

CATASTROPHIC MULTIPLE-DEATH FIRES IN 2013

**Stephen G. Badger
September 2014**



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

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Acknowledgments

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Catastrophic Multiple-Death Fires in 2013

In 2013, firefighters in the United States responded to an estimated 1.24 million fires, 387,000 of which occurred in residential structures, 100,500 in nonresidential structures, and 752,500 in non-structural or outside fires. These fires accounted for an estimated 3,240 deaths, 2,785 of which occurred in residential structures, 70 in nonresidential structures, and 385 in fires outside of structures.

Twenty of these fires were categorized as catastrophic multiple-death fires, defined here as fires or explosions in homes or apartments that result in five or more fire-related deaths, or fires or explosions in all other structures and outside of structures, such as wildfires and vehicle fires, that claim three or more lives.

These 20 fires killed 122 people, 28 of whom were children under the age of six. This accounted for 0.002 percent of the total estimated fires and 3.8 percent of the total fire deaths in the United States in 2013. By comparison, there were 17 catastrophic multiple-death fires in 2012, resulting in the deaths of 82 people, including 16 children under age six.

Of the catastrophic fires that occurred in 2013, 12 occurred in homes, resulting in 67 deaths. All of the 28 children under age six that died in multiple-death fires last year died in residential properties. Another six catastrophic fires occurred in non-residential structures, resulting in 31 deaths, including 13 firefighters. And two occurred in non-structure fires, resulting in 24 deaths, including 19 firefighters.

Catastrophic Home Fires

There were 12 catastrophic multiple-death fires in homes last year, an increase of 50 percent from the year before. Of these, 11 occurred in single-family homes, of which two were manufactured homes, and one occurred in a duplex. These fires killed 67 people, 23 people more than the year before, or a 52 percent increase over 2012. Of the 67 victims, 28 were children under the age of six. This was 12 children more than died in 2012, or 75 percent more than the year before.

Eleven of the 12 home fires broke out between the hours of 11 p.m. and 7 a.m. These fires killed 60 people, 23 of whom were children under age six.

Two of the largest loss-of-life fires in homes killed seven people each, including seven children. Five children died in one fire, and two died in the other. No information was reported in one of the fires, other than it occurred in a one-story, single-family home of unprotected wood-frame construction. The second fire, which occurred in a three-story duplex of unprotected ordinary construction, began when something was left cooking unattended on the stove and fire spread from the kitchen to the open stairway and up to the second floor, trapping the victims. Smoke alarms had been installed in the house, but the batteries were dead or missing.

Three of the catastrophic fires of 2013 killed six people each. The first broke out in a three-story, single-family home of unprotected wood-frame construction that had neither smoke alarms nor suppression equipment. It began when hot embers from a wood-burning stove ignited trash in a second-floor kitchen and spread up an open stairway, trapping the six victims on the third floor. Two of the victims were children under the age of six.

The second fire broke out in the family room of a single-family manufactured home. Four of the victims of this fire, which was of undetermined origin, were children. Investigators determined that the home's smoke detectors operated, but their report did not say why the residents failed to escape.

The third six-fatality fire, also of undetermined cause, broke out on the porch of a single-family home, then spread into the living space and charged the home with heat and smoke, cutting off the victims' only escape route. A smoke alarm was later found without a battery. Three children died in this blaze.

The other seven home fires killed five people each. All occurred in one- and two-story single-family homes; one had smoke alarms, and three did not. No information as to the presence or absence of smoke alarms was reported for the other fires. The cause of all seven fires was either not determined or not reported. Among the 35 victims were 12 children under age six.

Catastrophic Non-Home Structure Fires

Six of the 20 catastrophic multiple-death fires that occurred in 2013 started in non-home structures and resulted in 31 of the 122 fatalities. Thirteen of the victims were firefighters. Both the number of fires and number of fatalities were higher in 2013 than they were the year before, when two non-home structure fires resulted in a total of seven deaths.

The first non-home structure fire, which killed 15 people, was one of the largest catastrophic fires and explosions of 2013. It broke out in the bulk processing building of a one-story chemical fertilizer manufacturing plant in West, Texas, on April 17. Firefighters responding to 911 calls reporting the fire at 7:29 p.m. began fire suppression efforts and called for mutual-aid companies to respond. The fire in the unprotected, one-story, wood-frame building burned intensely for about 22 minutes, at which point the roof collapsed. This was followed at 7:51 p.m. by a massive explosion, when an estimated 28 to 34 tons (28,000 to 34,000 kilograms) of ammonium nitrate stored in bins near the burning building detonated, damaging or destroying everything in a 37-block area.

Of the 15 victims, nine were firefighters fighting the blaze, one was an EMT with a local fire department, and five were local residents. The cause of the fire remains undetermined.

The second catastrophic non-home fire broke out in the restaurant of a two-story motel. Four firefighters had been inside the burning building for just a few minutes, fighting the fire and performing a primary search, when the ceiling of the restaurant collapsed on them. All four were trapped and died. The cause of the fire was not reported.

Three fires that killed three people each occurred in vacant or abandoned homes that were occupied by squatters. The causes of these fires were listed as undetermined or not reported.

The last fire, which also killed three people, occurred at a hunting camp where a group of four stationary camper trailers under one roof ignited. The cause of the blaze was not determined, but it started in a common area under the roof. The three victims were in one trailer that had no smoke alarms.

Catastrophic Non-Structure Fires

There were two non-structure catastrophic fires in 2013, one of which, a wildland fire, resulted in the largest multiple-death fire of the year.

The wildfire broke out at about 5:30 p.m. on June 28 on a mountainous ridge near Yarnell, Arizona, after several lightning strikes. Due to the danger presented by the location and the time of day, it was decided to wait until the next morning to attack the fire. On the second day of fire suppression operations, afternoon thunderstorms broke out, producing an outflow of wind that affected the speed and direction of the fire. At that point, firefighting activities turned to the evacuation of the area and the protection of structures.

One crew of 19 firefighters remained in the fire suppression area. This crew was originally in an area that had already been burned over, but for unknown reasons the firefighters left the area and headed to an area already cleared of flammables. Driven by the wind, the fire headed towards the firefighters at a speed of 10 to 12 miles (16 to 19 kilometers) per hour, giving them less than two minutes to clear an area and deploy their fire shelters. As they did so, the fire overran them, killing all 19 men

The deaths of these 19 firefighters in a single incident was the largest loss of firefighters at a single fire since the 2001 terrorist attack on the World Trade Center in New York City. It was also the largest loss of firefighters at a wildland blaze since 1933, when 29 firefighters died in a wildfire in Griffith Park in Los Angeles.

The other non-structure catastrophic fire of 2013 involved a stretch limousine carrying nine passengers to a wedding shower. Friction heat produced by the rear drive shaft coming in contact with the drive shaft tunnel ignited the car's floor, carpet, and rear seat, trapping five of the nine passengers. The driver and four others managed to escape from the vehicle

Together, these two fires killed 24 people, seven fewer than the seven non-structure catastrophic fires that occurred in 2012.

The Role of Suppression Equipment and Smoke Detection

No information about the presence or absence of suppression equipment was reported for five of the 18 catastrophic multiple-death structure fires last year. In the other 13, however, there was no suppression equipment present. This is unfortunate, because sprinklers are proven lifesaving systems across many different kinds of properties, including homes. The risk of dying in a reported fire in a home decreases by about 80 percent when sprinklers are present, and sprinklers reduce the average property loss in home fires by 71 percent per fire. More information about home fire sprinklers is available at firesprinklerinitiative.org.

Information about automatic smoke detection equipment was available for nine of the 12 catastrophic home fires of 2013. Four homes were equipped with smoke alarms, but only one system is known to have operated. The fire department reports indicate that the other two homes either had dead or missing batteries, and it was not known if the last system operated. Five homes had no smoke alarms at all, and the fires in these homes killed 28 people, accounting for 42 percent of those killed in the catastrophic home fires of 2013, including 12 children under the age of six.

Information about detection equipment was reported for three of the six non-home structure fires. None of these structures had smoke detection equipment.

Smoke alarms have been proven effective in reducing the risk of death in home fires. The most effective arrangement is interconnected, multiple-station smoke alarms supplied by hardwired AC power with a battery back-up. These should be located outside each sleeping area, on each level, and in each bedroom. Homeowners should routinely test smoke alarms according to manufacturers' recommendations. NFPA recommends testing home smoke alarms at least monthly.

Batteries should also be replaced according to manufacturer recommendations; conventional batteries should be replaced at least yearly. If an alarm "chirps," warning that the battery is low, the battery should be replaced right away. All smoke alarms, including hard-wired alarms and alarms that use 10-year batteries, should be replaced when they are 10 years old or sooner if they do not respond properly when tested.

Smoke alarms are only effective if occupants leave the building when they sound. Children should be familiar with the sound of a properly operating smoke alarm and follow a practiced escape plan that emphasizes two exits from any location, as well as a designated meeting place once they have left the structure. Exit drills in the home are part of many schools' curricula. Practicing the plan helps families determine whether children and others readily waken to the sound of a smoke alarm if it sounds during night, and that information, along with assistance for family members who require it, can be factored into the plan. Practicing escape plans, as well as basic fire prevention principles, might have prevented many of the fires and deaths included in this article.

Where We Get Our Data, and Acknowledgments

NFPA obtains its data by reviewing national and local news media, including fire service publications. A news clipping service reads all daily U.S. newspapers and notifies the NFPA Fire Analysis and Research Division of catastrophic fires.

Once an incident has been identified, we request information from the local fire department or the agency having jurisdiction. NFPA's annual survey of U.S. fire experience and mailings to the state fire marshals are additional data sources, although not principal ones. We also contact federal agencies that have participated in the investigation of such fires.

The diversity and redundancy of these sources enable us to collect the most complete data available on catastrophic fires throughout the United States. We understand that, in many cases, a fire department cannot release information due to ongoing litigation. In other cases, fire departments have been unable to determine the information we requested.

NFPA wishes to thank the U.S. fire service and medical examiners for their contribution of data, without which this report would not be possible. The author would like to give a special thanks to Norma Candeloro and to his co-workers for their help in completing this report.

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Table 1. Residential Fires

Pennsylvania

Date, Time of Alarm, Number of Deaths

July, 3 a.m., seven (two under age six)

Number of Stories, Occupancy Type, Construction Type

This was a three-story duplex of unprotected ordinary construction that covered 750 square feet (70 square meters).

Smoke Alarms and Other Protection Devices

Smoke alarms were present, but the type and coverage were not reported. They did not operate; the batteries were either missing or dead.

Fire Origin and Path

The fire broke out in a first-floor kitchen; cause listed was unattended cooking.

Contributing Factors and Victim Locations

The fire spread from the kitchen to the front stairs and up to the second floor. At the same time, the fire spread to the second floor from a first-floor window. Six of the victims were located in one bedroom on the second floor. This room had two windows, one of which contained a box fan used to pull air in. During the fire, however, it pulled in the heat and flames spreading from the first-floor window. The seventh victim was found in a separate bedroom on the same floor. A lack of working smoke alarms contributed to the loss of life.

Pennsylvania

Date, Time of Alarm, Number of Deaths

May, 11:55 p.m., six (two under age six)

Number of Stories, Occupancy Type, Construction Type

This three-story, single-family home of unprotected wood-frame construction covered 432 square feet (40 square meters).

Smoke Alarms and Other Protection Devices

Neither smoke alarms nor automatic suppression equipment were present.

Fire Origin and Path

The fire began when hot embers from the wood stove in a second-floor kitchen ignited trash on the floor. The fire then spread to the third floor by way of an open stairway.

Contributing Factors and Victim Locations

Firefighters' attempts to enter all levels of this home were unsuccessful due to the heavy fire conditions. All six victims were found on the third floor, where they had been trapped by the fire. The lack of smoke alarms contributed to their failure to escape.

Ohio

Date, Time of Alarm, Number of Deaths

September, 7:54 a.m., six (four under age six)

Number of Stories, Occupancy Type, Construction Type

This single-family manufactured home of unprotected wood-frame construction covered 900 square feet (84 square meters).

Smoke Alarms and Other Protection Devices

A smoke alarm was present and operated. There was no automatic suppression equipment.

Fire Origin and Path

The fire broke out in a first-floor family room. The cause was not reported

Contributing Factors and Victim Locations

As firefighters entered the first floor, at least two of them fell through deteriorating flooring but managed to extricate themselves. A man and one child were found in a front bedroom. No information was reported as to where the other four children were located. Two firefighters were also injured fighting this fire. No information was reported on why the residents did not escape.

West Virginia

Date, Time of Alarm, Number of Deaths

October, 4:07 a.m., six (three under age six)

Number of Stories, Occupancy Type, Construction Type

This two-story, single-family home of unprotected wood-frame construction covered 1,700 square feet (158 square meters).

Smoke Alarms and Other Protection Devices

A smoke alarm of unknown type was located on the first floor, but it had no battery. There was no automatic suppression equipment.

Fire Origin and Path

This fire, of undetermined cause, began on a covered porch on the first floor.

Contributing Factors and Victim Locations

The porch had a very heavy fire load consisting of at least two couches and other materials. The fire spread from the porch to the living area, charging the space with heat and smoke and cutting off the only escape route. One victim was found on the landing of the stairway from the cellar to the first floor. The other five were found in two bedrooms on the second floor; a man and one child were in one room and the other adult and three children were in the second. Two of the victims died at the hospital, and three others died after being airlifted to a burn hospital. The sixth died two weeks later.

Kentucky

Date, Time of Alarm, Number of Deaths

January, 2:30 a.m., five (four under age six)

Number of Stories, Occupancy Type, Construction Type

This was a one-story, single-family home of unprotected wood-frame construction. Ground-floor area unreported.

Smoke Alarms and Other Protection Devices

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

One other person was injured.

Indiana

Date, Time of Alarm, Number of Deaths

February, 12:30 a.m., five (one under age six)

Number of Stories, Occupancy Type,

Construction Type

This one-story, single-family manufactured home of unprotected wood-frame construction covered 720 square feet (67 square meters).

Smoke Alarms and Other Protection Devices

The house had no smoke alarms or automatic suppression equipment.

Fire Origin and Path

The fire began on the ground floor. Cause is undetermined, but investigators believe it was unintentional.

Contributing Factors and Victim Locations

No information was reported.

Illinois

Date, Time of Alarm, Number of Deaths

March, 1 a.m., five

Number of Stories, Occupancy Type,

Construction Type

This one-story, single-family manufactured home of unprotected wood-frame construction covered 1,440 square feet (134 square meters).

Smoke Alarms and Other Protection Devices

This house had neither smoke alarms nor automatic suppression equipment.

Fire Origin and Path

The fire, of undetermined cause, began in a bedroom.

Contributing Factors and Victim Locations

One person was also injured but escaped.

Idaho

Date, Time of Alarm, Number of Deaths

April, 1:38 a.m., five

Number of Stories, Occupancy Type,

Construction Type

This two-story, single-family home of unprotected wood-frame balloon construction covered 1,200 square feet (111 square meters).

Smoke Alarms and Other Protection Devices

The presence or absence of smoke alarms was not reported, and there was no automatic suppression equipment.

Fire Origin and Path

The fire, of undetermined cause, broke out on a porch.

Contributing Factors and Victim Locations

On arrival, firefighters found the home fully involved in fire. They found two of the victims in the first-floor living room. Two more victims were also located in the living room, but authorities believe they had fallen from the second floor when the living room ceiling collapsed. The fifth victim was found in bed in a first-floor bedroom.

Georgia

Date, Time of Alarm, Number of Deaths

April, 1:17 a.m., five (four under age six)

Number of Stories, Occupancy Type,

Construction Type

This one-story, single-family home of unprotected wood-frame construction covered 4,176 square feet (388 square meters).

Smoke Alarms and Other Protection Devices

Smoke alarms or suppression equipment were absent.

Fire Origin and Path

This fire started in a first-floor family room, but the cause is listed as undetermined.

Contributing Factors and Victim Locations

When firefighters arrived, the house was fully involved in fire and had already vented through the roof. Heavy fire prevented firefighters from entering the home to rescue people. Eventually, two of the victims were found in the master bedroom, and the three children were located in another bedroom. One person, a juvenile, managed to escape through a window in the master bedroom.

Oregon

Date, Time of Alarm, Number of Deaths

September, 6:09 a.m., five (three under age six)

Number of Stories, Occupancy Type,

Construction Type

This was a single-family home. No additional information was reported.

Smoke Alarms and Other Protection Devices

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

No information was reported.

Table 2. Non-Residential Fires

Texas

Date, Time of Alarm, Number of Deaths

April, 7:30 p.m., 15 (nine firefighters, one EMT, and five civilians)

Number of Stories, Occupancy Type, Construction Type, Operating Status

This was a one-story, 12,000-square-foot (1,115-square-meter) fertilizer plant of unprotected wood-frame construction.

Detection Systems and Suppression Systems

The plant had neither an automatic detection nor suppression system.

Fire Origin and Path

A fire of undetermined cause broke out in the seed and fertilizer building in the bulk processing plant, where pallets with bags of seed were stored. The fire burned for about 22 minutes before a huge explosion occurred.

Contributing Factors and Victim Locations

Between 28 to 34 tons (28,000 to 34,000 kilograms) of ammonium nitrate were stored in bins near the burning structure. Approximately 20 minutes after the fire was discovered, the ammonium nitrate detonated, leaving a crater 90 feet (27 meters) wide by 10 feet (3 meters) deep. It damaged or destroyed more than 500 structures in a 37-block area, including homes, schools, and an elderly housing complex.

Texas

Date, Time of Alarm, Number of Deaths

May, 12:07 p.m., four firefighters

Number of Stories, Occupancy Type, Construction Type, Operating Status

The fire occurred in a restaurant in a two-story motel complex that covered a floor area of 2,000 square feet (186 square meters). Construction type was unreported.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

The cause of the fire was not determined.

Contributing Factors and Victim Locations

Firefighters were inside this restaurant fighting the fire when the ceiling collapsed, trapping and killing four of the firefighters and injuring several others.

Arizona

Date, Time of Alarm, Number of Deaths

February, 3:20 a.m., three

Number of Stories, Occupancy Type, Construction Type, Operating Status

This one-story abandoned home of unprotected ordinary construction covered 1,800 square feet (167 square meters). It was occupied by four squatters.

Detection Systems and Suppression Systems

The house had neither smoke alarms nor suppression equipment.

Fire Origin and Path

The fire started in a bathroom; cause was undetermined.

Contributing Factors and Victim Locations

The victims were found in two bedrooms. One person was rescued by a passerby and a police officer, who pulled security bars off a window.

New Jersey

Date, Time of Alarm, Number of Deaths

February, 1:07 a.m., three

Number of Stories, Occupancy Type, Construction Type, Operating Status

This vacant three-story home of unprotected wood-frame construction covered 1,000 square feet (93 square meters). The building was occupied by three squatters.

Detection Systems and Suppression Systems

The house had neither smoke alarms nor automatic suppression equipment.

Fire Origin and Path

The fire of undetermined cause broke out on the second floor and was listed as unintentional.

Contributing Factors and Victim Locations

A police officer on patrol smelled smoke, investigated, and found the house on fire. The three victims were found on the third floor, where the spreading fire cut off their escape route.

Alabama

Date, Time of Alarm, Number of Deaths

February, 7:44 p.m., three

Number of Stories, Occupancy Type, Construction Type, Operating Status

This two-story vacant and unsecured home was occupied by three squatters. The floor area and construction method were not reported.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

The fire began on the second floor and involved an open flame. No other details were reported.

Contributing Factors and Victim Locations

No information was reported.

Texas

Date, Time of Alarm, Number of Deaths

October, 3:20 a.m., three

Number of Stories, Occupancy Type, Construction Type, Operating Status

A group of four stationary travel trailers shared one common roof at a hunting camp.

Detection Systems and Suppression Systems

There were no smoke alarms present. The presence or absence of suppression equipment was not reported.

Fire Origin and Path

The fire's cause was listed as undetermined, but investigators believed it started under the common roof.

Factors Hindering Occupant Escape

Upon arrival, firefighters found multiple structures fully involved and were told that three people were unaccounted for. The three victims were later found in one of the trailers.

Table 3. Non-Structural Fires

Arizona

Date, Time of Alarm, Number of Deaths

June, 4:47 p.m., 19 firefighters

Setting

This wildfire began in a boulder field in steep terrain with no vehicle access on a mountainous ridge 4,500 to 6,052 feet (1,372 to 1,845 meters) high.

Climate

This fire broke out on a red flag fire day with high heat, low relative humidity, and winds 10 miles (16 kilometers) per hour, with gusts of 20 miles (32 kilometers) per hour.

Thunderstorms occurred during the afternoon.

Fire Origin and Path

A lightning strike caused this fire.

Factors Hindering Occupant escape

The firefighters had left a burned-over area and were traveling through an unburned area heading to an area with few combustible materials when a rapidly advancing fire overtook them as they deployed their fire shelters. The air flowing outward from thunderstorms in the area reached the fire's perimeter and changed the intensity and direction of the fire, eliminating the crew's chance of reaching the safety zone. At this point, the firefighters had less than 2 minutes to improve a fire shelter deployment area. This fire burned 8,377 acres (3,390 hectares) and 114 structures.

California

Date, Time of Alarm, Number of Deaths

May, 10:12 p.m., five

Setting

This vehicle fire involved a stretch limousine in the right lane of a bridge on a highway.

Fire Origin and Path

The fire was caused by metal-on-metal friction heat from the rear drive shaft where it came in contact with the drive shaft tunnel. The fire department report indicates that there was enough heat to ignite the material covering the vehicle's floor pan, carpet, and rear seat.

Factors Hindering Occupant Escape

At the time of the fire, a driver was taking nine passengers in the limo to a wedding shower. While on the road, the passengers saw smoke coming from the bottom of the rear seat and told the driver. After he was told about the smoke a second time, the driver stopped the car, and he and four passengers escaped from the vehicle. Of the four passengers who escaped, at least two were able to crawl through the small opening in the partition separating the driver from the passenger compartment. Another escaped through a door. Five passengers were trapped and died in the car.