TOPICAL FIRE REPORT SERIES Volume 15, Issue 10 / March 2015

One- and Two-Family Residential Building Basement Fires (2010–2012)

These topical reports are designed to explore facets of the U.S. fire problem as depicted through data collected in the U.S. Fire Administration's National Fire Incident Reporting System. Each topical report briefly addresses the nature of the specific fire or fire-related topic, highlights important findings from the data, and may suggest other resources to consider for further information.

Findings

- An estimated 6,500 one- and two-family residential building basement fires were reported to fire departments within the United States each year and caused an estimated 65 deaths, 400 injuries and $278 million in property loss.
- One- and two-family residential building basement fires are considered part of the residential fire problem, and they comprised about 3 percent of all one- and two-family residential building fires.
- The leading reported causes of one- and two-family residential building basement fires were "electrical malfunction" (19 percent); "heating" (14 percent); "appliances" (12 percent); and "other unintentional, careless" actions (12 percent).
- January (12 percent) was the peak month for one- and two-family residential building basement fires, followed by December (10 percent) and February (10 percent).
- Electrical arcing was the most common heat source in residential building basement fires (19 percent).

From 2010 to 2012, an estimated 6,500 one- and two-family residential building fires originating in basements were reported annually by U.S. fire departments. These fires caused an estimated 65 deaths, 400 injuries and $278 million in property damage each year.[1, 2, 3] Basement fires accounted for about 3 percent of all one- and two-family residential building fires reported to the National Fire Incident Reporting System (NFIRS) from 2010 to 2012.

In NFIRS, one- and two-family residential building basement fires are defined as those fires where the property use was reported to be a one- or two-family dwelling, and the story of fire origin was noted to be one or two stories below grade. The intent is to focus on single-family and duplex housing with a typical foundation basement.[4]

Basements associated with single-family and duplex houses may or may not have been designed to be finished and converted into living/recreational/sleeping/workshop areas, especially those homes built before World War II. They are frequently used for storage, as well as a location for major household utilities and appliances, including furnace, water heater, workshop and laundry areas. Whether intentionally or unintentionally, unsupervised children and teenagers may create fire hazards. Frequently associated with ad hoc residential use are several types of portable equipment — space heaters, dehumidifiers, microwave and/or toaster ovens, and even entertainment centers. If a basement was not converted from "unfinished" to "finished" in accordance with local codes, then these items might be plugged into undergauge extension cords and worn-out power strips.

Home fire safety material available from the U.S. Fire Administration (USFA) recommends that all basements include smoke alarm and sprinkler systems. Be aware of basement-related fire hazards, including combustible materials near open flame in water heaters and frayed wires on light bulbs, among other potential hazards.[5]

Although beyond the scope of this report, basement fires present significant safety issues for firefighters. An Underwriters Laboratory (UL) study in conjunction with the National Institute of Standards and Technology (NIST) established the universal instability of all types of floor construction during a basement fire. There are no reliable and repeatable warning signs of collapse, and there is no way to know when it is safe to operate on top of a basement fire.[6] In addition to unpredictable changes in flow paths, other aspects of basements that pose threats to firefighters include limited access, cluttered storage, and nonstandard room and furnishings arrangement.

This topical report addresses the characteristics of one- and two-family residential building basement fires, as reported to NFIRS from 2010 to 2012. The NFIRS data is used for the analyses presented throughout the report.[7] For the purpose of the report, the terms "one- and two-family residential fires" and "basement fires" are synonymous with "one- and two-family residential building fires" and "one- and two-family residential building basement fires," respectively. "Basement fires" is used throughout the body of this report; the findings, tables, charts, headings and endnotes reflect the full category, "one- and two-family residential building basement fires."

Type of Fire

Building fires are divided into two classes of severity in NFIRS: "confined fires," which are fires confined to certain types of equipment or objects, and "nonconfined fires," which are not confined. Confined building fires are small fire incidents that are limited in extent, staying within pots, fireplaces or certain other noncombustible containers.[8] Confined fires rarely result in serious injury or large content loss and are expected to have no significant accompanying property loss due to flame damage.[9] Of the two classes of severity, nonconfined fires accounted for 93 percent of basement fires. The smaller, confined fires accounted for the remaining 7 percent (Table 1).

Most NFIRS fire data analyses compare and contrast confined versus nonconfined building fires. However, basement fires are defined in part by the story of fire origin, which is only required to be reported for nonconfined fires. For confined fires, the story of fire origin is reported on an optional basis. As such, there is no way to meaningfully compare confined versus nonconfined basement fires. Therefore, the subsequent analyses in this report reflect all basement fires in one- and two-family dwellings and do not distinguish between confined and nonconfined fires.

Table 1. One- and Two-Family Residential Building Basement Fires by Type of Incident (2010–2012)

Incident Type	Percent
Nonconfined fires	92.8
Confined fires	7.2
Total	100.0

Source: NFIRS 5.0.

Loss Measures

Table 2 presents losses, averaged over the three-year period from 2010-2012, of reported basement and nonbasement residential fires.[10] Loss measures per fire should be compared with other broad categories of fire with caution, as the two are not directly comparable. Basement fires caused 20 percent more fatalities per 1,000 fires, 77 percent more injuries per 1,000 fires, and 91 percent greater dollar loss per fire than nonbasement fires (Table 2). Although these differences may be due to how the data are collected, especially confined versus nonconfined fires as previously outlined, this is still a compelling difference between basement fires and other one- and two-family residential building fires.

Table 2. Loss Measures for One- and Two-Family Residential Building Basement and Nonbasement Fires (Three-Year Average, 2010–2012)

Measure	One- and Two-Family Residential Building Basement Fires	One- and Two-Family Residential Building Nonbasement Fires
Average Loss		
Fatalities/1,000 fires	7.9	6.6
Injuries/1,000 fires	49.7	28.1
Dollar loss/fire	$34,220	$17,910

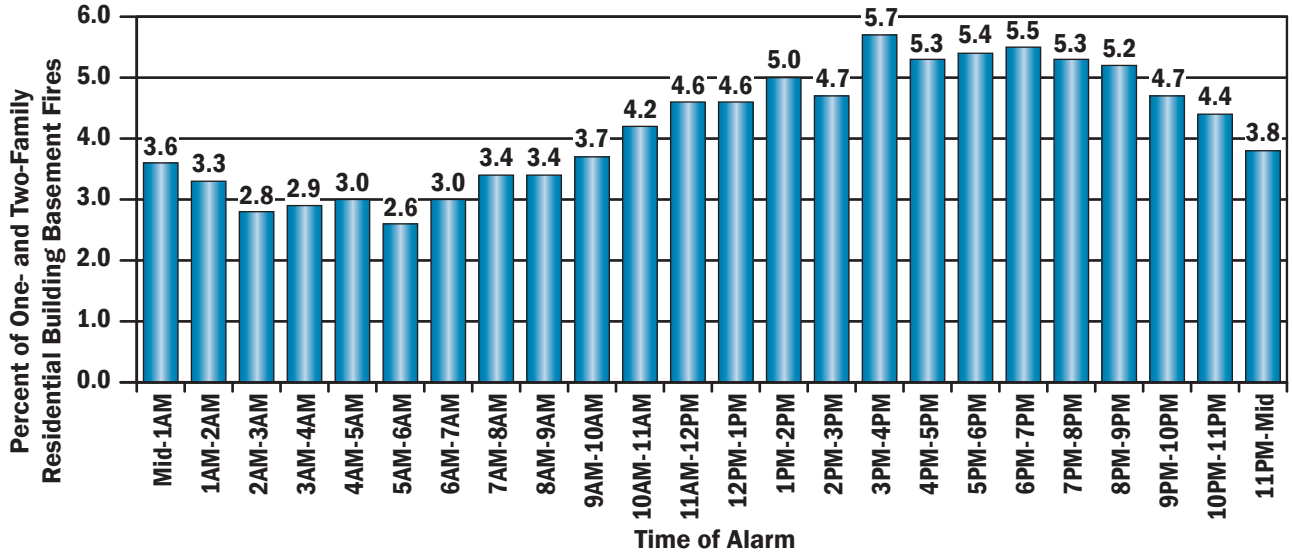
Source: NFIRS 5.0.

Notes: 1. Average loss for fatalities and injuries is computed per 1,000 fires. Average dollar loss is computed per fire and rounded to the nearest $10.
2. When calculating the average dollar loss per fire for 2010-2012, the 2010 and 2011 dollar-loss values were adjusted to their equivalent 2012 dollar-loss values to account for inflation.

When Residential Building Basement Fires Occur

As shown in Figure 1, basement fires occurred most frequently in the late afternoon to early evening hours from 3 to 9 p.m., accounting for 32 percent of the fires.[11] This period includes a notable peak from 3 to 4 p.m., which may be associated with activity typical of school age children after school, including heating snacks and turning on space heaters. Fires gradually declined throughout the late evening and early morning hours, reaching the lowest point from 5 to 6 a.m. Beginning at 6 a.m., fire incidence started to increase until the peak hours were reached.

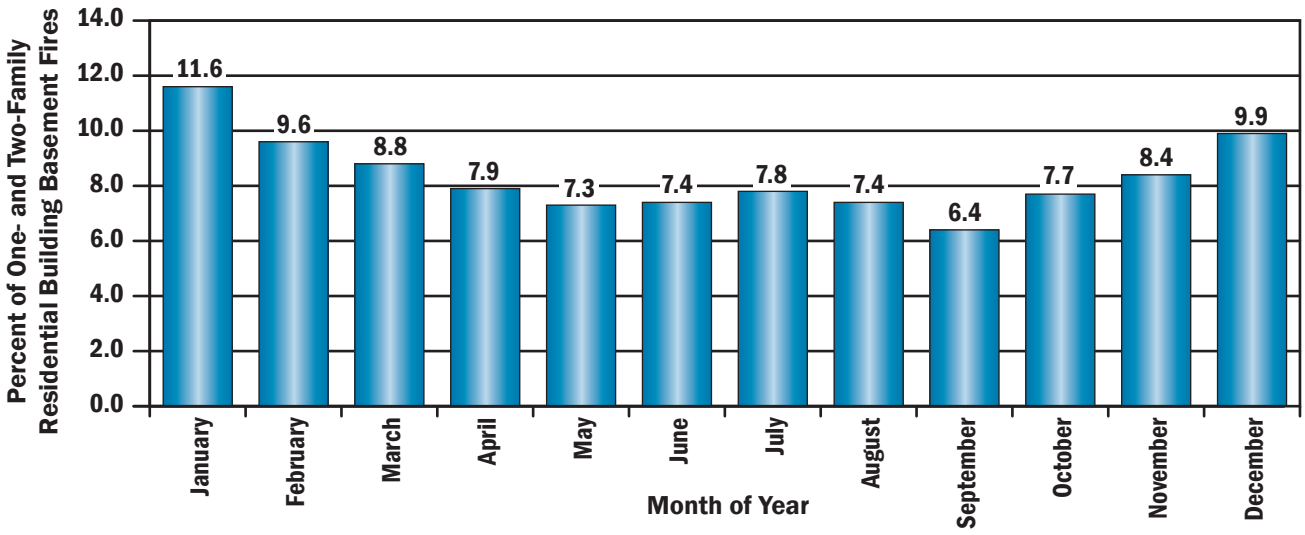
Figure 1. One- and Two-Family Residential Building Basement Fires by Time of Alarm (2010-2012)



Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Figure 2 illustrates that basement fires have a substantial peak in January at 12 percent, followed by December and February, each at 10 percent. The increase in basement fires during these peak months was driven by an increase in heating fires and other unintentional, careless actions. Electrical malfunction, the leading cause of basement fires throughout the year, remained fairly constant throughout the year, while the next three leading causes — heating, unintentional and careless actions, and appliances — varied considerably throughout the year. The lowest incidence of basement fires occurred in September, when fires caused by heating, and unintentional and careless actions, were well below their monthly average (data not shown).[12]

Figure 2. One- and Two-Family Residential Building Basement Fires by Month (2010-2012)



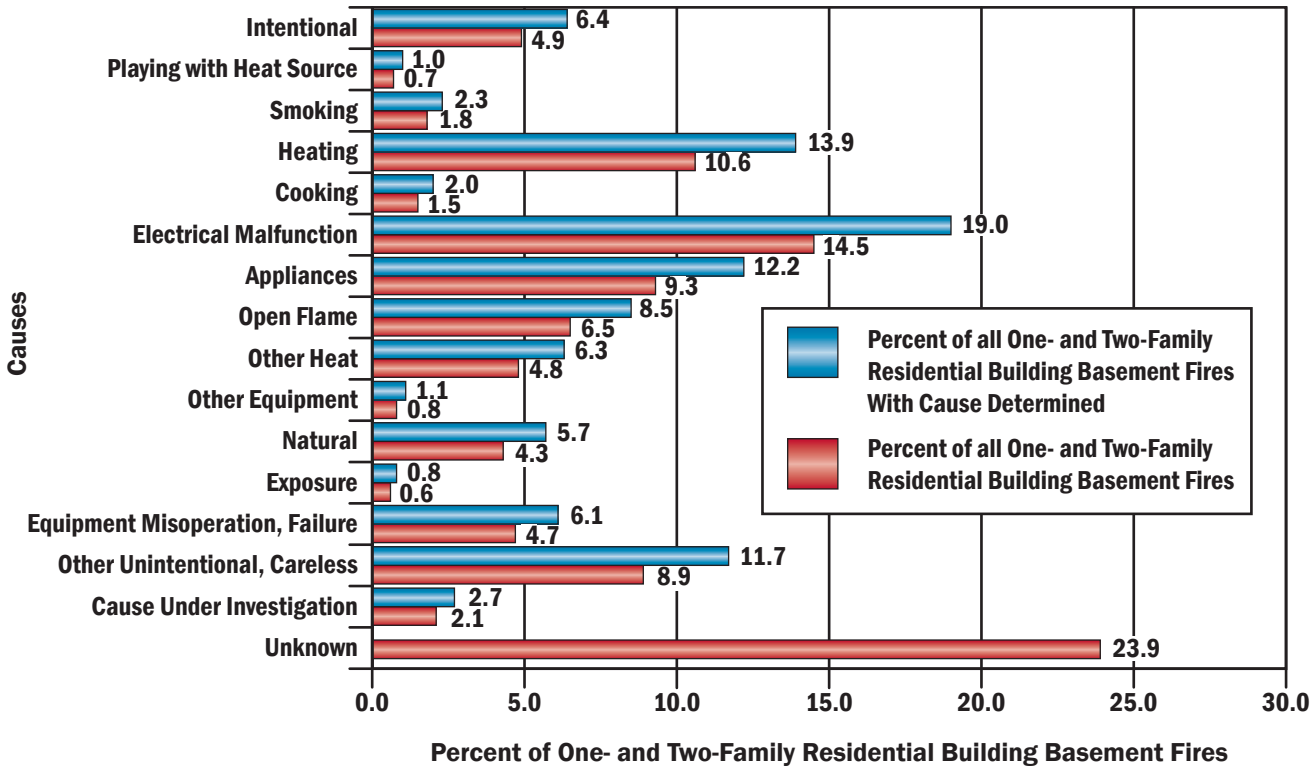
Source: NFIRS 5.0.
Note: Total does not add up to 100 percent due to rounding.

Causes of One- and Two-Family Residential Building Basement Fires

Figure 3 shows the causes of basement fires.[13, 14] Electrical malfunctions caused 19 percent of all basement fires. This finding suggests that homeowners and residents should make it a priority to have electrical equipment and electrical wiring in basements professionally installed, inspected and maintained.

The next three leading reported causes combined accounted for 38 percent of basement fires: heating (14 percent); appliances (12 percent); and other unintentional, careless actions (12 percent).

Figure 3. One- and Two-Family Residential Building Basement Fires by Cause (2010-2012)



Source: NFIRS 5.0.

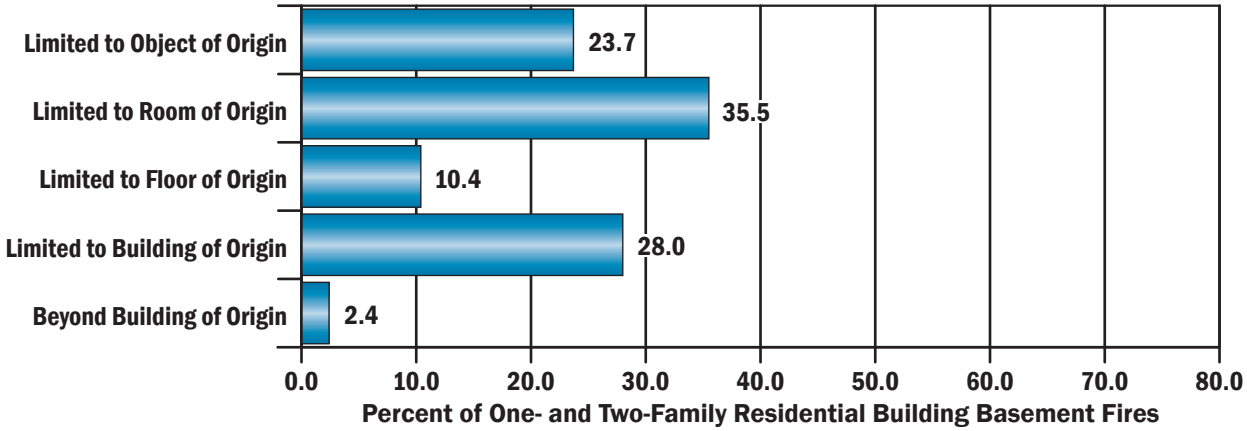
Notes: 1. Causes are listed in order of the USFA Structure Fire Cause Hierarchy for ease of comparison of fire causes across different aspects of the fire problem. Fires are assigned to one of 16 cause groupings using a hierarchy of definitions, approximately as shown in the chart above. A fire is included in the highest category into which it fits. If it does not fit the top category, then the second one is considered, and if not that one, the third and so on. 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 in the hierarchy.

2. Totals do not add up to 100 percent due to rounding.

Fire Spread in Residential Building Basement Fires

Fires that originate in the basement can be especially hazardous, as the natural convection of the flames may contribute to the fire's spread to additional sources of fuel. As shown in Figure 4, basement fires are hazards, which is evident in the extent of fire spread: Of basement fires, 24 percent were limited to the object of origin, 36 percent were limited to the room of origin, 38 percent spread beyond the room of origin to the floor or building, and 2 percent of fires originating in basements spread beyond the building. Although not directly comparable and thus not depicted on this figure, due to the nature of how basement fires are identified, this is substantially different than the fire spread profile for all one- and two-family residential building fires where 48 percent were limited to the object of origin, 21 percent were limited to the room of origin, 28 percent spread beyond the room of origin to the floor or building, and 4 percent of fires spread beyond the building.[15, 16]

Figure 4. Extent of Fire Spread in One- and Two-Family Residential Building Basement Fires (2010–2012)



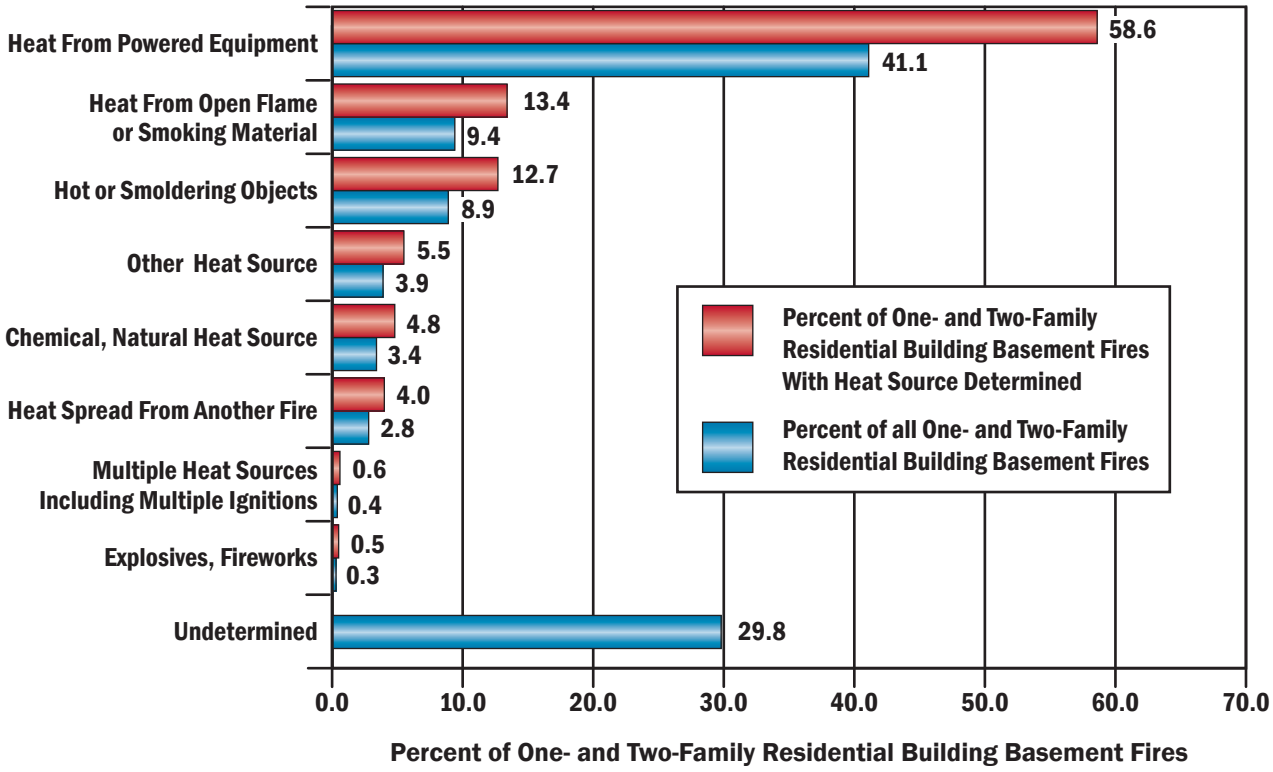
Source: NFIRS 5.0.

How One- and Two-Family Residential Building Basement Fires Start (Heat Source)

Figure 5 shows sources of heat categories in basement fires. The "heat from powered equipment" category accounted for 59 percent of all basement fires. Within this category, electrical arcing accounted for 19 percent; heat from other powered equipment accounted for 17 percent; radiated or conducted heat from operating equipment accounted for 12 percent; and sparks, embers or flames from operating equipment accounted for 10 percent of all basement fires.[17]

The "heat from open flame or smoking materials" and "hot or smoldering object" categories each accounted for 13 percent of basement fires. The top three specific heat sources from these combined groupings were "hot ember or ash" (6 percent); "hot or smoldering object, other" (6 percent); and "heat from other open flame or smoking materials" (4 percent).

Figure 5. Sources of Heat in One- and Two-Family Residential Building Basement Fires by Major Category (2010–2012)



Source: NFIRS 5.0.
Note: Total for one- and two-family residential building basement fires with heat source determined does not add up to 100 percent due to rounding.

What Ignites First in One- and Two-Family Residential Building Basement Fires

As shown in Table 3, the leading specific items most often first ignited in basement fires were "electrical wire, cable insulation" (13 percent); "structural member or framing" (12 percent); and "wearing apparel not on a person" (8 percent). Of interest, fires involving "dust, fiber, lint, including sawdust and excelsior" accounted for 5 percent of basement fires.

Table 3. Leading Items First Ignited in One- and Two-Family Residential Building Basement Fires (2010-2012)

Item First Ignited	Percent (Unknowns Apportioned)
Electrical wire, cable insulation	12.6
Structural member or framing	12.0
Wearing apparel not on a person	7.9
Item first ignited, other	6.3
Dust, fiber, lint, including sawdust and excelsior	5.2

Source: NFIRS 5.0.
Note: In 30 percent of the one- and two-family residential building basement fires, the item first ignited was specified as unknown.

Factors Contributing to Ignition in One- and Two-Family Residential Building Basement Fires

Table 4 shows the categories of factors contributing to ignition in basement fires. The leading category was "misuse of material or product" (32 percent). In this category, heat source too close to combustibles (14 percent) and abandoned or discarded materials or products (6 percent) were the leading specific factors that accounted for 20 percent of basement fires.

The "electrical failure, malfunction" category was a contributing factor in 27 percent of basement fires. The leading specific factor contributing to ignition in this category was other electrical failure, malfunction (13 percent), followed by unspecified short-circuit arc (7 percent). "Operational deficiency" was the third leading factor contributing to ignition category at 15 percent.

Table 4. Factors Contributing to Ignition for One- and Two-Family Residential Building Basement Fires by Major Category (Where Factors Contributing to Ignition Are Specified, 2010-2012)

Factors Contributing to Ignition Category	Percent of One- and Two-Family Residential Building Basement Fires
Misuse of material or product	31.6
Electrical failure, malfunction	26.9
Operational deficiency	14.7
Mechanical failure, malfunction	14.2
Natural condition	5.0
Other factors contributing to ignition	4.8
Fire spread or control	3.7
Design, manufacture, installation deficiency	2.8

Source: NFIRS 5.0.
Notes: 1. Includes only incidents where factors that contributed to the ignition of the fire were specified.
2. Multiple factors contributing to fire ignition may be noted for each incident; the total will exceed 100 percent.

Alerting/Suppression Systems in One- and Two-Family Residential Building Basement Fires

Technologies to detect and extinguish fires have been major contributors to the drop in fire fatalities and injuries over the past 35 years. Smoke alarms are now present in the majority of residential buildings. In addition, the use of residential sprinklers is widely supported by the fire service and is gaining support within residential communities.

Smoke Alarm Data

Smoke alarm data presented in Tables 5 and 6 are the raw counts from the NFIRS dataset and are not scaled to national estimates of smoke alarms in one- and two-family residential buildings where basement fires occurred. In addition, NFIRS does not allow for the determination of the type of smoke alarm — that is, if the smoke alarm was photoelectric or ionization — or the location of the smoke alarm with respect to the area of fire origin. Because NFIRS does not collect information on the location of the smoke alarm with respect to the area of fire origin, many smoke alarms may be located in the above grade floors of the residence and not necessarily in the basement.

Overall, smoke alarms were present in 57 percent of residences where basement fires occurred — both occupied and unoccupied — and were known to have operated in 36 percent of the fires. In 18 percent of basement fires, no smoke alarms were present. In another 25 percent of these fires, firefighters were unable to determine if a smoke alarm was present (Table 5).

While 11 percent of all basement fires occurred in one- and two-family residential buildings that are **not** currently or routinely occupied, these buildings — which are under construction, undergoing major renovation, vacant and the like — are unlikely to have alerting and suppression systems that are in place and, if in place, that are operational. In fact, only 14 percent of all basement fires in unoccupied residential buildings were reported as having smoke alarms that operated.[18] In addition, automatic suppression systems were reported as present in less than 1 percent of basement fires in residential buildings that were not routinely occupied. As a result, the detailed smoke alarm and automatic extinguishing system (AES) analyses in the next two sections of the report focus on basement fires in occupied residential buildings only.

Table 5. NFIRS Smoke Alarm Presence in One- and Two-Family Residential Building Basement Fires (2010-2012)

Presence of Smoke Alarms	Count	Percent
Present	8,027	56.8
None present	2,597	18.4
Undetermined	3,512	24.8
Total incidents	14,136	100.0

Source: NFIRS 5.0.
Note: The data presented in this table are raw data counts from the NFIRS dataset. They do not represent national estimates of smoke alarms in one- and two-family residential building basement fires. They are presented for informational purposes.

Smoke Alarms in Occupied One- and Two-Family Residential Building Basement Fires

Smoke alarms were reported as present in 61 percent of basement fires in occupied one- and two-family residential buildings (Table 6). Smoke alarms were known to have operated in 39 percent of basement fires in occupied residential buildings, and they were known to be absent in 15 percent. Firefighters were unable to determine if a smoke alarm was present in another 24 percent of these fires.

When operational status is considered, the percentage of smoke alarms reported as present (61 percent) consisted of:

- Present and operated — 39 percent.
- Present but did not operate — 15 percent (alarm failed to operate, 7 percent; fire too small, 7 percent).[19]
- Present but operational status unknown — 7 percent.

When the subset of incidents where smoke alarms were reported as present was analyzed separately as a whole, smoke alarms were reported to have operated in 65 percent of these incidents. The alarms failed to operate in 12 percent of these incidents, and the fire was too small to activate the alarm in another 12 percent. The operational status of the alarm was undetermined in an additional 11 percent of these incidents.

Nationally, only 3 percent of households lack smoke alarms.[20] One of the most important values of smoke alarms is detecting smoldering fires before they break into open flame or produce large volumes of smoke. Smoke alarms could be especially useful in early detection of basement fires if the alarm is properly placed. Properly installed and maintained smoke alarms provide an early warning signal to household members in the event that a fire occurs. Smoke alarms help save lives and property.

USFA continues to partner with other government agencies and fire service entities to improve and develop new smoke alarm technologies. More information on smoke alarm technologies, performance, disposal and storage, training bulletins, and public education and outreach materials is available at http://www.usfa.fema.gov/prevention/technology/smoke_fire_alarms.html.

Table 6. NFIRS Smoke Alarm Data for Occupied One- and Two-Family Residential Building Basement Fires (2010-2012)

Presence of Smoke Alarms	Smoke Alarm Operational Status	Smoke Alarm Effectiveness	Count	Percent
Present	Fire too small to activate smoke alarm		920	7.3
	Smoke alarm operated	Smoke alarm alerted occupants, occupants responded	3,642	29.1
		Smoke alarm alerted occupants, occupants failed to respond	129	1.0
		No occupants	575	4.6
		Smoke alarm failed to alert occupants	118	0.9
		Undetermined	462	3.7
	Smoke alarm failed to operate		928	7.4
	Undetermined		860	6.9
None present			1,907	15.2
Undetermined			2,990	23.9
Total incidents			12,531	100.0

Source: NFIRS 5.0.

Note: The data presented in this table are raw data counts from the NFIRS dataset. They do not represent national estimates of smoke alarms in basement fires in occupied one- and two-family residential buildings. They are presented for informational purposes.

Automatic Extinguishing System Data

Residential sprinklers are the primary AESs in residences but are not yet widely installed. In fact, full or partial AESs were reported as present in only 1 percent of occupied one- and two-family residential building basement fires (Table 7). The data presented in Table 7 are the raw counts from the NFIRS dataset and are not scaled to national estimates of AESs in basement fires.

Residential sprinkler systems help to reduce the risk of civilian and firefighter casualties, homeowner insurance premiums, and uninsured property losses. Yet many residences are unequipped with AESs that are often installed in hotels and businesses. Sprinklers are required by code in hotels and many multifamily residences. There are major movements in the U.S. fire service to require or facilitate use of sprinklers in all new homes, which could improve the use of residential sprinklers in the future. At present, however, they are largely absent in residences nationwide.[21]

USFA and fire service officials across the nation are working to promote and advance residential fire sprinklers. More information on costs and benefits, performance, training bulletins, and public education and outreach materials regarding residential sprinklers is available at http://www.usfa.fema.gov/prevention/technology/home_fire_sprinklers.html. Additionally, USFA's position statement on residential sprinklers is available at http://www.usfa.fema.gov/about/sprinklers_position.html.

Table 7. NFIRS Automatic Extinguishing System Data for Occupied One- and Two-Family Residential Building Basement Fires (2010-2012)

Automatic Extinguishing System Presence	Count	Percent
Automatic extinguishing system present	144	1.1
Partial system present	16	0.1
Automatic extinguishing system not present	11,655	93.0
Unknown	716	5.7
Total incidents	12,531	100.0

Source: NFIRS 5.0.

Notes: 1. The data presented in this table are raw data counts from the NFIRS dataset. They do not represent national estimates of AESs in basement fires in occupied one- and two-family residential buildings. They are presented for informational purposes.
2. Total does not add up to 100 percent due to rounding.

Examples

The following are recent examples of basement fires reported by the media:

- October 2014: A basement fire was reported at 3:06 a.m. in Morris, Minnesota. When firefighters arrived, they encountered heavy black smoke coming from the basement windows. A dehumidifier in the basement caused the fire, which had been burning for an extensive amount of time. It was reported that the home had working smoke alarms, which allowed the family of four and a pet dog to escape without injury.[22]
- October 2014: A late night house fire in Birch Run Township, Michigan, started in a basement bedroom. Although the fire spread to another room, it was contained to the basement. Two residents escaped the fire uninjured; however, the house sustained heavy smoke damage. The cause of the blaze is unknown.[23]
- October 2014: A fire that originated in the basement of a Racine, Wisconsin, home was unusual in that it mostly self-extinguished due to the lack of available oxygen after spreading through much of the basement. No civilian or firefighter injuries were reported; however, the fire resulted in the loss of a pet cat and caused an estimated $75,000 in damages. The cause of the fire was reported to be an electrical connection that failed or overheated.[24]
- September 2014: A basement fire in a single-story home in Godfrey, Illinois, started in the basement laundry room. Firefighters were able to prevent the fire from spreading into the main floor of the home. Significant fire damage occurred in a large portion of the basement, along with heavy smoke damage throughout the house, resulting in an estimated $100,000 loss of property and contents. The cause of the fire remains under investigation.[25]

NFIRS Data Specifications for One- and Two-Family Residential Building Basement Fires

Data for this report were extracted from the NFIRS annual Public Data Release files for 2010, 2011 and 2012. Only Version 5.0 data were extracted.

Basement fires were defined using the following criteria:

- Aid Types 3 (mutual aid given) and 4 (automatic aid given) were excluded to avoid double counting of incidents.
- Incident Types 111 to 123 (excluding Incident Type 112):

Incident Type	Description
111	Building fire
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
123	Fire in portable building, fixed location

Note: Incident Types 113 to 118 do not specify if the structure is a building.

- Property Use 419: one- or two-family dwelling, detached, manufactured home, mobile home not in transit, duplex.
- Structure Type:
  - For Incident Types 113 to 118:
    - 1—Enclosed building.
    - 2—Fixed portable or mobile structure, and Structure Type not specified (null entry).
  - For Incident Types 111 and 120 to 123:
    - 1—Enclosed building.
    - 2—Fixed portable or mobile structure.
- Story of Fire Origin: -1 or -2.

The analyses contained in this report reflect the current methodologies used by USFA. USFA is committed to providing the best and most currently available information on the U.S. fire problem and continually examines its data and methodology to fulfill this goal. Because of this commitment, data collection strategies and methodological changes are possible and do occur. As a result, analyses and estimates of the fire problem may change slightly over time. Previous analyses and estimates on specific issues (or similar issues) may have used different methodologies or data definitions and may not be directly comparable to the current ones.

Information regarding USFA's national estimates for residential building fires as well as the data sources used to derive the estimates can be found in the document, "Data Sources and National Estimates Methodology Overview for the U.S. Fire Administration's Topical Fire Report Series (Volume 15)," http://www.usfa.fema.gov/downloads/pdf/statistics/data_sources_and_national_estimates_methodology.pdf. This document also addresses the specific NFIRS data elements analyzed in the topical reports, as well as "unknown" data entries and missing data.

To request additional information or to comment on this report, visit http://www.usfa.fema.gov/contact.html.

Notes:

[1]National estimates are based on 2010-2012 native Version 5.0 data from NFIRS, residential structure fire loss estimates from the National Fire Protection Association's (NFPA's) annual surveys of fire loss, and USFA's residential building fire loss estimates: http://www.usfa.fema.gov/data/statistics/order_download_data.html. Further information on USFA's residential building fire loss estimates can be found in the "National Estimates Methodology for Building Fires and Losses," August 2012, http://www.usfa.fema.gov/downloads/pdf/statistics/national_estimate_methodology.pdf. For information on NFPA's survey methodology, see NFPA's report on fire loss in the U.S.: http://www.nfpa.org/~/media/Files/Research/NFPA%20reports/Overall%20Fire%20Statistics/osfireloss.pdf. In this topical report, fires are rounded to the nearest 100, deaths to the nearest five, injuries to the nearest 25, and dollar loss to the nearest million dollars.

[2]In NFIRS Version 5.0, a structure is a constructed item of which a building is one type. In previous versions of NFIRS, the term "residential structure" commonly referred to buildings where people live. To coincide with this concept, the definition of a residential structure fire for NFIRS 5.0 has, therefore, changed to include only those fires where the NFIRS 5.0 Structure Type is 1 or 2 (enclosed building and fixed portable or mobile structure) with a residential property use. Such structures are referred to as "residential buildings" to distinguish these buildings from other structures on residential properties that may include fences, sheds and other uninhabitable structures. In addition, confined fire incidents that have a residential property use but do not have a Structure Type specified are presumed to occur in buildings. Nonconfined fire incidents that have a residential property use without a Structure Type specified are considered to be invalid incidents (Structure Type is a required field) and are not included.

[3]"One- and two-family residential buildings" include detached dwellings, manufactured homes, mobile homes not in transit, and duplexes.

[4]In NFIRS, basements are defined as Story of Fire Origin: -1 or -2. This information is collected for nonconfined fires, and it is only voluntary for confined fires. This may impact direct comparisons between basement fires and all residential building fires.

[5]USFA, "Fire Safety Checklist," usfa.fema.gov, FA-285, April 2012, http://www.usfa.fema.gov/downloads/pdf/publications/fa_285.pdf (accessed Oct. 14, 2014).

[6]Jerrard, Jane, "UL Basement Fire Study," firefighternation.com, June 14, 2012, http://www.firefighternation.com/article/firefighter-safety/ul-basement-fire-study (accessed Oct. 10, 2014).

[7]Fire department participation in NFIRS is voluntary; however, 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. From 2010 to 2012, 70 percent of NFPA's annual average estimated 1,365,300 fires to which fire departments responded were captured in NFIRS. Thus, NFIRS is not representative of all fire incidents in the U.S. and is not a "complete" census of fire incidents. Although NFIRS does not represent 100 percent of the incidents reported to fire departments each year, the enormous dataset exhibits stability from one year to the next, without radical changes. Results based on the full dataset are generally similar to those based on part of the data.

[8]In NFIRS, confined fires are defined by Incident Type codes 113-118.

[9]NFIRS distinguishes between "content" and "property" loss. Content loss includes losses to the contents of a structure due to damage by fire, smoke, water and overhaul. Property loss includes losses to the structure itself or to the property itself. Total loss is the sum of the content loss and the property loss. For confined fires, the expectation is that the fire did not spread beyond the container (or rubbish for Incident Type code 118), and hence, there was no property damage (damage to the structure itself) from the flames. However, there could be property damage as a result of smoke, water and overhaul.

[10] The average fire death and fire injury loss rates computed from the national estimates do not agree with average fire death and fire injury loss rates computed from NFIRS data alone. The fire death rate computed from national estimates is (1,000*(65/6,500)) = 10.0 deaths per 1,000 one- and two-family residential building basement fires, and the fire injury rate is (1,000*(400/6,500) = 61.5 injuries per 1,000 one- and two-family residential building basement fires.

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

[12] Source: NFIRS.

[13] The USFA Structure Fire Cause Methodology was used to determine the cause of one- and two-family residential building basement fires. The cause methodology and definitions can be found in the document "National Fire Incident Reporting System Version 5.0 Fire Data Analysis Guidelines and Issues," July 2011, http://www.usfa.fema.gov/downloads/pdf/nfirs/nfirs_data_analysis_guidelines_issues.pdf.

[14] Fires caused by intentional actions include, but are not limited to, fires that are deemed to be arson. Intentional fires are those fires that are deliberately set and include fires that result from the deliberate misuse of a heat source and fires of an incendiary nature (arson) that require fire service intervention. For information and statistics on arson fires only, refer to the Uniform Crime Reporting Program arson statistics from the U.S. Department of Justice, FBI, Criminal Justice Information Services Division, http://www.fbi.gov/about-us/cjis/ucr/ucr.

[15] Total percent of one- and two-family residential building fires does not add to 100 percent due to rounding.

[16] "One- and Two-Family Residential Building Fires (2010-2012)," Topical Fire Report Series, USFA, September 2014, Volume 15, Issue 3, http://www.usfa.fema.gov/downloads/pdf/statistics/v15i3.pdf.

[17] Total does not add up to 59 percent due to rounding.

[18] Source: NFIRS.

[19] Total does not add up to 15 percent due to rounding.

[20] Greene, Michael and Craig Andres, "2004-2005 National Sample Survey of Unreported Residential Fires," Division of Hazard Analysis, Directorate for Epidemiology, U.S. Consumer Product Safety Commission, July 2009.

[21] U.S. Department of Housing and Urban Development and U.S. Census Bureau, 2011 American Housing Survey, "Health and Safety Characteristics-All Occupied Units (National)," Table S-01-AO, http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=AHS_2011_S01AO&prodType=table.

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[23] Jordan, Heather, "Fire officials investigate Birch Run house fire that started in basement bedroom," mlive.com, Oct. 5, 2014, http://www.mlive.com/news/saginaw/index.ssf/2014/10/fire_officials_investigate_bir.html (accessed Oct. 9, 2014).

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[25] "Basement fire displaces Godfrey family," thetelegraph.com, Sept. 8, 2014, http://thetelegraph.com/news/news/50277807/Basement-fire-displaces-Godfrey-family (accessed Oct. 9, 2014).