

For The Defense™

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The Voice of the
Defense Bar
The magazine
for defense,
insurance and
corporate counsel

November 2017

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A Christmas Story

By Lisa P. Gruen
and Bradley D. Remick

Although Christmas trees very rarely cause fires, such fires are five times more likely to result in a death than other home fires, and they can affect injuries substantially.

Tree Fires— Prevention and Investigation

In 2015, there were 1,345,500 fires reported in the United States. These fires caused 3,280 civilian deaths, 15,700 civilian injuries, and \$14.3 billion in property damage. Of these, 501,500 were structure fires, which caused 2,685

civilian deaths, 13,000 civilian injuries, and \$10.3 billion in property damage. Vehicle fires accounted for 204,500 of the total fires, causing 500 civilian fire deaths, 1,875 civilian fire injuries, and \$1.8 billion in property damage.

During the calendar year 2015, a fire department responded to a fire every 23 seconds. A structure fire was reported every 63 seconds. A home or residential structure fire was reported every 86 seconds. A civilian fire injury was reported every 34 minutes. One civilian fire death occurred every two hours and 40 minutes.

Residential fires often cause significant emotional distress beyond any physical injury. Psychologists have written that losing your home in a fire involves not only the physical loss of your residence and other things of value, such as photo albums, important documents, and trea-

sured objects, but also your sense of well-being. The home is your place of security, comfort, and safety. After a fire, this sense of security may be destroyed, and this can significantly disrupt the normality of daily life. When overlaid with suffering this loss around a holiday, such as Christmas, a time of joy for many, the psychological injury can be compounded.

It is not uncommon for people to experience several stages of adjustment, including shock, anger, depression, and hopelessness. We have seen adults collapse from shock when they arrive home and see their house surrounded by a haze of smoke and fire crews. For children, the effects of a fire, especially around the holidays, can be more severe and recovery can take longer. Children and adolescents can react in a variety of ways when dealing with a fire, including experiencing anxiety, night-

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mares, and sleep disorders. This poses many difficulties for those tasked with investigating these types of losses. Additionally, when defending clients against lawsuits in these cases, you must also consider the significant psychological effect on the jury hearing the cases. Imagine a jury hearing a relatively calm party testifying about the house fire that destroyed her home and all her personal property. Now imagine the effect on the jury when that same party begins crying as she describes the sound of each of the Christmas ornaments that she has collected her entire life exploding one by one in the heat of the fire.

Media coverage of Christmas tree fires also differs greatly from coverage of residential or structure fires at other times of the year. A common news media industry phrase is that “if it bleeds, it leads.” Fires show up really well on a TV screen and catch the eye of the watcher to such an extent that ratings are improved. A news clip usually runs 8–10 seconds. However, a clip of a holiday fire will typically run much longer, as will associated stories about fundraisers being set up to replace the children’s Christmas presents lost in the fire. Shots of the melted piles of plastic wrapped in pretty paper have quite a powerful effect on your future jury pool. Newspersons often revisit the site of a particularly large tragic loss on its anniversary, or they may cover the charitable foundation formed in the aftermath or the memorials set up for those lost. It is not a surprise that plaintiffs’ counsel always seem to want a trial date as close to Christmas as possible. There is something just so poignant about a holiday time that is supposed to be a time of peace, a time of joy, a time of family that is shattered by a life-altering or even a life-ending fire.

The Hazard

’Twas the night before Christmas and all through the house, not a creature was stirring, not even a mouse... except for that one mouse, which ate through the power cord to the power strip under the Christmas tree. You had meant to water that tree but had never quite gotten around to it. And the spark from the arc across the wires catches that tree on fire. Because it is dried out, it goes up like a Roman candle.

Christmas trees are very rarely the cause of fires. There has never been a documented case of a Christmas tree spontaneously combusting except in a Hollywood movie. Lights, wiring, intentional fires, or arson, heating equipment, candles, close proximity to combustibles, and other factors contribute to the ignition of these fires. However, due to the nature of Christmas tree-related fires, the statistics involving them are frightening. The National Fire Protection Association (NFPA) reports that between 2009 and 2013, an average of 210 home-structure fires per year began with Christmas trees. This is out of an estimated 30 million trees sold each year. However, Christmas tree fires are five times more likely to result in a death (one out of 31 reported fires), compared with home fires (one death out of 144 total). According to the U.S. Fire Administration’s National Fire Incident Reporting System (NFIRS) and NFPA’s annual fire department experience survey, from 2009 to 2013, Christmas tree-related fires resulted in an annual average of seven civilian fire deaths, 19 civilian fire injuries, and \$17.5 million in direct property damage.

Results from several research studies support the statement that natural Christmas trees become significant fire hazards *only* when proper care, including regular watering, is not provided by the user. Christmas trees can become involved in residential fires when they become dry as a result of human neglect. Christmas trees become a significant factor with respect to fires in one of two ways: either the Christmas tree itself is the first fuel ignited at the origin of the fire, or a rapidly burning Christmas tree accelerates the development of a fire that started elsewhere.

The reason that Christmas trees accelerate the development of a fire is that a dry tree is a significant fuel load that burns exceptionally quickly. Although the fuel load is on the same order of magnitude as a chair or a couch, the heat-release rate is much higher. The needles and small branches on a dry Christmas tree can be consumed within *one minute of ignition*. A burning Christmas tree creates very high ceiling temperatures above the tree and can easily ignite nearby combustibles due to radiant heat.

The leading causes of Christmas tree fires are issues with electrical distribution and lighting equipment (38 percent), intentionally set fires (arson) (22 percent), and heating equipment too close to the tree (15 percent). Of those related to electrical issues, 18 percent involved decorative lights, 12 percent involved wiring or related equipment, and 5 percent involved

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cords or plugs. The primary sources of ignition are electrical failure or malfunction; heat source is too close to combustibles; misuse of material or product; playing with heat source; abandoned or discarded material or product; outside or open fire for debris or waste disposal; and candles, cooking equipment, arson, and mechanical failure or malfunction. Despite the chilling statistics presented above, the frequency of such fires and the devastation that they cause is actually decreasing as the public becomes more educated about, and aware of, the dangers posed by a dried out tree.

The Life of a Christmas Tree

Christmas tree growers start harvesting trees in early to mid-November to ship them and have them on retail lots by late November. A tree bought on a lot may have

been cut four to six weeks before the day of purchase. Alternatively, a consumer can go to a self-serve farm and cut the tree on the day that the consumer puts it in the display stand.

When a tree is in the ground, it will have a given moisture level that depends on the local conditions of precipitation or drought during that season. The water in a recently

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cut tree can account for more than half the total weight of the tree. Live trees take in moisture from the roots and lose moisture to the air through pores in the needles. Once the trees are cut, the cut surface will seal off with sap and no more moisture is drawn into the tree.

Large growers bale the trees and store them in cool, moist conditions before and during shipment to minimize moisture loss. The majority of water loss occurs on the retail lot. However, trees will be fine and not pose a significant fire hazard if they do not drop below a damage threshold that is indicated by a change in tree color from green to brown and the loss of a significant number of needles.

At the time that it is cut on the tree farm, a tree may have 100 percent, or close to 100 percent, moisture content in its deadlines. However, if it is not properly hydrated, the moisture content can decrease to 10 percent in a very, very, short time.

Tree Fire Prevention

The good news is that properly maintained trees are very difficult to ignite with an open flame. Proper maintenance of a cut tree includes removing a fresh, horizontal cut of at least one inch long from the bottom of the tree; displaying the tree in a container of water; and making sure that the water level never drops below the cut sur-

face on the trunk of the tree. If the water level does drop below the cut surface, sap will re-seal the cut surface and reduce the ability of the tree to take in water from the stand. If that occurs, someone would have to make another cut in the trunk of the tree and remove another one-inch-long portion.

The water is taken into the tree through capillary structures near the outer surface of the tree so a proper cut needs to be straight and perpendicular to the trunk of the tree. Tapering the cut actually is counterproductive because the water level is more likely to drop below the critical outer surface when it is located higher in the container.

A tree that was recently cut down may take in very little water at first because the tree already has sufficient water. A tree with a fresh cut on the bottom can take in up to one quart of water per inch of trunk diameter per day. This value will change depending on how dry the tree was to begin with and how warm and how much air circulation there is in the display environment. As such, people living in warmer and dryer climates, or desert climates such as California or Arizona, need to take even more care to keep a tree hydrated.

The species of tree also plays a large role in the ability of the tree to absorb and retain water. Fir and spruce trees, in general, absorb and retain water better than pine trees.

In addition to being harder to ignite, trees that have been properly maintained burn with a much lower heat-release rate (more slowly), and they are less likely to cause the room that they are in to flash over. "Flashover" is defined as the condition in a room or compartment in which surfaces exposed to thermal radiation reach ignition temperature, simultaneously causing fire to spread rapidly throughout the space.

To reduce the fire hazard of dry trees, there are no effective alternatives to proper maintenance by hydrating the trees as described above. Testing has shown that fire retardant sprays have no significant effect on reducing the flammability of trees that have not been properly watered.

In addition to that most important act—keeping a tree watered—the other steps to be taken to minimize the danger of Christmas tree fires are the following:

- Be extra careful with electricity, all open flames, and other heat sources during the holidays.
- Check all Christmas tree lights, other electric decorations, and electrical appliances. Use only Underwriters Laboratories-approved electrical decorations and extension cords.
- Do not allow sentiment about a decoration to convince you to display one which may be unsafe.
- Place the Christmas tree well away from heat registers, candles, space heaters, fireplaces, and wood stoves.
- Place the Christmas tree well clear of doors: keep the emergency escape route clear of trees, packages and furniture. Make sure to review and practice your family's emergency escape route regularly, all year, but especially at holiday times.
- Unplug tree lights and other decorations when out of the room or house or while sleeping.

Follow your common sense and use nothing with a worn or frayed electrical cord or an observably loose connection. Just as you unplug your coffee pot, or should do so, when you leave for work in the morning, unplug the tree lights and decorations before going to sleep. Just as you would hopefully not place a pile of newspapers next to a space heater, do not place such an item next to a Christmas tree. Additionally, a smoke detector does not have to be anchored into wall or a ceiling. One can be bought and placed near the tree.

Do not keep a Christmas tree in the home for weeks after the holiday is over. Even those who usually keep a tree hydrated before and through the holidays tend to taper off on the vital watering of the tree after New Year's Day. A tree can just as easily burn in January as it can in December. If you are not watering it, it should not be left inside your home.

Artificial Trees

Live-cut Christmas trees are not the only hazard. Artificial, pre-lit trees are gaining popularity due to greater convenience and long-term savings. Underwriters Laboratories (UL) has recognized this trend and developed a certification program. A recent examination of the UL database indicates

that 160 products have been UL certified under this program. The care to be taken with these trees is similar to the care that should be taken with any electrical item in the home: ensure that the electrical connections are intact and properly grounded and that the tree is not too close to combustible materials.

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Investigation of a Christmas Tree Fire

It was revealed in one a fairly recent catastrophic loss involving six deaths that the involved Christmas tree was slated to be thrown away the day after the fire. It is quite likely that the tree in question was significantly dried out but may have still had electrical lights decorating it. These issues have to be explored by the experts, attorneys, or insurance personnel investigating the cause and origin of such a fire. However, survivors or family members who have lost loved ones, or suffered catastrophic damage to their homes and have lost irreplaceable mementos, photographs, or other items, are not ready, in the immediate aftermath of a fire, to hear that they may have contributed to the cause of the catastrophe. This means that extreme sensitivity and creativity is needed from investigators while they still explore all potential information or evidence avenues.

In this digital age, it is likely that photographs of the layout of the house, the tree, and the decorative lights that were involved in a fire were taken within a

short period of time before the fire. Survivors, family members, or close friends need to be asked to check their cameras and cell phones and to provide *and preserve* any photographs of the areas in question. Similarly, although sales receipts and instruction manuals related to lights and decorations may have been burned up in a fire, it is likely that the fire survivors or other family members may be able to obtain some of that information by checking bank and credit card information online. You must ask for the location or identification of the Christmas tree seller or supplier. Typically, other family members may recall that lights were certain shapes, colors, or sizes, among other characteristics. This may help identify the seller or the manufacturer of the lights, or both, and lead you to locating the warnings or instructions for their use. Survivors or other family members may recall into which outlet lights were plugged. They may recall which other items of furniture, electrical items, or combustibles, such as presents, newspapers, tissue paper, and wrapping paper, were nearby.

You must learn the habits of the homeowners: did they leave the tree lights on 24/7, were the lights new or old, how were the lights plugged in, were extension cords or surge protectors in use, and if so, how many items were plugged into them? Did the homeowners buy the same type of tree, place it in the same spot within the home, and use the same decorations on the tree year after year? Family members, domestic employees, such as housekeepers, cleaning companies, or nannies, Christmas tree decorators, or handymen who have been at the home, may also have vital information useful in investigating a fire.

If the home or building involved is of fairly new construction, the local municipal building department may have plans or blueprints on file and even reports of electrical inspections or other records. These records will inform investigators about the age of the home, from which investigators can infer the likely type and location of electrical outlets, fuse boxes, and insulation and the composition of the building materials, among other things. These records may provide information about ventilation and other pertinent areas of

inquiry. Undertaking an online investigation into the weather may also be vital and may provide information about temperature, wind velocity and direction, and humidity and precipitation.

Conclusion

As Christmas tree fires typically occur in December and January and often result in the loss of life or catastrophic property losses, they receive a lot more publicity than other fires. As such, there may also be a lot of misinformation about a particular fire, spread through gossip and news sources. Christmas tree fires also engender a lot of emotion in first responders and municipal investigators. When you investigate such a fire, you will need to determine which information is based on firsthand knowledge and which information is conjecture or hearsay or from secondhand sources. As an investigator or lawyer, you must be sensitive but thorough in dealing with all potential sources of information.

Christmas trees are not inherently dangerous. They do not spontaneously combust. Fires involving Christmas trees are almost always preventable. Community education in the perils of overuse or misuse of lights and decorations and about the vital need to water the trees regularly, and preferably daily, has cut down on the frequency of these horrific events.

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