

HOME CHRISTMAS TREE AND HOLIDAY LIGHT FIRES

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October 2009



**National Fire Protection Association
Fire Analysis and Research Division**

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Abstract

NFPA estimates that Christmas trees, both natural and artificial, were the item first ignited in an estimated average of 250 reported home structure fires per year during 2003-2007. These fires caused an estimated average of 14 civilian deaths, 26 civilian injuries, and \$13.8 million in direct property damage per year. These estimates are based on data from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual fire department experience survey.

During the same period, holiday lights and other decorative lighting with line voltage were involved in an estimated average of 170 home structure fires per year. These fires caused an average of seven civilian deaths, 17 civilian injuries, and \$7.9 million in direct property damage per year.

Keywords: Christmas tree, holiday lights, fire statistics, decorative lights, home fires

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.

We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

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Executive Summary

The winter holiday season should be a joyous time of year. However, certain types of fires and injuries, associated with holiday decorating, are much more common during this season. In 2003-2007, U.S. fire departments responded to an estimated average of 250 home structure fires that began with Christmas trees, including an average of 60 per year with confined incident types. Christmas tree fires caused an average of 14 civilian deaths, 26 civilian injuries, and \$13.8 million in direct property damage per year.

Although these fires are not common, when they do occur, they are likely to be unusually serious. On average, one of every 18 reported home structure Christmas tree fires resulted in a death compared to an average of one death per 134 total reported home structure fires.

Because casual data is typically not required for fires with confined fire incident types, the remaining statistics are based on non-confined fires only. Nearly two-thirds (62%) of the home Christmas tree structure fires were in December and 22% were in January. More than one-third (36%) of home Christmas tree structure fires were reported on the ten days between Christmas Eve (December 24) and the day after New Year's Day (January 2). The top day was Christmas with 6% of the fires.

Electrical failures or malfunctions were involved in 45% of the non-confined home Christmas tree structure fires; 26% occurred because some type of heat source was too close to the tree. Decorative lights with line voltage were involved in 23% of these incidents. Fourteen percent of the home Christmas tree fires were started by candles.

Also during 2003-2007, an annual average of 460 outside and other non-structure, non-vehicle fires on home properties started with Christmas trees. Three out of five (59%) of these fires occurred in January. Six out of seven (86%) were intentionally set. This suggests that discarded Christmas trees may be an attractive target for firesetters.

Holiday lights and other decorative lighting with line voltage were involved in an estimated average of 170 home structure fires per year in this same period. These fires caused an average of seven civilian deaths, 17 civilian injuries, and \$7.9 million in direct property damage per year. Forty-two percent occurred in December and 13% were in January. One-fifth (21%) of these fires began with Christmas trees. Electrical failures or malfunctions were factors in two-thirds (67%) of the fires involving holiday or decorative lights.

In a study of fall-related injuries during the holiday season, Stevens and Vajani estimated that an average of roughly 5,800 fall injuries related to holiday decorating were treated at hospital emergency rooms between November 1 and January 31 in 2000-2001, 2001-2002, and 2002-2003.¹ Sixty-two percent of those injured were between 20 and 49 years of age.

¹ J.A. Stevens and M. Vajani. "Fall-Related Injuries During the Holiday Season -- United States, 2000--2003, *MMWR Weekly*, December 10, 2004, 53(48):1127-1129, online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5348a1.htm>.

With 43% of the injuries resulting from falls from ladders and 13% caused by falls from the roof, it appears that the majority of these falls occurred during outdoor decorating. Falls from furniture, typically inside the structure, accounted for 11% of the injuries. Some falls occurred when people tripped over or slipped on tree skirts or other decorations.

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Home Fires Involving Christmas Trees and Holiday Lights, 2003-2007

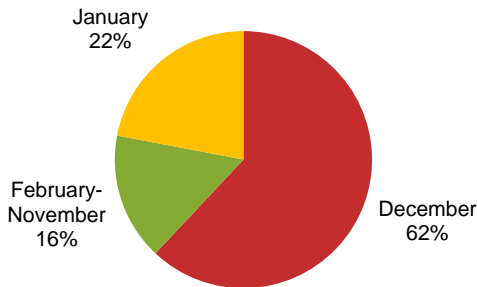
Christmas Tree Fires

U.S. fire departments responded to an estimated average of **250** home¹ structure fires that began with Christmas trees in 2003-2007. These fires caused an annual average of

- 14 civilian fire deaths
- 26 civilian fire injuries
- \$13.8 million in direct property damage

On average, one of every 18 reported home Christmas tree fires resulted in a death.

Home Structure Fires in Which Christmas Trees Were First Ignited by Month: 2003-2007



Thirty-six percent of home Christmas tree structure fires occurred on the ten days between December 24 and January 2.

Electrical problems were factors in nearly half (45%) of home Christmas tree structure fires.

A heat source was too close to the Christmas tree in one-quarter (26%) of the fires.

Twenty-three percent of home Christmas tree fires involved decorative lights.

Candles started 14% of home Christmas tree structure fires.

Half of all home Christmas tree fires started in the living room, family room, or den.

An average of 460 outside or unclassified Christmas tree fires occurred on home properties. Fifty-nine percent occurred in January; 86% were intentionally set.

Line-Voltage Holiday or Decorative Light Fires

Line-voltage holiday or decorative lights or were involved in an average of 170 home structure fires per year, resulting in an average of

- 7 civilian deaths,
- 17 civilian injuries, and
- \$7.9 million in direct property damage.

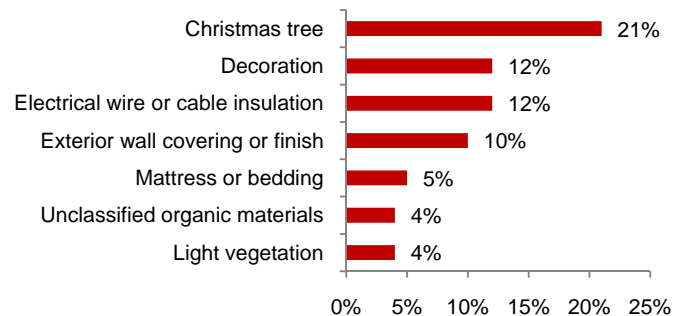
Forty-two percent of these fires were reported in December and 13% occurred in January.

In one-fifth (21%) of these fires, Christmas trees were the item first ignited.

Electrical problems were factors in 67% of these fires. Something that could burn was too close to the lights in 10% of the fires.

Roughly 5,800 people per year were treated at hospital emergency rooms for falls associated with holiday decorations.²

Leading items First Ignited in Holiday Light Home Structure Fires



¹Homes are dwellings, duplexes, manufactured homes, apartments, townhouses, and rowhouses.

²J.A. Stevens and M Vajami. "Fall-Related Injuries During the Holiday Season -- United States, 2000--2003, *MMWR Weekly*, December 10, 2004, 53(48); 1127-1129, online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5348a1.htm>.

Home Structure Fires Originating with Christmas Trees

On average, 250 home structure fires began with Christmas trees each year.

During 2003-2007, Christmas trees were the items first ignited in an estimated average of 190 reported non-confined home structure fires per year and 60 confined fires per year, or an annual average total of 250 fires per year.

Home structure fires that began with Christmas trees caused an estimated average of 14 civilian deaths, 26 civilian injuries, and \$13.8 million in direct property damage per year.

Christmas tree fires accounted for 0.1% of the reported home fires, 0.5% of home fire deaths, 0.2% of home fire injuries, and 0.2% of the direct property damage resulting from home fires.

Also in 2003-2007, Christmas trees were the items first ignited in an estimated average of 20 reported non-confined non-home structure fires per year. These fires caused an estimated average of \$0.8 million in direct property damage per year and involved no reported civilian deaths or injuries.

Home Christmas tree structure fires have declined fairly steadily over the past 27 years.

Table 1 and Figure 1 show that the number of Christmas tree fires declined fairly steadily from 1980 through the late 1990s. Overall, these fires fell a total of 67% from a high of 850 in 1980 to 280 in 2007. In recent years, the estimated number of reported home fires starting with Christmas trees has hovered between 200 and 300.

Deaths from Christmas tree fires peaked in the mid-1980s to early 1990s.

Over the 28-year period of 1980 to 2007, the projected number of Christmas tree fire deaths ranged from a low of zero to a high of 54. Because these statistics are projections and not a complete census of all fire deaths resulting from these fires, it is possible to have an estimate of zero deaths in a year when some

Methodology

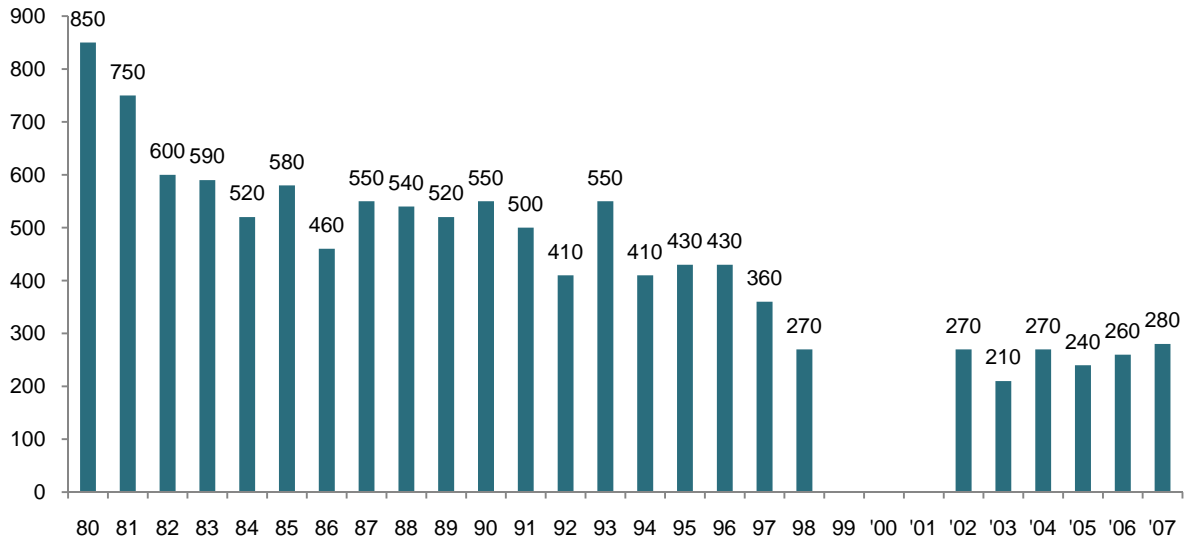
The statistics in this analysis are projections derived from the U.S. Fire Administrations National Fire Incident Reporting System (NFIRS) and NFPA's annual fire department experience survey. Homes include one- and two-family homes, apartments, townhouses, row houses and manufactured housing.

Version 5.0 of NFIRS (NFIRS 5.0) does not require much information on certain types of confined fires, e.g., confined cooking, chimney or trash fires. These fires were included in the home Christmas tree fire totals and estimates of fire severity but excluded from further analysis.

In NFIRS, Christmas trees are identified by item first ignited code 41. The code has remained consistent in the different versions of NFIRS. No statistics are available on fires that started with other items but spread to Christmas trees. The methodology is described in Appendix A.

deaths actually occurred. A fire that kills several people, when projected, can result in an artificially high estimate of deaths.

Figure 1. Home Structure Fires in Which Christmas Trees Were First Ignited by Year



Note: See Note and Source on Table 1. In 1999-2001, participation in NFIRS Version 5.0 was low, which means estimates for these years are highly uncertain and is why those estimates are not shown here.

Figure 2 shows four-year estimated averages of deaths, beginning with the period of 1980-1983, and ending with 2004-2007. Because of low participation in NFIRS Version 5.0 in 1999-2001, those estimates are highly uncertain and year groups including any of those years are not shown here.

Figure 2. Deaths in Home Structure Fires in which Christmas Trees Were First Ignited Four-Year Rolling Averages

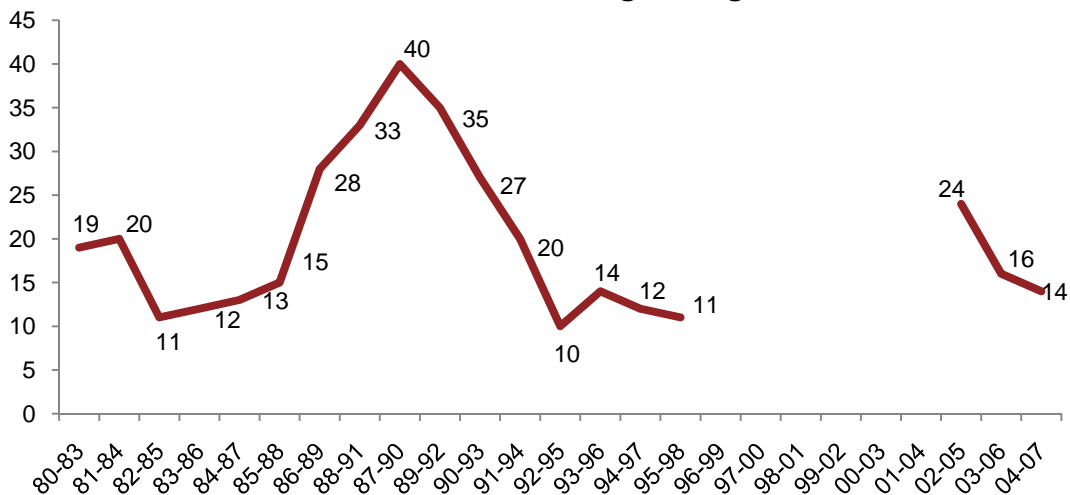


Figure 3 shows that nearly two-thirds (62%) of the non-confined Christmas tree fires occurred in December, and more than one-fifth (22%) occurred in January.

Figure 4 shows that these fires peaked between 6:00 and 9:00 p.m.

Figure 3. Non-Confined Home Structure Fires in Which Christmas Trees Were First Ignited, by Month: 2003-2007

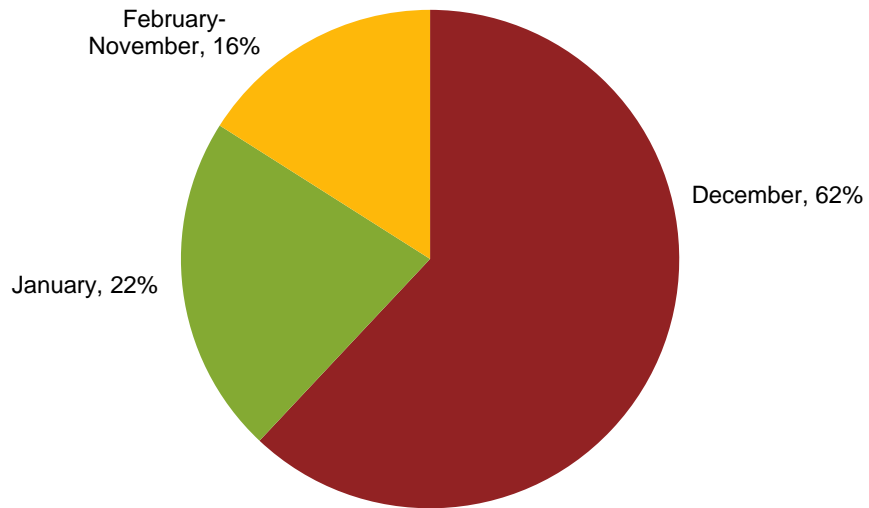
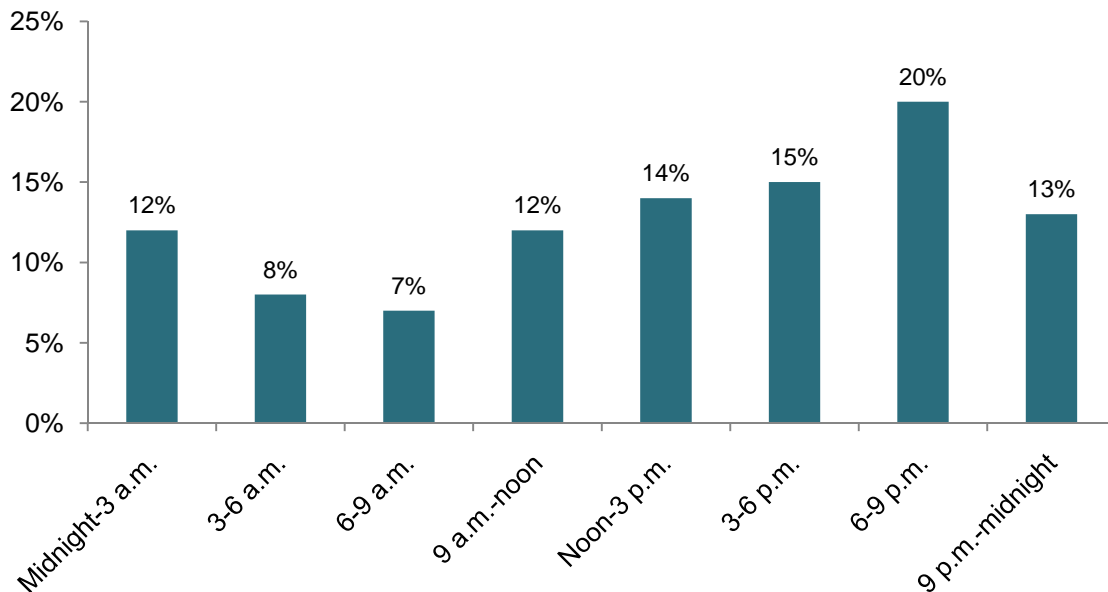


Figure 4. Home Structure Fires in which Christmas Trees Were First Ignited by Time of Alarm: 2003-2007



More than one-third of home Christmas tree fires occurred in the ten days between Christmas Eve and the day after New Year’s Day.

Table A shows that 6% of non-confined home Christmas tree structure fires occurred on Christmas, and nine of the ten leading days for Christmas tree fires fall in this ten-day range. (Each day of the year = 0.27%, or 1/365.25 of the total.) Overall, 36% of the home Christmas tree fires, 22% of the deaths, 35% of the injuries, and 48% of the direct property damage associated with these fires occurred in the ten days shown below. By contrast, ten average days would total just 2.7% of the fires.

By Christmas Eve, virtually all homes that are going to put up a Christmas tree will have done so. By January 2, many homes will have taken their trees down. Between Christmas and New Year’s Day, there is the highest likelihood that a natural Christmas tree has dried out and become much easier to ignite, either because the tree has been taken down but not yet disposed of off-site or because of limitations in watering a tree for many days after it has been cut. The peaking of Christmas fires during this period therefore makes sense; it is the period when many homes still have a Christmas tree in their homes but natural trees may have dried out.

Table A.
Rank by Share of Non-Confined Home Structure Fires
in which Christmas Tree Was the Item First Ignited
of Ten Days Between December 24 and January 2: 2003-2007

Rank	Date	Percent of Fires
1.	December 25	6%
2.	December 27	5%
3.	January 2	4%
4.	December 26	4%
5.	December 31	4%
6.	January 1	4%
7.	December 28	3%
8.	December 29	3%
9.	December 24	3%
10.	December 30	2%

If a Christmas tree fire occurs, the risk of death is unusually high.

Although the number of home structure fires beginning with Christmas trees is relatively small, it is important to remember that these items are generally in use a short time each year. When they do occur, Christmas tree fires are unusually likely to be severe. In 2003-2007, on average, one of every 18 reported home structure Christmas tree fires (including confined and non-confined fires) resulted in a death, compared to an average of one death per 134 total reported home structure fires (including the confined fire incident types).

Some examples of deadly Christmas tree fires are shown below to illustrate some of the things that can happen. These incidents, taken from NFPA’s Fire Incident Data Organization (FIDO) anecdotal database, were previously published in either *NFPA Journal’s* “Firewatch”

column, or in NFPA's studies of catastrophic fires. The full published incident descriptions may be found in Appendix B and C.

- A 14-year-old boy died in a 2007 fire in an Illinois single-family home that started when lights on the Christmas tree failed and ignited the tree. The fire spread to wall coverings and the couch.²
- Four people, including a 1-year old boy, a 12-year-old girl, a 38-year-old woman, and a 40-year-old man died in a 2007 Pennsylvania fire in a single-family home that started when an electrical fault ignited combustibles, including an artificial Christmas tree and a sofa. Three people were injured when they jumped from other floors to escape the blaze.³
- In 2005, a Christmas tree fire started by an extension cord in a Tennessee single-family dwelling killed four people.⁴
- A 2003 early morning electrical fire ignited a Christmas tree in a Virginia single-family home. The tree lights, connected to two extension cords, had been left on, and the resistance heating ignited the tree. Three people died in this fire.⁵
- Seven people died in a 2003 fire that started when a candle ignited a Christmas tree that had either fallen over or been unintentionally knocked over in a single-family Ohio home.⁶

Table 2 shows 24% of the reported fires that began with Christmas trees were confined fires identified by incident type. Presumably, damage in these fires was confined to the object of origin. Fourteen percent of the Christmas tree fires had an incident type other than the six specific ones used for confined fires but had flame damage was confined to the object of origin. Thirty-five percent of the home Christmas tree structure fires spread beyond the room of origin. These fires caused 90% of the associated deaths.

*The remaining analysis excludes fires with the specific confined fire incident types and focuses exclusively on the remaining **non-confined** fires (without a confined fire incident type), regardless of the extent of flame damage.*

Electrical problems and heat sources that were too close were leading causes of these fires.

Table 3 shows that only 5% of home Christmas tree structure fires were intentionally set. Table 4 shows that some type of electrical failure or malfunction was a factor in 45% of the home structure fires that originated with Christmas trees. One-quarter (26%) were caused by

² Kenneth J. Tremblay, 2008, "Christmas Tree Fire Kills One, Illinois," *NFPA Journal*, March/April, 24-25.

³ Kenneth J. Tremblay, 2009, "House Fire Kills Four, Pennsylvania", *NFPA Journal*, January/February, 23.

⁴ Kenneth J. Tremblay, 2006, "Overloaded Extension Cord Ignites Christmas Tree, Tennessee," *NFPA Journal*, November/December, 20.

⁵ Kenneth J. Tremblay, "Electrical Fire in Christmas Tree Kills Three, Virginia," 2004, *NFPA Journal*, November/December, 16-17.

⁶ Stephen G. Badger, 2004, "Catastrophic Multiple-Death Fires 2003", *NFPA Journal*, September/October, 68.

some type of heat source too close to the tree, and 7% resulted from someone, typically a child, playing with fire or other heat source.

Decorative lights were involved in 23% of the incidents.

Table 5 shows that 29% of Christmas tree fires in homes were coded as no equipment involved. Decorative lights with line voltage (including holiday lights) were involved in 23%; unclassified electrical wiring or related equipment was involved in 10%; and fixed or portable space heaters were involved in 9% of these incidents.

Candles started 14% of home Christmas tree structure fires.

Arcing was the heat source in 21% of the home Christmas tree structure fires, radiated or conducted heat from operating equipment in 14%, candles in 14%, and unclassified heat from powered equipment was the source of heat in 12% of home structure Christmas tree fires. (See Table 6.)

Table 7 shows that half (50%) of the home structure Christmas tree fires started in the living room, family room or den.

The data element “type of material first ignited” provides the best indication of whether the Christmas tree was artificial or natural. The code for plastic implies an artificial tree (although it could also refer to plastic ornaments on the tree) and the codes for unclassified natural product, round timber and sawn wood all imply a natural tree. Other codes for wood do not as clearly relate to a natural tree and also make little difference in the share of fires attributable to natural trees. Based on these codings, fires involving natural trees outnumber fires involving artificial trees by about 3-to-2, and the ratios are higher for associated losses – 4 or 5-to-1 for civilian deaths, 3 or 3-½-to-1 for civilian injuries, and 3-½-to-1 for direct property damage. Polling data on relative use of artificial vs. natural Christmas trees shows a substantial and growing majority of artificial trees. This implies a considerably higher fire risk with natural trees.⁷

Six out of seven outside and other home Christmas tree fires were intentional.

During 2003-2007, an annual average of 460 outside and other fires on home properties started with Christmas trees. Only 13% of the outside and other home Christmas tree fires occurred in December. Fifty-nine percent occurred in January. Eighty-six percent were intentionally set. This suggests that discarded Christmas trees may be an attractive target for firesetters.

⁷ Gary Langer, "Poll: Fake Christmas Trees Grow Popular", ABC News, December 23, 2004, <http://abcnews.go.com/print?id=355330>. They found a 58% to 42% advantage for artificial trees.

Researchers easily ignited dry Scotch Pine trees, but not one that had been kept moist.

In 1999, the National Institute of Standards and Technology (NIST) conducted tests to measure the heat release of Scotch Pine Christmas trees. Seven trees had been allowed to dry out for three weeks, while the eighth had been cut fresh and kept in a bucket of water. The first seven trees had dry needles that were slightly brown and brittle and fell when a branch was shaken. The eighth tree had greener pliable needles that did not separate from the tree as easily. An electric match easily ignited the first seven trees, but the electric match did not ignite the eighth tree that had been kept moist.⁸

White, DeMars, and Bishop also explored the flammability of Christmas trees.⁹ They cited a 1963 Canada Department of Forestry Study by C. E. Van Wagner that found that matches could not ignite Christmas trees that had been continuously standing in water. However, if a tree had dried to below the moisture recovery limit, it continued to dry out even if again placed in water. The same study found that a burning ring around the base of the tree could ignite the crown of any of the trees. In their study, White, Demars, and Bishop tested trees with four different types of initial conditioning: immediately placed in water, bundled, laid in a pile without bundling, and bundled but left in storage. Different types of trees were cut according to industry practices for that type. In three conditions, the tree was stored in an apartment. In the fourth, the trees were kept in a garage. In final conditioning for all four, the bottom of each tree was trimmed and the tree was placed in water. Tests were done with four ignition sources: a match, a lighter, a sustained electric arc, and an overheated wire. In most cases, no ignition occurred. In a few, some needles ignited, but the fire was self-extinguished after the heat source was removed. The authors conclude: "If proper procedures of cutting the stem and keeping it in plain water are followed by the consumer, our MN data support the position that the moisture content of the tree will likely be sufficient to make accidental ignition of the tree itself from matches, lighter, electric arc, or overheated wire very unlikely." The authors also noted that the U.S. Department of Agriculture (USDA) Forest Products Library (FPL) no longer encourages the use of fire-retardant coatings with Christmas trees and instead stresses the importance of trimming the stem and keeping the tree in water.

NFPA/UL video demonstrates the flammability of a dry vs. watered Christmas tree.

Additional information about Christmas tree safety, including a video produced by NFPA and Underwriters Laboratories, is available in the seasonal safety section of safety information for consumers at www.nfpa.org/displaycontent.asp?categoryID=296. In the 90 second video, viewers can watch fire development after ignition simultaneously in two trees, one dry, and one watered. Information from NFPA 1, *Fire Code*, is also provided.

⁸ D.W. Stroup, L. DeLauter, J. Lee and G. Roadarmel. *Scotch Pine Christmas Tree Fire Tests: Report of Test FR 4010*, U.S. Department of Commerce, National Institute of Standards and Technology, Building and Fire Research Laboratory, December 1, 2000, online at <http://fire.nist.gov/bfrlpubs/fire00/PDF/f00147.pdf>.

⁹ Robert H. White, Donald DeMars, and Mark Bishop. "Flammability of Christmas Trees and Other Vegetation," *Proceedings of the International Conference on Fire Safety*, Volume 24, 1997, online at <http://www.fpl.fs.fed.us/documnts/pdf1997/white97b.pdf>.

Safety Tips

- Plan where your tree will be positioned. Use a sturdy tree stand designed not to tip over. Make sure it is at least 3 feet (1 meter) away from the fireplace, radiators, space heaters and other sources of heat. Do not place the tree in front of or near your exit. Try to position it near an outlet so that cords are not running long distances.
- When buying a live tree, check for fresh, green needles. Do not buy a tree which is dry or dropping needles. When buying an artificial tree, be sure it is labeled as fire-retardant.
- When using a live tree, cut an additional two inches off the trunk. Place the tree in a sturdy stand. Keep your tree watered at all times.
- Buy lights with the label of a recognized testing laboratory. Use the correct lights for indoor, outdoor or indoor/outdoor use. Never use electric lights on a metal tree.
- Connect no more than three strands of push-in bulbs and a maximum of 50 bulbs for screw-in bulbs.
- Follow the manufacturer's instructions on how to use tree lights. Lights with worn, frayed or broken cords or loose bulb connections should not be used.
- Never use staples or nails to hang light strings.
- Check your strands of lights to determine the maximum number of strands that may be connected.
- Always unplug or switch off all holiday lights before leaving home or going to sleep.
- Keep a natural tree as moist as possible by giving it plenty of water daily.
- Never use lit candles to decorate a tree. Be sure any candles are well away from tree branches.
- Children are fascinated with Christmas trees. Keep a watchful eye on them when they are around the tree, and do not let them play with the wiring or lights.
- Remove the tree from your home when it begins dropping needles, and dispose of it properly. Dried-out trees burn easily and should not be left in a garage or placed against the house.
- Take holiday lights down after the holidays. Holiday lights are for temporary, seasonal use up to 90 days.
- Discarded Christmas trees can be attractive targets for firesetters. Do not leave them outside long before pickup.

Table 1.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited, by Year
1980-2007

Year	Fires		Civilian Injuries	Direct Property Damage (in Millions)	Adjusted Loss in Millions of 2007 Dollars
1980	850		80	\$11.1	\$28.0
1981	750		72	\$7.0	\$15.9
1982	600		56	\$7.9	\$17.0
1983	590		66	\$9.8	\$20.4
1984	520		64	\$10.9	\$21.7
1985	580		72	\$13.3	\$25.6
1986	460		70	\$9.2	\$17.4
1987	550		67	\$11.2	\$20.4
1988	540		125	\$10.4	\$18.3
1989	520		102	\$14.1	\$23.6
1990	550		109	\$19.4	\$30.8
1991	500		139	\$18.0	\$27.4
1992	410		93	\$20.9	\$30.9
1993	550		119	\$33.4	\$48.0
1994	410		125	\$11.4	\$16.0
1995	430		63	\$19.1	\$26.0
1996	430		64	\$13.2	\$17.5
1997	360		24	\$10.3	\$13.3
1998	270		11	\$8.0	\$10.2
1999*	380	(380)	59	\$27.1	\$33.8
2000	380	(380)	55	\$36.6	\$44.1
2001	290	(290)	0	\$20.9	\$24.5
2002	270	(270)	14	\$15.3	\$17.7
2003	210	(210)	31	\$10.4	\$11.7
2004	270	(180)	16	\$15.9	\$17.5
2005	240	(210)	42	\$12.0	\$12.8
2006	260	(150)	10	\$14.2	\$14.6
2007	280	(200)	33	\$14.9	\$14.9

Estimates for 1999-2007 are based on data collected originally in NFIRS 5.0 only. The 1999-2007 estimates shown without parentheses are sums of the non-confined (shown in parentheses) and the confined fire (not shown) projections. Confined fires are reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, compactor, or trash. No injuries and very minimal property damage resulted from these confined fires. Due to the smaller share of NFIRS data collected in 1999-2001, statistics for these years should be viewed with caution.

Note: Numbers in parentheses exclude confined fires. Statistics shown are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported.

Source: Data from NFIRS Version 4.1 (1980-1998) and Version 5.0 (1999-2007) and from NFPA survey. Inflation adjustments were based on the consumer price index.

Table 2.
U.S. Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Extent of Flame Damage
2003-2007 Annual Averages

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Property Damage (in Millions)	
Confined fire identified by incident type	60	(24%)	0	(0%)	0	(0%)	\$0.0	(0%)
Confined to object of origin	30	(14%)	0	(0%)	5	(20%)	\$1.0	(7%)
Confined to room of origin	70	(27%)	1	(10%)	6	(22%)	\$2.2	(17%)
Confined to floor of origin	20	(10%)	3	(20%)	4	(15%)	\$1.9	(14%)
Confined to building of origin	60	(23%)	10	(70%)	8	(30%)	\$7.7	(57%)
Extended beyond building of origin	10	(2%)	0	(0%)	3	(13%)	\$0.6	(5%)
Total	250	(100%)	14	(100%)	26	(100%)	\$13.5	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where extent of flame damage was unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Table 3.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Cause
2003-2007 Annual Averages

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	120	(64%)	8	(55%)	21	(81%)	\$10.0	(74%)
Failure of equipment or heat source	60	(29%)	6	(45%)	4	(14%)	\$3.1	(23%)
Intentional	10	(5%)	0	(0%)	0	(0%)	\$0.2	(2%)
Other known cause	0	(2%)	0	(0%)	1	(5%)	\$0.1	(0%)
Total	190	(100%)	14	(100%)	26	(100%)	\$13.5	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where cause of fire was still under investigation, unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Table 4.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Factor Contributing to Ignition
2003-2007 Annual Averages

Factor Contributing	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Electrical failure or malfunction	80	(45%)	6	(43%)	6	(22%)	\$6.0	(45%)
Heat source too close to combustibles	50	(26%)	0	(0%)	10	(37%)	\$5.5	(41%)
Playing with heat source	10	(7%)	1	(8%)	4	(16%)	\$0.7	(5%)
Unclassified misuse of material or product	10	(5%)	2	(13%)	3	(10%)	\$0.2	(1%)
Equipment unattended	10	(4%)	0	(0%)	0	(0%)	\$0.5	(4%)
Unclassified factor contributed to ignition	10	(3%)	5	(36%)	3	(11%)	\$0.6	(4%)
Abandoned or discarded material	10	(3%)	0	(0%)	0	(0%)	\$0.2	(2%)
Other known factor	30	(15%)	1	(9%)	3	(11%)	\$1.1	(8%)
Total*	190	(100%)	14	(100%)	26	(100%)	\$13.5	(100%)
Total entries**	200	(108%)	15	(109%)	29	(108%)	\$14.8	(109%)

* Multiple entries are allowed, resulting in total entries higher than the totals.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where factor contributing to ignition was listed as none, unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Table 5.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Equipment Involved in Ignition
2003-2007 Annual Averages

Equipment Involved	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
No equipment involved	50	(29%)	2	(14%)	10	(38%)	\$3.1	(23%)
Decorative lights with line voltage, including holiday lights	40	(23%)	4	(28%)	8	(30%)	\$4.0	(30%)
Unclassified electrical wiring or related equipment	20	(10%)	0	(0%)	0	(0%)	\$1.7	(12%)
Fixed or portable space heater	20	(9%)	0	(0%)	8	(32%)	\$1.7	(13%)
Other known equipment	50	(28%)	8*	(58%)	0	(0%)	\$3.0	(22%)
Total	190	(100%)	14	(100%)	26	(100%)	\$13.5	(100%)

*Extension cords accounted for 58% of the deaths.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where equipment involved in ignition was unknown or unreported or where an entry of "no equipment" was not matched by a specific non-equipment heat source entry under Heat Source. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Table 6.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Heat Source
2003-2007 Annual Averages

Heat Source	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Arcing	40	(21%)	2	(16%)	2	(7%)	\$3.1	(23%)
Candle*	30	(14%)	1	(8%)	1	(6%)	\$4.0	(29%)
Radiated or conducted heat from operating equipment	30	(14%)	5	(33%)	3	(11%)	\$1.7	(13%)
Unclassified heat from powered equipment	20	(12%)	0	(0%)	1	(6%)	\$0.7	(5%)
Unclassified heat source	20	(11%)	3	(24%)	4	(15%)	\$1.2	(9%)
Unclassified hot or smoldering object	20	(8%)	0	(0%)	2	(9%)	\$0.6	(4%)
Spark, ember or flame from operating equipment	10	(6%)	0	(0%)	1	(3%)	\$0.8	(6%)
Lighter*	10	(5%)	1	(7%)	3	(10%)	\$0.3	(2%)
Other known heat source	20	(9%)	2	(12%)	9	(34%)	\$1.1	(8%)
Total	190	(100%)	14	(100%)	26	(100%)	\$13.5	(100%)

* Estimates for heat sources in the open flame or smoking material category (e.g., candles, matches and lighters) include a proportional share of fires coded with heat source code 60 – “heat from open flame or smoking materials, other.”

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where heat source was unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Table 7.
U.S. Non-Confined Home Structure Fires
in Which Christmas Trees Were the Item First Ignited
by Area of Origin
2003-2007 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Living room, family room or den	100	(50%)	12	(85%)	17	(63%)	\$9.3	(69%)
Unclassified function area	40	(22%)	2	(15%)	7	(27%)	\$2.7	(20%)
Lobby or entrance way	10	(3%)	0	(0%)	1	(4%)	\$0.1	(1%)
Bedroom	10	(3%)	0	(0%)	0	(0%)	\$0.1	(1%)
Kitchen or cooking area	10	(3%)	0	(0%)	0	(0%)	\$0.1	(1%)
Other known area of origin	30	(18%)	0	(0%)	2	(6%)	\$1.2	(9%)
Total	190	(100%)	24	(100%)	26	(100%)	\$13.5	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Because the number of Christmas tree fire deaths is so small, estimates for individual years are unreliable and therefore not shown. Fires are rounded to the nearest ten, civilian injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where item first ignited was unknown or unreported and of Christmas tree fires where area of origin was unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to Christmas tree fires.

Source: NFIRS and NFPA survey.

Home Structure Fires in which Holiday Lights or Other Decorative Lighting with Line Voltage Were Involved in Ignition

Holiday or decorative line-voltage lighting was involved in an average of 170 home structure fires per year.

During 2003-2007, decorative lights with line voltage or holiday lights were the equipment involved in an estimated average of 170 reported non-confined home structure fires per year. (Homes include one- and two-family homes, row houses, townhouses, apartments, and manufactured housing.) These decorative lighting home structure fires caused an average of seven civilian deaths, 17 civilian injuries, and \$7.9 million in direct property damage per year.¹⁰ These fires are identified by NFIRS 5.0 equipment involved in ignition code 242, “Decorative lights, line voltage. Includes holiday lighting, Christmas lights.”

Version 5.0 of the National Fire Incident Reporting System (NFIRS 5.0) requires minimal information on certain types of confined fires, e.g., confined cooking, chimney, fuel burner/boiler, or trash fires. These confined fires (incident type 113-118) were excluded from the analysis.

Low voltage decorative or landscape lighting was involved in an average of 50 home structure fires per year.

Equipment involved in ignition code 243 is used to identify decorative or landscape lighting with low voltage. Low voltage decorative or landscaping lighting was involved in an average of 50 reported home structure fires per year, resulting in an average property loss of \$1.1 million per year. No casualties were reported. This category of lighting equipment is involved in far fewer fires than the holiday or decorative line-voltage lighting group and only part of the category includes decorative lighting. For these reasons, low-voltage lighting is excluded from the remainder of this analysis.

Two out of five line-voltage holiday or decorative lighting fires occurred in December.

Figure 5 shows that 42% of these fires were reported in December and 13% occurred in January. Figure 6 shows that over half (56%) of these fires were reported between 6:00 p.m. and 3:00 a.m.

More than one-quarter of these fires were confined to the object of origin.

Table 8 shows that in 27% of these fires, flame damage was confined to the object of origin. Forty-five percent of the home structure holiday or decorative lighting fires spread beyond the room of origin.

¹⁰ These statistics include a proportional share of fires in which the equipment involved in ignition was unreported, undetermined, or coded as “none” without a heat source code indicating a non-equipment heat source. Please refer to the Appendix for a detailed description of the methodology used.

Electrical problems were factors in two-thirds of these fires.

Table 9 shows that at most 2% of these fires were intentional. Table 10 shows that some type of electrical failure or malfunction was a factor in 67% of the home structure fires involving holiday lights or other decorative lighting with line voltage. Ten percent were caused by a combustible too close to the lighting.

Figure 5. Home Structure Fires in Which Holiday Lights or Other Decorative Lights with Line Voltage Were Involved in Ignition, by Month: 2003-2007

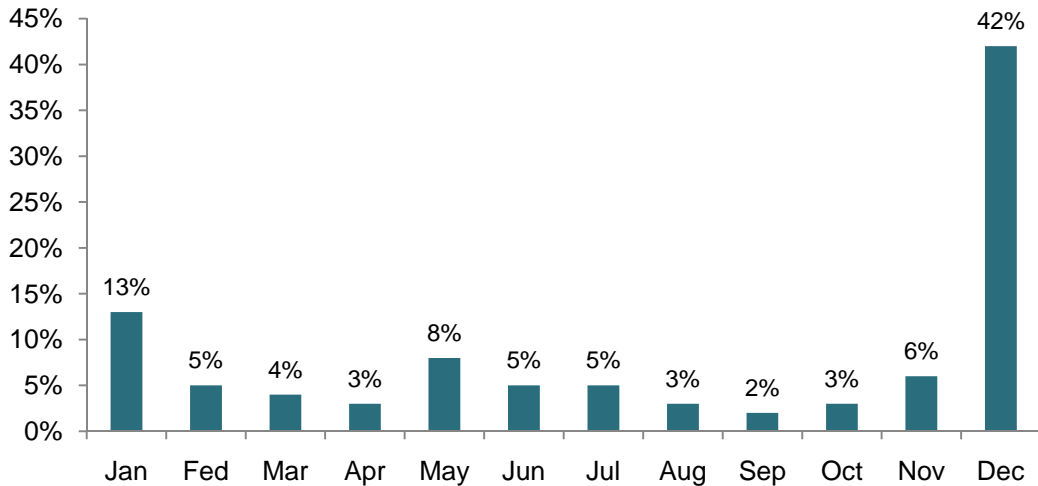
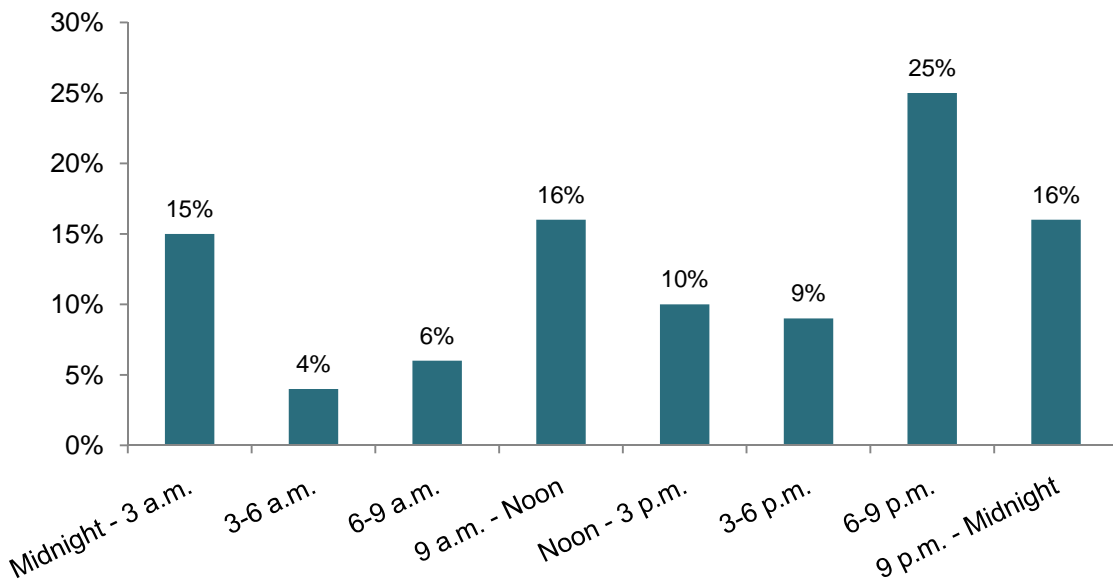


Figure 6. Home Structure Fires in Which Holiday Lights or Other Decorative Lights with Line Voltage Were Involved in Ignition by Time of Alarm: 2003-2007



One-fifth of these fires began with Christmas trees.

Table 11 shows that Christmas trees were the item first ignited in 21% of the home structure fires involving holiday lights or decorative lights with line voltage. Decorations were first ignited in 12% as were electrical wire or cable insulation.

More than one-third of these fires originated in the living room, family room or den.

Table 12 shows that 35% of the home structure fires involving holiday lights or other decorative lighting with line voltage started in the living room, family room, den or common room; 10% began in the bedroom; and 8% started on an exterior balcony or unenclosed porch.

CPSC has recalled several sets of holiday lights.

Over the years, the U.S Consumer Product Safety Commission has issued a number of recalls for holiday lights due to fire and shock hazards. Details may be found by searching for “Lights (seasonal)” at <http://www.cpsc.gov/cgi-bin/recalldb/prod.asp>.

Roughly 5,800 people per year were treated at hospital emergency rooms for falls associated with holiday decorations.

In a study of fall-related injuries during the holiday season, Stevens and Vajani estimated that an average of roughly 5,800 fall injuries related to holiday decorating were treated at hospital emergency rooms between November 1 and January 31 in 2000-2001, 2001-2002, and 2002-2003.¹¹ Sixty-two percent of those injured were between 20 and 49 years of age. Roughly 43% of the injuries resulted from falls from ladders, 13% involved falls from the roof, and 11% involved falls from furniture.

Safety Tips

- Buy lights with the label of a nationally recognized testing laboratory. Use the correct light for indoor, outdoor, or indoor/outdoor use. Never use electric lights on a metal tree.
- Follow the manufacturer's instructions on how to use holiday lights. Lights with worn, damaged or broken cords or loose bulb connections should not be used.
- Connect no more than three strands of push-in bulbs and a maximum of 50 bulbs for screw-in bulbs.
- Always unplug and/or switch off holiday lights before leaving home or going to sleep.
- Bring outdoor electrical lights inside after the holidays. Lights are for temporary seasonal use, up to 90 days.
- When using a ladder to hang holiday lights, be sure it is secured on level ground. Never stand on the top three rungs of the ladder. When placed up against a roof, a ladder should reach at least three feet above the roof's edge. Move the ladder to make your reach easier
- Use a wood or fiberglass ladder when a ladder must be used near power lines or wiring.

¹¹ J.A. Stevens and M Vajami. "Fall-Related Injuries During the Holiday Season -- United States, 2000--2003, *MMWR Weekly*, December 10, 2004, 53(48);1127-1129, online at <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5348a1.htm>.

Table 8.
U.S. Non-Confined Home Structure Fires in Which Holiday Lights
or Other Decorative Lighting with Line Voltage Were Involved in Ignition
by Extent of Flame Damage
2003-2007 Annual Averages

Extent of Flame Damage	Fires		Civilian Deaths		Civilian Injuries		Property Damage (in Millions)	
Confined to object of origin	50	(27%)	0	(0%)	4	(22%)	\$0.1	(2%)
Confined to room of origin	50	(27%)	0	(0%)	1	(9%)	\$1.6	(20%)
Confined to floor of origin	10	(9%)	3	(38%)	1	(9%)	\$0.8	(10%)
Confined to building of origin	50	(31%)	5	(62%)	8	(50%)	\$4.5	(57%)
Extended beyond building of origin	10	(5%)	0	(0%)	2	(10%)	\$0.9	(11%)
Total	170	(100%)	7	(100%)	17	(100%)	\$7.9	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where equipment involved was unknown, unreported, or listed as “no equipment” with no specific non-equipment heat source coded to establish that it was known to be a non-equipment heat source. The statistics also include a proportional share of holiday or other decorative lighting fires with extent of flame damage unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to holiday or decorative lighting fires.

Source: NFIRS and NFPA survey.

Table 9.
U.S. Non-Confined Home Structure Fires in Which Holiday Lights
or Other Decorative Lighting with Line Voltage Were Involved in Ignition
by Cause
2003-2007 Annual Averages

Cause	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Unintentional	90	(50%)	0	(0%)	4	(21%)	\$4.8	(61%)
Failure of equipment or heat source	80	(48%)	7	(100%)	13	(79%)	\$3.0	(38%)
Intentional	0	(1%)	0	(0%)	0	(0%)	\$0.0	(0%)
Unclassified	0	(1%)	0	(0%)	0	(0%)	\$0.1	(1%)
Total	170	(100%)	7	(100%)	17	(100%)	\$7.9	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where equipment involved was unknown, unreported, or listed as “no equipment” with no specific non-equipment heat source coded to establish that it was known to be a non-equipment heat source. The statistics also include a proportional share of holiday or other decorative lighting fires with cause of ignition unknown, unreported or still under investigation. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to holiday or decorative lighting fires.

Source: NFIRS and NFPA survey.

Table 10.
U.S. Non-Confined Home Structure Fires in Which Holiday Lights
or Other Decorative Lighting with Line Voltage Were Involved in Ignition
by Factor Contributing to Ignition
2003-2007 Annual Averages

Factor Contributing	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Electrical failure or malfunction	110	(67%)	7	(100%)	17	(100%)	\$6.0	(76%)
Heat source too close to combustibles	20	(10%)	0	(0%)	0	(0%)	\$0.9	(11%)
Collision or knock down	10	(4%)	3	(38%)	2	(12%)	\$0.3	(4%)
Unclassified misuse of material or product	10	(4%)	0	(0%)	0	(0%)	\$0.1	(1%)
Unclassified factor contributing to ignition	10	(4%)	0	(0%)	2	(10%)	\$0.5	(6%)
Unintentionally turned on or not turned off	10	(3%)	0	(0%)	0	(0%)	\$0.0	(0%)
Other known factor	30	(15%)	0	(0%)	0	(0%)	\$0.8	(10%)
Total*	170	(100%)	7	(100%)	17	(100%)	\$7.9	(100%)
Total entries*	190	(108%)	10	(138%)	20	(122%)	\$8.5	(108%)

* Multiple entries are allowed which can result in sums higher than totals.

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where equipment involved was unknown, unreported, or listed as “no equipment” with no specific non-equipment heat source coded to establish that it was known to be a non-equipment heat source. The statistics also include a proportional share of holiday or other decorative lighting fires with factor contributing to ignition unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to holiday or decorative lighting fires.

Source: NFIRS and NFPA survey.

Table 11.
U.S. Non-Confined Home Structure Fires in Which Holiday Lights
or Other Decorative Lighting with Line Voltage Were Involved in Ignition
by Item First Ignited
2003-2007 Annual Averages

Item First Ignited	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Christmas tree	40	(21%)	5	(69%)	5	(28%)	\$2.7	(34%)
Decoration	20	(12%)	2	(31%)	5	(30%)	\$0.9	(11%)
Electrical wire or cable insulation	20	(12%)	0	(0%)	1	(8%)	\$0.6	(8%)
Exterior wall covering or finish	20	(10%)	0	(0%)	3	(17%)	\$0.9	(12%)
Mattress or bedding	10	(5%)	0	(0%)	0	(0%)	\$0.0	(0%)
Unclassified organic materials	10	(4%)	0	(0%)	0	(0%)	\$1.2	(15%)
Light vegetation including grass	10	(4%)	0	(0%)	0	(0%)	\$0.0	(0%)
Unclassified furniture or utensil	10	(3%)	0	(0%)	0	(0%)	\$0.1	(1%)
Other known item	50	(28%)	0	(0%)	3	(17%)	\$1.5	(19%)
Total	170	(100%)	7	(100%)	17	(100%)	\$7.9	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where equipment involved was unknown, unreported, or listed as “no equipment” with no specific non-equipment heat source coded to establish that it was known to be a non-equipment heat source. The statistics also include a proportional share of holiday or other decorative lighting fires with item first ignited unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to holiday or decorative lighting fires.

Source: NFIRS and NFPA survey.

Table 12.
U.S. Non-Confined Home Structure Fires in Which Holiday Lights
or Other Decorative Lighting with Line Voltage Were Involved in Ignition
by Area of Origin
2003-2007 Annual Averages

Area of Origin	Fires		Civilian Deaths		Civilian Injuries		Direct Property Damage (in Millions)	
Living room, family room or den	60	(35%)	7	(100%)	12	(73%)	\$3.4	(43%)
Bedroom	20	(10%)	0	(0%)	2	(10%)	\$0.3	(4%)
Exterior balcony, unenclosed porch	10	(8%)	0	(0%)	0	(0%)	\$0.6	(8%)
Unclassified outside area	10	(7%)	0	(0%)	0	(0%)	\$0.1	(1%)
Unclassified function area	10	(6%)	0	(0%)	0	(0%)	\$0.8	(10%)
Bathroom	10	(5%)	0	(0%)	0	(0%)	\$0.7	(9%)
Exterior wall surface	10	(4%)	0	(0%)	0	(0%)	\$0.1	(1%)
Courtyard, terrace or patio	10	(4%)	0	(0%)	0	(0%)	\$0.0	(0%)
Exterior stairway	10	(3%)	0	(0%)	3	(17%)	\$0.3	(4%)
Other known area	30	(18%)	0	(0%)	0	(0%)	\$1.7	(22%)
Total	170	(100%)	7	(100%)	17	(100%)	\$7.9	(100%)

Note: These are national estimates of fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. National estimates are projections. Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest ten, civilian deaths and injuries are rounded to the nearest one, and direct property damage is rounded to the nearest hundred thousand dollars. The statistics include a proportional share of fires where equipment involved was unknown, unreported, or listed as “no equipment” with no specific non-equipment heat source coded to establish that it was known to be a non-equipment heat source. The statistics also include a proportional share of holiday or other decorative lighting fires with area of origin unknown or unreported. These estimates do not include estimates of fires reported as confined to cooking vessel, chimney or flue, boiler or burner, incinerator, commercial compactor, or trash, which are normally analyzed separately and do not appear relevant to holiday or decorative lighting fires.

Source: NFIRS and NFPA survey.

Appendix A. How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit <http://www.nfirs.fema.gov/>. Copies of the paper forms may be downloaded from http://www.nfirs.fema.gov/documentation/design/NFIRS_Paper_Forms_2008.pdf.

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

Methodology may change slightly from year to year.

NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

NFPA's fire department experience survey provides estimates of the big picture.

Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; 3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit <http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf>.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database - the NFPA survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

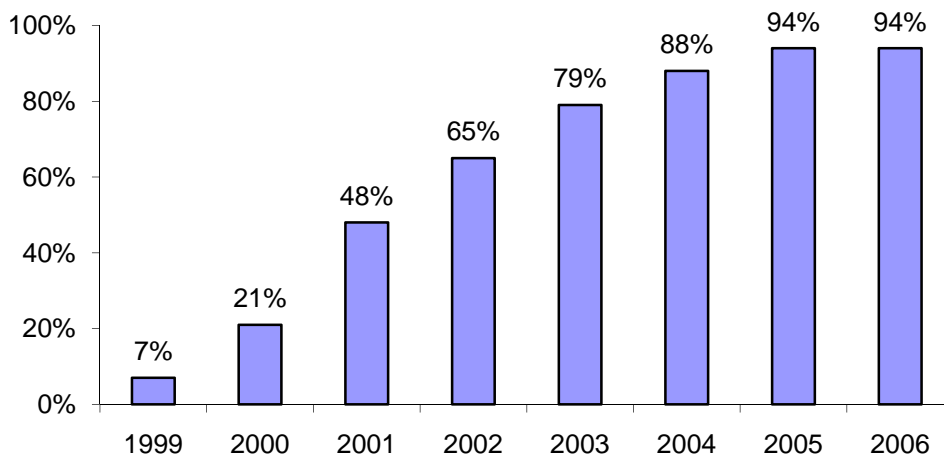
Scaling ratios are obtained by comparing NFPA's projected totals of residential structure fires, non-residential structure fires, vehicle fires, and outside and other fires, and associated civilian deaths, civilian injuries, and direct property damage with comparable totals in NFIRS. Estimates of specific fire problems and circumstances are obtained by multiplying the NFIRS data by the scaling ratios. Reports for incidents in which mutual aid was given are excluded NFPA's analyses.

Analysts at the NFPA, the USFA and the Consumer Product Safety Commission developed the specific basic analytical rules used for this procedure. "The National Estimates Approach to U.S. Fire Statistics," by John R. Hall, Jr. and Beatrice Harwood, provides a more detailed explanation of national estimates. A copy of the article is available online at <http://www.nfpa.org/osds> or through NFPA's One-Stop Data Shop.

Version 5.0 of NFIRS, first introduced in 1999, used a different coding structure for many data elements, added some property use codes, and dropped others. The essentials of the approach described by Hall and Harwood are still used, but some modifications have been necessary to accommodate the changes in NFIRS 5.0.

Figure 1 shows the percentage of fires originally collected in the NFIRS 5.0 system. Each year's release version of NFIRS data also includes data collected in older versions of NFIRS that were converted to NFIRS 5.0 codes.

Figure 1. Fires Originally Collected in NFIRS 5.0 by Year



For 2002 data on, analyses are based on scaling ratios using only data originally collected in NFIRS 5.0:

$$\frac{\text{NFPA survey projections}}{\text{NFIRS totals (Version 5.0)}}$$

For 1999 to 2001, the same rules may be applied, but estimates for these years in this form will be less reliable due to the smaller amount of data originally collected in NFIRS 5.0; they should be viewed with extreme caution.

NFIRS 5.0 introduced six categories of confined structure fires, including:

- cooking fires confined to the cooking vessel,
- confined chimney or flue fires,
- confined incinerator fire,
- confined fuel burner or boiler fire or delayed ignition,
- confined commercial compactor fire, and
- trash or rubbish fires in a structure with no flame damage to the structure or its contents.

Although causal and other detailed information is typically not required for these incidents, it is provided in some cases (typically 10-20%). Some analyses, particularly those that examine cooking equipment, heating equipment, fires caused by smoking materials, and fires started by playing with fire, may examine the confined fires in greater detail. Because the confined fire incident types describe certain scenarios, the distribution of unknown data differs from that of all fires. Consequently, allocation of unknowns must be done separately.

Some analyses of structure fires show only non-confined fires. In these tables, percentages shown are of non-confined structure fires rather than all structure fires. This approach has the advantage of showing the frequency of specific factors in fire causes, but the disadvantage of possibly overstating the percentage of factors that are seldom seen in the confined fire incident types.

Other analyses include entries for confined fire incident types in the causal tables and show percentages based on total structure fires. In these cases, the confined fire incident type is treated as a general causal factor.

For most fields other than Property Use, NFPA allocates unknown data proportionally among known data. This approach assumes that if the missing data were known, it would be distributed in the same manner as the known data. NFPA makes additional adjustments to several fields. *Casualty and loss projections can be heavily influenced by the inclusion or exclusion of unusually serious fire.*

In the formulas that follow, the term “all fires” refers to all fires in NFIRS on the dimension studied.

Factor Contributing to Ignition: In this field, the code “none” is treated as an unknown and allocated proportionally. For Human Factor Contributing to Ignition, NFPA enters a code for “not reported” when no factors are recorded. “Not reported” is treated as an unknown, but the code “none” is treated as a known code and not allocated. Multiple entries are allowed in both of these fields. Percentages are calculated on the total number of fires, not entries, resulting in sums greater than 100%. Although Factor Contributing to Ignition is only required when the cause of ignition was coded as: 2) unintentional, 3) failure of equipment or heat source; or 4) act of nature, data is often present when not required. Consequently, any fire in which no factor contributing to ignition was entered was treated as unknown.

In some analyses, all entries in the category of electrical failure or malfunction (factor contributing to ignition 30-39) are combined and shown as “electrical failure or malfunction.” This category includes:

31. Water-caused short circuit arc;
32. Short-circuit arc from mechanical damage;
33. Short-circuit arc from defective or worn insulation;
34. Unspecified short circuit arc;
35. Arc from faulty contact or broken connector, including broken power lines and loose connections;
36. Arc or spark from operating equipment, switch, or electric fence;
37. Fluorescent light ballast; and
30. Electrical failure or malfunction, other.

Type of Material First Ignited (TMI). This field is required only if the Item First Ignited falls within the code range of 00-69. NFPA has created a new code “not required” for this field that is applied when Item First Ignited is in code 70-99 (organic materials, including cooking materials and vegetation, and general materials, such as electrical wire, cable insulation, transformers, tires, books, newspaper, dust, rubbish, etc..) and TMI is blank. The ratio for allocation of unknown data is:

$$\frac{(\text{All fires} - \text{TMI Not required})}{(\text{All fires} - \text{TMI Not Required} - \text{Undetermined} - \text{Blank})}$$

Heat Source. In NFIRS 5.0, one grouping of codes encompasses various types of open flames and smoking materials. In the past, these had been two separate groupings. A new code was added to NFIRS 5.0, which is code 60: “Heat from open flame or smoking material, other.” NFPA treats this code as a partial unknown and allocates it proportionally across the codes in the 61-69 range, shown below.

- 61. Cigarette;
- 62. Pipe or cigar;
- 63. Heat from undetermined smoking material;
- 64. Match;
- 65. Lighter: cigarette lighter, cigar lighter;
- 66. Candle;
- 67 Warning or road flare, fuse;
- 68. Backfire from internal combustion engine. Excludes flames and sparks from an exhaust system, (11); and
- 69. Flame/torch used for lighting. Includes gas light and gas-/liquid-fueled lantern.

In addition to the conventional allocation of missing and undetermined fires, NFPA multiplies fires with codes in the 61-69 range by

$$\frac{\text{All fires in range 60-69}}{\text{All fires in range 61-69}}$$

The downside of this approach is that heat sources that are truly a different type of open flame or smoking material are erroneously assigned to other categories. The grouping “smoking materials” includes codes 61-63 (cigarettes, pipes or cigars, and heat from undetermined smoking material, with a proportional share of the code 60s and true unknown data.

Equipment Involved in Ignition (EII). NFIRS 5.0 originally defined EII as the piece of equipment that provided the principal heat source to cause ignition if the equipment malfunctioned or was used improperly. In 2006, the definition was modified to “the piece of equipment that provided the principal heat source to cause ignition.” However, much of the data predates the change. Individuals who have already been trained with the older definition may not change their practices. To compensate, NFPA treats fires in which EII = NNN and heat source is not in the range of 40-99 as an additional unknown.

To allocate unknown data for EII, the known data is multiplied by

$$\frac{\text{All fires}}{(\text{All fires} - \text{blank} - \text{undetermined} - [\text{fires in which EII} = \text{NNN and heat source} \in 40-99])}$$

In addition, the partially unclassified codes for broad equipment groupings (i.e., code 100, - heating, ventilation, and air conditioning, other; code 200- electrical distribution, lighting and power transfer, other; etc.) were allocated proportionally across the individual code choices in their respective broad groupings (heating, ventilation, and air conditioning; electrical distribution, lighting and power transfer, other; etc.). Equipment that is totally unclassified is

not allocated further. This approach has the same downside as the allocation of heat source 60 described above. Equipment that is truly different is erroneously assigned to other categories.

In some analyses, various types of equipment are grouped together. (Confined fire incident types are not discussed here)

Code Grouping	EII Code	NFIRS definitions
Central heat	132	Furnace or central heating unit
	133	Boiler (power, process or heating)
Fixed or portable space heater	131	Furnace, local heating unit, built-in
	123	Fireplace with insert or stove
	124	Heating stove
	141	Heater, excluding catalytic and oil-filled
	142	Catalytic heater
	143	Oil-filled heater
Fireplace or chimney	121	Fireplace, masonry
	122	Fireplace, factory-built
	125	Chimney connector or vent connector
	126	Chimney – brick, stone or masonry
	127	Chimney-metal, including stovepipe or flue
Wiring, switch or outlet	210	Unclassified electrical wiring
	211	Electrical power or utility line
	212	Electrical service supply wires from utility
	214	Wiring from meter box to circuit breaker
	216	Electrical branch circuit
	217	Outlet, receptacle
	218	Wall switch
	Power switch gear or overcurrent protection device	215
219		Ground fault interrupter
222		Overcurrent, disconnect equipment
227		Surge protector
Lamp, bulb or lighting	230	Unclassified lamp or lighting

	231	Lamp-tabletop, floor or desk
	232	Lantern or flashlight
	233	Incandescent lighting fixture
	234	Fluorescent light fixture or ballast
	235	Halogen light fixture or lamp
	236	Sodium or mercury vapor light fixture or lamp
	237	Work or trouble light
	238	Light bulb
	241	Nightlight
	242	Decorative lights – line voltage
	243	Decorative or landscape lighting – low voltage
	244	Sign
Cord or plug	260	Unclassified cord or plug
	261	Power cord or plug, detachable from appliance
	262	Power cord or plug- permanently attached
	263	Extension cord
Torch, burner or soldering iron	331	Welding torch
	332	Cutting torch
	333	Burner, including Bunsen burners
	334	Soldering equipment
Portable cooking or warming equipment	631	Coffee maker or teapot
	632	Food warmer or hot plate
	633	Kettle
	634	Popcorn popper
	635	Pressure cooker or canner
	636	Slow cooker
	637	Toaster, toaster oven, counter-top broiler
	638	Waffle iron, griddle
	639	Wok, frying pan, skillet
	641	Breadmaking machine

Item First Ignited. In most analyses, mattress and pillows (item first ignited 31) and bedding, blankets, sheets, and comforters (item first ignited 32) are combined and shown as “mattresses and bedding.” In many analyses, wearing apparel not on a person (code 34) and wearing apparel on a person (code 35) are combined and shown as “clothing.” In some analyses, flammable and combustible liquids and gases, piping and filters (item first ignited 60-69) are combined and shown together

Area of Origin. Two areas of origin: bedroom for more than five people (code 21) and bedroom for less than five people (code 22) are combined and shown as simply “bedroom.”

Rounding and percentages. The data shown are estimates and generally rounded. An entry of zero may be a true zero or it may mean that the value rounds to zero. Percentages are calculated from unrounded values. It is quite possible to have a percentage entry of up to 100%, even if the rounded number entry is zero. The same rounded value may account for a slightly different percentage share. Because percentages are expressed in integers and not carried out to several decimal places, percentages that appear identical may be associated with slightly different values.

Inflation. Property damage estimates are not adjusted for inflation unless so indicated.

Appendix B. Selected Published Incidents

The following are selected published incidents involving Christmas tree fires. Included are short articles from the "Firewatch" or "Bi-monthly" columns in *NFPA Journal* or its predecessor *Fire Journal* and incidents from either the large-loss fires report or catastrophic fires report.

It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

NFPA's Fire Incident Data Organization (FIDO) identifies significant fires through a clipping service, the Internet and other sources. Additional information is obtained from the fire service and federal and state agencies. FIDO is the source for articles published in the "Firewatch" column of the *NFPA Journal* and many of the articles in this report.

House Fire Kills Four, Pennsylvania

An early-morning fire that started in the first-floor living room of a single-family home killed four and injured three others who jumped from upper floors while trying to escape. Five firefighters were also injured.

The three-story house, which had an asphalt shingle roof and brick walls, was 49 feet (15 meters) long and 20 feet (6 meters) wide. Smoke alarms were installed in the basement, on the second floor, and in the attic, but the occupants did not hear them and they appear not to have sounded during the fire. There were no sprinklers.

An occupant discovered the fire and called to report it at 2:54 a.m. A 1-year-old boy, a 12-year-old girl, a 38-year-old woman, and a 40-year-old man died when they failed to escape from the burning house, though the report does not say where they were found. A 14-year-old girl and a 16-year-old girl were injured when they jumped from a second-floor window, as was an 18-year-old girl who jumped from a third-floor window.

Investigators believe that the fire began when an electrical fault ignited combustibles, including an artificial Christmas tree and a sofa.

The home and its contents, valued at \$95,000, were nearly destroyed.

Kenneth J. Tremblay, 2009, "Firewatch", *NFPA Journal*, January/February, 23.

Christmas Tree Fire Kills One, Illinois

A fire that started in a natural Christmas tree quickly spread throughout a two-story, single-family home before firefighters arrived, killing a 14-year-old boy.

The wood-frame house, which was 44 feet (13 meters) long and 24 feet (7 meters) wide, was constructed of balloon-type framing with an asphalt roof. It had a battery-operated smoke alarm, which operated, but its location was not reported. There were no sprinklers.

The fire began when ornamental lights on the Christmas tree in the first-floor living room failed and ignited the tree. The blaze spread to wall coverings and a couch.

The boy discovered the fire and woke his aunt as a smoke alarm began to operate. Both of them made it to the first floor, but investigators believe the boy stayed in the house or ran back into it in search of two cats.

Once outside the house, the aunt tried to call 911 on her cell phone, but discovered that the battery was dead. Heavy smoke prevented her from going back inside the home to search for her nephew, so she flagged down a car, which took her to a neighbor's house where she called the fire department. She and the neighbor then returned to the house and broke a first-floor window in an attempt to release some of the smoke and find her nephew. Unfortunately, this action only intensified the fire.

Arriving firefighters, who found the home nearly engulfed in flames, were told that the boy was missing. After they knocked down the heavy fire, they found him in a bathroom not far from his room. He had died of smoke inhalation.

The home, valued at \$40,000, and its contents, valued at \$5,000, were completely destroyed.

Kenneth J. Tremblay, 2008, "Firewatch," *NFPA Journal*, March/April, 24-25.

Overloaded Extension Cord Ignites Christmas Tree, Tennessee

A fire investigators believe was started by an electrical extension cord killed a family of four and destroyed their single-family home.

The single-story, wood-frame house had an asphalt-covered roof and encompassed approximately 1,100 square feet (335 square meters) of living space. The three-bedroom house had neither smoke alarms nor sprinklers.

A passerby called 911 at 11:27 p.m. to report the fire, and firefighters arrived eight minutes later to find the blaze spreading in all directions from the middle of the house. Firefighters entering through two doors and a front window found all four victims in their bedrooms and took them outside for emergency medical treatment.

Investigators determined that the fire started in the dining room near a window where the Christmas tree was located and spread up the wall and across the ceiling, filling the house with heat and smoke.

The four victims, a 39-year-old man, his 40-year-old wife, their 10-year-old son, and their 17-year-old daughter, died of smoke inhalation. The house and its contents were destroyed.

Kenneth J. Tremblay, 2006, "Firewatch," *NFPA Journal*, November/December, 20.

Electrical Fire in Christmas Tree Kills Three, Virginia

Three people died when a fire in a live Christmas tree quickly spread to other combustibles in their single-family home. A fire a month earlier had damaged the smoke alarm on the floor of

origin, and it had never been replaced. The ranch-style, wood-frame house measured 24 feet (7 meters) by 24 feet (7 meters) with a full basement. The first-floor smoke alarm had been disconnected, but there was a working smoke alarm in the basement. There were no sprinklers.

At the time of the fire, a family of four lived in the basement, and another family of four lived on the first floor where a single person also rented a room. The earlier fire had displaced the two children who lived on the first floor from their bedroom, forcing the daughter to sleep on the floor of her parents' room and the son to sleep in the living room.

Shortly after 2 a.m., the son awoke to find a fire in the living room and alerted his parents. The father broke a window in the bedroom and forced his wife out, but he and the two children remained in the house. The renter on the first floor also awoke to find flames burning through the top of her bedroom door. She escaped through the sliding glass door in her room and met another occupant who was going to a neighbor's house to call 911. It wasn't reported how the tenants in the basement apartment were alerted, but witnesses saw them escape through windows.

The fire department received the 911 call at 2:24 a.m. and arrived to find the house in flames. The officer checking all four sides of the building found fire shooting from the double-glass door of the dining room and ordered his crew to position a 1-3/4-inch hose line at the front door. Firefighters forced entry and searched for the trapped civilians. By this time, flames had ignited nearly everything in the front rooms, and the crew discovered the bodies, two in one bedroom and the third in a second.

Investigators discovered that the holiday lights on the Christmas tree had been left operating. They were connected to two extension cords, and it appears that resistance heating on the lights ignited the tree, which was quickly consumed. Flames ignited contents of the living room and spread down the hallway, trapping the victims.

The house, valued at \$225,000, suffered an estimated fire loss of \$60,000, and its contents, valued at \$50,000, suffered a \$40,000 loss. The 48-year-old father, his 25-year-old son, and his 14-year-old daughter all died.

Kenneth J. Tremblay, 2004, "Firewatch," *NFPA Journal*, November/December, 16-17.

Heat from Fireplace Ignites Christmas Gifts in Fatal Fire, California

Three of the five people in a two-family house died of smoke inhalation when embers or flames from the fireplace in one apartment ignited the contents of the living room. Investigators believe a hard-wired smoke alarm in the apartment was removed from its mounting prior to the fire, contributing to the deaths.

The two-story, wood-framed structure, which covered 900 square feet (83.6 square meters), was un-sprinklered; the smoke alarms, installed in the hallways leading to the bedrooms, had no battery backup.

On the night of the fire, four children, ages 11, 9, 5, and 3, were at home with their 60-year-old grandmother. During the evening, the 9-year-old boy started a fire in the living room fireplace without supervision. He and the others then went to bed, only to awaken around 2:30 a.m. to find the apartment filled with fire and smoke.

Investigators determined that embers or flames from the fireplace ignited nearby combustibles, which included holiday gifts and a Christmas tree. The tree, only a foot or two (30 to 60 centimeters) from the fireplace, was a significant source of fuel for the fire, which spread to other combustibles in the room.

The 9-year-old and his 11-year-old sibling escaped the blaze, but neither called 911 to report the fire. Their grandmother, 5-year-old sister, and 3-year-old brother died in the blaze.

Damage to the house, valued at \$500,000, was estimated at \$200,000. Damage to its contents, valued at \$50,000, was estimated at \$10,000.

Kenneth J. Tremblay, 2003, "Firwatch," *NFPA Journal*, November/December, 14.

Christmas Tree Fire Kills Three, Oklahoma

A mother and her two young sons were removing a dry Christmas tree from their wood-framed house when the tree ignited, blocking the door. Security bars and storage against another door and windows prevented them from escaping as fire heavily damaged the home.

The two-story, single-family home had a ground-floor area of approximately 1,500 square feet (139 square meters). Its exterior walls were covered with brick veneer, and the roof had asphalt shingles. There were working battery-operated smoke alarms on each floor, but no sprinklers.

The three were dragging the tree out of the house when it touched a gas-fired heater and caught fire. The mother, who was already outside, ran back into the house to rescue her two boys, ages 9 and 10, but the fire blocked their escape route. They were unable to open the other door because stored items were piled in front of it, and security bars with no quick-release lever covered the windows.

All three victims died of smoke inhalation. The house, valued at \$75,000, and its contents, valued at \$25,000, were near-total losses.

Kenneth J. Tremblay, 2003, "Firewatch," *NFPA Journal*, January/February, 16.

Multiple-Death Single-Family Home, Ohio

Date: December 2003

Time: 4:06 a.m.

Number of Civilian Deaths: Seven (two under age six)

The Building

Two-and-a-half story single-family house of unprotected wood-frame construction.

Detection and Suppression Systems

The occupants had taken the alarms down.

The Fire

The fire began in the living room when a Christmas tree either fell over or was unintentionally knocked over onto a lit candle.

Contributing Factors and Other Details

There was a delay in notifying the fire department while the family members arriving home attempted to extinguish the fire. Due to heavy fire and high heat conditions, firefighters were driven back in their rescue attempts.

Stephen G. Badger, 2004, "*Catastrophic Multiple-Death Fires 2003*," *NFPA Journal*, September/October, 68.

Multiple-Death Two-Family Home, Arkansas

Date: December 2002

Time: 11:00 p.m.

Number of Deaths: Five (two under age six)

The Building

Two-family duplex dwelling; Unprotected ordinary construction; One story.

Detection and Suppression Systems

There was on smoke alarm in the hallway. It did activate.

The Fire

A fire of undetermined origin involved a Christmas tree.

Contributing Factors and Other Details

This fire appears to have consumed all the oxygen in the house and burned itself out. A relative who came by for a visit discovered the bodies about 19 hours after the fire.

Stephen G. Badger, 2003, "*Catastrophic Multiple-Death Fires 2002*," *NFPA Fire Analysis and Research*, Quincy, MA.

Electrical Short Ignites Blaze in Christmas Tree, Illinois

An electrical short in Christmas tree lights ignited a tree in a single-family home. The blaze spread so quickly that, even though the occupants detected it almost immediately, they couldn't put it out with a fire extinguisher.

The two-story, 5,700-square-foot dwelling of unprotected, wood-frame construction had exterior walls covered by brick veneer. Although single-station smoke detectors in the house were properly located, they weren't a factor in detection. There were no sprinklers.

A woman and her daughter were home when the mother heard a pop in the first-floor living room. She looked in and saw a fire in their Christmas tree about 2 feet from the top. While the daughter called 911, the mother got a dry chemical fire extinguisher. By the time she returned, however, the fire had traveled across the ceiling to furniture on the other side of the room. What she did with the extinguisher wasn't reported, but the result was ineffective, and they quickly left the house.

Investigators determined that an electrical short caused the fire. Damage to the home, which was valued at \$800,000, was estimated at \$50,000 for the structure and \$100,000 for the contents. There were no injuries.

Kenneth J. Tremblay, 1995, "Firewatch," *NFPA Journal*, November/December, 36.

Residential Sprinklers Extinguish Christmas Tree Fire, Arizona

A residential sprinkler system extinguished a fire in a Christmas tree in a single-story, one-family dwelling of unprotected, wood-frame construction. Following the fire, fire department officials said, "The...sprinkler system... was instrumental in controlling and extinguishing this fire. Because the sprinkler system was present in the house, the occupants escaped with no injury or loss of life."

The residential sprinklers, which were installed in all rooms of the home, were not required by local ordinance. They had been installed by the owner. A single-station, battery-operated smoke alarm was located in the hallway, but it is not known whether it operated.

The owner's wife was home with their 10-year-old son when the boy plugged in the lights on the Christmas tree in the living room. Shortly after he did so, one bulb blew and ignited the tree. The son screamed and, seeing his father just driving up, ran outside to tell him about the fire. The mother was calling the fire department when the father entered the house, and the three of them left the building as the sprinkler system activated.

The fire department responded to the 6:16 p.m. call and arrived to find light smoke coming from the front living room window. The sprinkler system had operated, and the father and a neighbor had used a garden hose to put additional water on the fire through a front window. Firefighters completed overhaul and ventilation.

Although the sprinkler system activated almost immediately, the fire burned with great intensity. Eight sidewall sprinklers, one in each room, and two pendant sprinklers in the hallways activated.

Damage to the dwelling, which was valued at \$125,000, was estimated at \$20,000. There was no information on damage to the contents. There were no injuries.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, November/December, 34.

Overheated Electrical Cord Ignites Dry Christmas Tree, Kills Two, Michigan

Two people died during an early morning fire that started when an electrical extension cord supplying their Christmas tree lights was overloaded. The single-family, wood-frame home did not have any smoke alarms or sprinklers.

When the two occupants returned early in the evening from a short Christmas vacation, they turned on the lights of their Christmas tree, which was in the living room. They left the lights on when they went to bed. At 1:55 a.m., a neighbor across the street noticed the blaze and called 911.

Firefighters found the couple dead in their bedroom. The woman was by the bedroom door, and the man was sitting on the bed. His hand was cut, apparently from trying to break the bedroom's only window to escape. A dresser that was placed in front of the window had hindered his attempt.

Investigators traced the fire to the electrical extension cord that supplied the Christmas tree lights. The dry Christmas tree had not been watered while the occupants were away, and, with no alarms, the flames spread undetected.

Damage to the building and its contents, which were valued at \$85,000, was estimated at \$80,000.

Kenneth J. Tremblay, 1994, "Firewatch," *NFPA Journal*, November/December, 33.

Smoke Detectors Warn Mother and Son of Christmas Tree Fire, Michigan

Two smoke detectors alerted a mother and her 11-year-old son to a fire that began when old Christmas tree lights short circuited and ignited their tree. Both occupants escaped without injury.

The single-story, manufactured home measured 68 feet by 14 feet and was of metal and wood construction. Smoke detectors were located in a front room and in the hallway.

The fire started in the living room where the Christmas tree was located. The lights on the tree, which were 10 years old, short circuited and ignited the tree, which fell to the floor. The smoke detector in the front room operated, but the mother and son, who were in the bathroom with the radio playing, did not hear it. They became aware of the fire when the second smoke detector in the hallway sounded, and ran to a neighbor's house, where they called 911. Firefighters arrived and extinguished the fire.

Combined damage to the building and its contents was estimated to be \$24,000.

Kenneth J. Tremblay, 1993, "Firewatch," *NFPA Journal*, November/December, 28-29.

Christmas Tree Fire Kills Two, Ohio

Two men died in a house fire that started when electrical wiring short circuited and ignited an artificial Christmas tree. The fire burned for approximately 5 to 10 minutes before one of the occupants discovered it.

An elderly couple and their 28-year-old grandson occupied the single-family house of wood-frame construction. The two-and-a-half-story structure did not contain any fire detection or suppression equipment.

The occupants were asleep on the second floor when the fire broke out. The grandson woke to the smell of smoke and investigated. Finding the living room ablaze, he immediately went back to the second floor to warn his grandparents.

The grandmother called 911 at 11:39 p.m., then she and the grandson left the house. Once outside, they realized that the grandfather had not followed them and was still inside. Before firefighters arrived, the young man re-entered the house to search for his grandfather.

Firefighters arrived approximately 4 minutes after they received the alarm and entered the dwelling. They found the two men on the second floor with fatal smoke inhalation injuries. Damage to the structure and its contents was estimated at \$15,000.

Kenneth J. Tremblay, 1993, "Firewatch," *NFPA Journal*, November/December, 28.

Smoke Detector Alerts Mother, Child to Christmas Tree Fire, Michigan

A woman and her 4-year-old child escaped safely from their home when a smoke detector alerted them to a fire involving a live Christmas tree in the living room of the single-family dwelling.

The woman and child were in the basement of the single-story, unprotected wood-frame dwelling when the alarm sounded. The woman discovered the fully involved Christmas tree and immediately left the house with the child.

A call to 911 notified the fire department at 10:59 a.m. Fire personnel arrived on the scene 4 minutes later, and within 18 minutes, the fire was under control.

Officials believe that a defective extension cord connected to the lights on the Christmas tree short-circuited and ignited the tree. A smoke detector mounted on a hallway ceiling alerted the occupants.

The living room, the kitchen, and a bedroom sustained fire damage. The combined loss to the structure -- valued at \$58,000 -- and its contents was estimated at \$27,500.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, November/December, 28.

Three Die When Child Ignites Christmas Tree with Lighter, Iowa

Three children died when one of the children, who was playing with a cigarette lighter, ignited the family's Christmas tree. Their mother had planned to keep the live tree, which had been standing for more than 40 days, until the father returned from military service in the Middle East.

The two-story, wood-frame dwelling was one of 12 units in a townhouse-style apartment building that measured 300 feet by 32 feet. The first floor of the unit of origin included a living room, a kitchen, and a dining area. There were two bedrooms and a bathroom on the second floor. Fire officials found a smoke detector, but because of severe damage to the unit, they did not know if it had operated. There were no other protection systems.

The mother had left the three children, ages 6 weeks, 2, and 4, unattended in the apartment while she completed some errands and visited neighbors. Investigators learned that one of the children found a lighter on a table and used it to ignite the dry tree. The fire quickly engulfed the tree and combustibles in the room, and spread to the second floor by way of a non-enclosed stairwell.

A passerby noticed smoke and flames coming from the windows and tried to enter the dwelling, but was driven back by the intense heat. The fire department received notification at 3:44 p.m., about 10 minutes after ignition and 1 minute after the passerby discovered it. Firefighters arrived 4 minutes later and quickly extinguished the fire using one 1 1/2-inch and one 2-inch handline.

All three children died of smoke inhalation. The older two were found in the master bedroom on the second floor; the infant was found on the living-room couch. Damage was limited to the unit of origin and was estimated at \$73,000.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, January/February, 22.

Multiple- Death Single-Family Home, Michigan

Date: December 1990

Time: 11:10 p.m.

Number of Civilian Deaths: Seven (3 under age 6)

Time and Number of Deaths

Single-family dwelling. Unprotected wood-frame construction; 1 story.

Time and Number of Deaths

One smoke detector in hallway; performance not reported.

Time and Number of Deaths

A Christmas tree was ignited by tree lights in an undetermined manner. The fast-moving fire blocked a rear exit and quickly engulfed the interior of the structure. A ceiling/attic fan provided a path of travel to the attic. Rapid fire spread and open bedrooms meant most of the children were trapped and killed in their rooms.

Time and Number of Deaths

After escaping with one child and the mother, the father reentered the house to rescue the other six children; all seven died. When the mother called the fire department, she did not describe the nature of the emergency accurately and only a medic unit was sent.

Rita F. Fahy and Kenneth J. Tremblay, "The Catastrophic Fires of 1990", *NFPA Journal*, July/August, 64.