alert occupants	32
Unknown	53
Total Incidents	**87**

Source: 2006 NFIRS 5.0

Appendix Table 20. Detached Garages—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		10
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	11
		Smoke alarm alerted occupants, occupants failed to respond	1
		No occupants	6
		Smoke alarm failed to alert occupants	0
		Undetermined	2
	Smoke alarm failed to operate		1
	Undetermined		8
None present			2,402
Undetermined			260
Total incidents			**2,701**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL OUTSIDE OR SPECIAL PROPERTY BUILDINGS

Appendix Table 21. Nonresidential Outside or Special Property Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	204
Smoke alarm did not alert occupants	2,352
Unknown	7,044
Total Incidents	**9,600**

Source: 2006 NFIRS 5.0

Appendix Table 22. Nonresidential Outside or Special Property Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		24
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	41
		Smoke alarm alerted occupants, occupants failed to respond	0
		No occupants	19
		Smoke alarm failed to alert occupants	0
		Undetermined	8
	Smoke alarm failed to operate		17
	Undetermined		61
None present			2,024
Undetermined			459
Total incidents			**2,653**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL OTHER BUILDINGS

Appendix Table 23. Nonresidential Other Buildings—Confined Fires

Smoke Alarm Effectiveness	Count
Smoke alarm alerted occupants	141
Smoke alarm did not alert occupants	82
Unknown	609
Total Incidents	**832**

Source: 2006 NFIRS 5.0

Appendix Table 24. Nonresidential Other Buildings—Nonconfined Fires

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count
Present	Fire too small to activate smoke alarm		12
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	21
		Smoke alarm alerted occupants, occupants failed to respond	2
		No occupants	9
		Smoke alarm failed to alert occupants	1
		Undetermined	80
	Smoke alarm failed to operate		135
	Undetermined		18
None present			748
Undetermined			218
Total incidents			**1,244**

Source: 2006 NFIRS 5.0

NFIRS Raw Automatic Extinguishing System Data

ALL NONRESIDENTIAL BUILDINGS

Appendix Table 25. Nonresidential Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	6,769	3,570
AES Not Present	27,332	15,531
Unknown	3,212	1,385
Total Incidents	**37,313**	**20,486**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL ASSEMBLY BUILDINGS

Appendix Table 26. Nonresidential Assembly Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	381	208
AES Not Present	1,399	828
Unknown	162	85
Total Incidents	**1,942**	**1,121**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL EATING AND DRINKING ESTABLISHMENTS

Appendix Table 27. Nonresidential Eating and Drinking Establishments with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	1,065	627
AES Not Present	1,216	771
Unknown	259	146
Total Incidents	**2,540**	**1,544**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL EDUCATIONAL BUILDINGS

Appendix Table 28. Nonresidential Educational Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	524	280
AES Not Present	1,079	616
Unknown	143	65
Total Incidents	**1,746**	**961**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL INSTITUTIONAL BUILDINGS

Appendix Table 29. Nonresidential Institutional Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	947	484
AES Not Present	727	340
Unknown	136	45
Total Incidents	**1,810**	**869**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL STORES AND OFFICE BUILDINGS

Appendix Table 30. Nonresidential Stores and Office Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	1,655	896
AES Not Present	5,516	3,070
Unknown	800	386
Total Incidents	**7,971**	**4,352**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL BASIC INDUSTRY BUILDINGS

Appendix Table 31. Nonresidential Basic Industry Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	149	80
AES Not Present	852	395
Unknown	99	36
Total Incidents	**1,100**	**511**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL MANUFACTURING BUILDINGS

Appendix Table 32. Nonresidential Manufacturing Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	1,499	734
AES Not Present	1,220	659
Unknown	270	114
Total Incidents	**2,989**	**1,507**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL STORAGE BUILDINGS

Appendix Table 33. Nonresidential Storage Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	324	174
AES Not Present	8,240	4,731
Unknown	465	174
Total Incidents	**9,029**	**5,079**

Source: 2006 NFIRS 5.0

DETACHED GARAGES

Appendix Table 34. Detached Garages with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	5	1
AES Not Present	2,618	1,844
Unknown	79	41
Total Incidents	**2,702**	**1,886**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL OUTSIDE OR SPECIAL PROPERTY BUILDINGS

Appendix Table 35. Nonresidential Outside and Special Properties with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	71	34
AES Not Present	2,412	1,308
Unknown	197	80
Total Incidents	**2,680**	**1,422**

Source: 2006 NFIRS 5.0

NONRESIDENTIAL OTHER BUILDINGS

Appendix Table 36. Nonresidential Other Buildings with AES

Presence of AES	Count	Count for AES with Dollar Loss
AES Present	93	28
AES Not Present	1,038	528
Unknown	121	51
Total Incidents	**1,252**	**607**

Source: 2006 NFIRS 5.0