CATASTROPHIC MULTIPLE-DEATH FIRES FOR 2006

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For the second year in a row, the largest loss of life in a multiple-death fire occurred in a vehicle fire. In 2006, 24 aircraft passengers died of burns or smoke inhalation following an aircraft crash in Kentucky.

In 2005, 23 people lost their lives when a bus carrying hurricane evacuees from a nursing home caught fire on a Texas interstate highway.

In August 2006, an early morning flight from Lexington, Kentucky, to Atlanta, Georgia, was preparing for takeoff. The aircraft, a 54-seat, two-engine turbo jet with 3 crew members and 47 passengers on board was cleared to take off on one runway, but instead taxied onto another runway, which was approximately 3,500 feet (1,067 meters) shorter. The aircraft attempted to take off, but was still on the ground when it reached the end of the runway, and crashed into a fence and trees.

The shattered aircraft came to rest in a field about 1,800 feet (549 meters) from the end of the runway and caught fire. The first-arriving emergency responders were able to assist the co-pilot from a window and to safety. He was in critical condition, but has survived. The other 2 crew members and all the passengers perished. Twenty-four deaths were fire-related. Ten died of thermal injuries, and 14 died of smoke and products of combustion inhalation. The remaining 25 died of multiple blunt force trauma.

After the aircraft was cleared for takeoff, the air traffic controller, who was working alone, turned around to perform other duties. He heard a noise, saw a fire, and notified the fire department of the emergency within seconds on the tower crash phone. A complete report of this incident is available from the National Transportation Safety Board.

This incident was just 1 of 36 catastrophic multiple-death fires in 2006 that killed 223 people, 6 of whom were firefighters and 28 children under the age of 6. This is in contrast to 2005, when there were 20 such fires that killed 134 people, 23 of whom were children under age 6. A “catastrophic multiple-death fire” is one that kills 5 or more people in residential properties or kills 3 or more people in nonresidential and nonstructural properties.

In the last 10 years (1997-2006), 1 fire has been the deadliest fire of the year in 8 years, and in the other 2 years, 2 fires have had equal death tolls greater than those in any other fire. Vehicles accounted for the deadliest fire of the year in 3 years (2 aircraft and a bus) and one of the deadliest fires (a multi-vehicle highway crash fire) in one of the 2 years with a tie. Homes accounted for the deadliest fire of the year in 2 years (a dwelling and an apartment building) and one of the deadliest fires (a duplex and a manufactured home) in both of the years with a tie. All other properties accounted for the deadliest fires in only 3 years (the World Trade Center attack,

the Station Night Club fire, and a board and care home) and one of the deadliest fires (a jail) in one of the 2 years were the same.

Homes and vehicles consistently account for most of the fire deaths in the U.S. It is worth remembering that they also often account for the deadliest fires as well.

The 36 catastrophic multiple-death fires in 2006, accounting for 223 deaths, were both slightly above the recent 10-year average of 35 fires and 206 deaths.

In the U.S. in 2006, there were an estimated 1,642,500 fires (412,500 in residential properties, 111,500 in nonresidential, and 1,118,500 in nonstructural properties). There were an estimated 3,245 civilian deaths (2,620 in residential properties, 85 in nonresidential, and 540 in nonstructural properties)[1]. The catastrophic multiple-death fires accounted for .002 percent of these fires and 6.9 percent of the deaths.

Catastrophic residential fires

The largest number of catastrophic multiple-death fires (18) occurred in residential structures. Of these 18 residential fires, 15 involved single-family dwellings (5 of which were manufactured homes), 2 involved apartment buildings (one a 4-unit and one a 12-unit building), and one involved a 104-unit residential hotel. These 18 fires accounted for half the catastrophic multiple-death fires in 2006, 5 fires more than in 2005. In these residential structure fires, there were 106 deaths—almost half the deaths in catastrophic multiple-death fires 2006, and 26 more than in 2005. The deaths of 25 children under age 6, up 2 from 2005, accounted for almost one-quarter of the residential catastrophic multiple-fire deaths in 2006.

Seventeen of the 18 fires occurred between the hours of 11 p.m. and 7 a.m. Ninety-four of the deaths occurred during this time period. All the children under age 6 died during this time period. See Table 1 for details on these fires.

The largest loss-of-life residential fire killed 12 people. The fire occurred in a 4-story (I believe we categorized this as just a four-story building), 104-room residential hotel that had complete coverage smoke alarms, smoke detection, and manual pull stations. In the second story hallway, numerous box springs and mattresses were stored as they were removed and replaced in the rooms. During the evening, an argument ensued between two second-story occupants. Shortly after that, one of the participants in the argument took a mattress and placed it in front of the door of the other person. She set the mattress on fire and returned to her room. Fire and heat spread rapidly until the hallway flashed over. Smoke and fire spread rapidly throughout most of

[1]Michael Karter, "Fire Loss in the United States During 2006," NFPA Journal, September/October 2007.

the building. The smoke detector in the area of ignition activated and notified a central station alarm company, which in turn notified the fire department. The 12 victims were located in various areas of the U-shaped structure—6 on the second story, 4 on the third story, and 2 on the fourth story. Two people involved in the argument survived. The woman who set the fire was arrested and convicted.[2]

The second largest fire killed 9 people, 4 of them under 6. The fire occurred in a two-story, single-family dwelling of unprotected wood-frame construction that had no smoke alarms. Arcing electrical equipment ignited combustibles in the ceiling/attic area above a second-story bedroom. Something woke a resident asleep on the first story. He heard screams from the second story, and he made several unsuccessful rescue attempts before he escaped unharmed.

The third fire killed seven people, one of them a child under age 6. The building was a one-story, single-family dwelling of unprotected wood-frame construction with no smoke alarms. Very little information was reported other than that the fire occurred when an overheated refrigerator motor ignited nearby combustibles.

Three fires killed six people each. The first fire was in a one-story, single-family dwelling of unprotected wood-frame construction with no smoke alarms. One victim was under the age of 6. Due to the destruction, the cause and origin could not be determined. Indications are that four victims, two adults and two children, were attempting to escape and were located near the back door. The location of the other two victims was unclear.

The second fire occurred in a two-section manufactured home of unprotected wood-frame construction with no smoke alarms. The family arrived home from a trip to find the power had been shut off the day before. They lit a propane lantern and placed it in a kitchen nook/dining area. The family went to bed and left the lantern unattended. Nearby combustibles ignited, and the fire burned into the bathroom and up above the ceiling throughout the home. There were three 20-pound (9.1 kilogram) propane cylinders and four oxygen bottles inside the home, which contributed to fire spread. The victims were located in various bedrooms.

The third fire broke out in a 12-unit, three-story apartment building of unprotected ordinary construction. There were two victims under age 6. There were no smoke alarms in the apartment where the victims were located, and it was not reported if there were any in the rest of the building. An open flame in contact with clothing in a third-floor apartment hallway caused

[2] Bob Duval, NFPA Investigation Report, "The Reno Hotel Fire."

the fire. It was not reported why the open flame was in use. The fire extended throughout the third-story apartment only.

There were 12 fires that killed five people each. The 12 fires consisted of five dwelling fires (three two-story dwellings, a one-and-a-half-story dwelling, and a one-story dwelling), four manufactured homes, and three apartment buildings (a four-story building, a three-story row house, and a two-story row house). In several of the buildings with more than one story, fire trapped some victims on upper floors after beginning on the ground floor.

Six of the twelve fires began in a living room, family room, den, or front room. Three fires began in an unreported area, and the other three began in a computer room, a crawl space, and a porch.

Two of the fires cited unusual complicating factors that point to important safety lessons:

- Trying to fight fire using water from a sink;
- Only one egress door available; and
- Candles used for lighting because power had been shut off before fire.

Catastrophic nonresidential fires

There were seven nonresidential catastrophic multiple-death fires in 2006, which resulted in 42 deaths, compared to two in 2005, which resulted in 18 deaths. Two of the seven fires occurred in coal mines and one each in a 19-bedroom residential care facility, a religious social hall, a dwelling under construction, a warehouse, and an oil storage tank facility. See Table 2 for details on these fires.

The largest loss-of-life incident in this category was an explosion that killed 12 coal miners. Lightning struck a cable a distance from the coal mine, followed it in, and caused a methane explosion. There was no detection or suppression equipment in place in the mine. One miner was killed in the explosion. Twelve others survived the explosion and sought refuge behind a barricade curtain they built to keep out the deadly fumes. Approximately 41 hours after the explosion, rescuers located one survivor and the bodies of the other eleven miners two miles (3.2 kilometers) into the mine. A report on the incident is available on the Mine Safety and Health Administration (MSHA), www.msha.gov.

The second fire was in a one-story, 19-bedroom residential care facility of unprotected ordinary construction. Eleven people died in this fire, including ten residents and one caregiver. There were smoke alarms in the common areas, and three manual pull stations but only a single horn/strobe in the building. There were no reports of any alarms operating. There was no automatic suppression equipment present.

An electrical malfunction in a common area near the north wall of the structure ignited combustibles. The fire spread to the attic and raced to the south end of the structure. A neighbor reported the fire after seeing flames coming from the roof. Arriving firefighters found heavy fire from the roof and numerous casualties. At first, firefighters were able to enter the building, but they were forced out by smoke and fire conditions. At least 24 other residents were injured, many of them removed before the fire department arrived.[3] Since this incident, the state has required sprinklers in group homes and nursing homes.

The third incident was another methane explosion in a coal mine. This explosion killed five miners—two as a result of the blast and three due to inhalation of smoke and soot. There was no detection or suppression equipment in use. A portable methane detector was present but was not in use. Miners were cutting a metal roof strap with an acetylene torch. The torch ignited methane that leaked around a seal leading to an unused section of the mine. A report on the incident is available on the MSHA Web site.

Two fires killed four people each. The first occurred at a single-family house under construction. Due to pending legal actions, the fire department could not release any details on the incident.

The other occurred in a three-story building of unprotected wood-frame construction with a social hall on the ground floor. There were four apartments on the second and third stories, three of which were occupied. There were smoke alarms in the apartments, but none on the ground floor. There was no suppression equipment in the building. At the time of the fire, there were 24 to 30 occupants in the hall and kitchen area on the ground floor, preparing for a religious festival.

There was a 350-square-foot (32.5-square-meter) religious shrine constructed of wood and paper in a large open meeting room on the ground floor. Candles floated in pans of water on the shrine. When someone attempted to light a candle, the head of the match broke and landed in paper decorations. The shrine soon became involved and the fire spread rapidly.

The fire was between the exits and the kitchen area where the victims were working, trapping them. Investigators found several code violations, but they did not directly cause the deaths. Ten other people were injured.

Two fires killed three persons each. The first occurred in a crude-oil storage tank. There was no detection or suppression equipment. Welders were working on top of one tank in a series

[3] Bob Duval, NFPA Investigation Report, "The Anderson Board and Care Fire."

of crude oil tanks connected by a pipeline. The tank being welded had been purged, but the others had not. The connecting pipe had been disconnected near the tank and left open ended and not capped. A torch ignited vapors escaping the uncapped pipe. The fire flashed into the tank being worked on and the tank next to it. The workers were thrown off the roof by the resulting explosion.

The second incident was an explosion in a 60,000-square-foot (5574-square-meter) one-story warehouse of protected non-combustible construction. There was no automatic detection equipment. No information on suppression equipment was reported. The explosion and fire resulted in complete devastation over the 10-acre (4.4-hectare) site. The cause of this massive explosion and ensuing fire is still under investigation. Along with the 3 fatalities, at least 40 other workers were injured.

Catastrophic nonstructural fires

There were 11 nonstructural catastrophic multiple-death fires in 2006, killing 75 people, or a third of the deaths in catastrophic multiple-death incidents. The fires occurred in nine vehicle incidents—five involving highway vehicles, three involving aircraft, and one involving a tugboat, barges, and a pipeline—as well as two wildland fires. See Table 3 for details on these fires.

A medical examiner or coroner verified that the deaths in the vehicle crashes and fires were due to inhalation of products of combustion or thermal injuries, not impact.

The largest loss-of-life in an incident in this category was 24 in the aircraft crash and fire discussed earlier.

One wildland incident killed 12 people. This was a wildland complex that encompassed two large fires and six smaller ones. This incident occurred during drought condition where the area had no rainfall for 11 months. A downed power line caused the fire, which burned 907,245 acres (367,149 hectares) and destroyed 89 structures, including nine homes, five vehicles, 1,040 electric poles, 2,000 miles (3,219 kilometers) of fence, and 4,296 head of cattle.

The deaths occurred in various locations. A firefighter was killed when his fire apparatus overturned while he was responding to one of the fires in the complex. Four people died in a nine-vehicle collision on a smoke-shrouded highway. Visibility was down to zero when one vehicle stopped and caused the chain reaction crash. Four more died when their car ran off the road and fire overran them when they were fleeing. Three people died in their homes as they were preparing to evacuate.

One fire killed six people. This incident occurred as a tugboat pushed two barges about 1½ to two miles (2.4 to 3.2 kilometers) off shore. The aft spud, a five-ton (4,535.9-kilogram) steel shaft used as a mooring device on one of the barges, released from a fully upright position on the barge, fell into the shallow water, and struck a submerged natural gas pipeline. The release of gas ignited in a fireball that engulfed the vessels. Two people survived the fire. The United States Coast Guard and NTSB are investigating.

Four fires killed five people each. This first fire occurred on an interstate as a two-vehicle crash and fire. One child under age 6 died in this fire. A pickup truck was rear ended by an 18-wheel semi-tractor trailer and both vehicles ended up off the side of the highway. Sparks ignited spilled fuel. The seven occupants in the pickup died: three due to burns, two due to smoke inhalation, and two due to blunt force trauma.

The second fire had no information reported other than it was a two-vehicle crash and fire; with one victim under age 6.

The third fire occurred when a small single-engine aircraft struck a manufactured home, then crashed and burned in a cornfield. One child under age 6 was among the victims. The plane was performing a touch-and-go-around when its engine stalled. The plane struck the home, then crashed in a field, killing all five on board the aircraft. No one on the ground or in the home was killed.

The fourth one was a wildland fire that killed five firefighters. This incendiary fire was set on a day that had Santa Ana wind conditions -with gusts of up to 50 mph (80.5 kmph) and relative humidity of between 5 and 10 percent. The blaze burned over 40,000 acres (16,187.4 hectares) and destroyed 34 homes and 20 outbuildings. The firefighters died as they were protecting a home in the path of the fire. The fire overran and trapped them.[4]

There was one crash and fire that killed four people. This occurred when a small aircraft crashed on a mountain at the 2,070-foot (631-meter) elevation mark. The cause of the crash has not been determined yet. The NTSB is investigating.

There were three vehicle crashes and fires that killed three people each. Two were single-vehicle crashes. One ran off the road and into a tree and one hit a barrier and overturned. The third was a multi-vehicle crash and fire on an interstate highway. In all cases, victims were trapped in the wreckage and engulfed by the fire.

[4] Rita F. Fahy, Paul R. LeBlanc, Joseph Molis. "Firefighter Fatalities in the United States 2006," NFPA Journal, July/August 2007.

Role of smoke alarms and sprinklers

Information on detection equipment was reported for 14 of the 18 residential fires. Six properties had detection equipment present—one had complete coverage, two had partial coverage, and the coverage of three was unknown. Two systems operated properly, yet there were 17 deaths in these fires. One of these two fires flashed over in a hallway and rapidly filled the building with fire and thick smoke. No reason for detector ineffectiveness was reported in the second fire. In one of the remaining four properties, there were two detectors found—one operated, and the other was missing a battery. Two properties had equipment that didn't operate because both were missing their batteries. The operation of the equipment in the sixth property was unknown or not reported.

Eight properties had no detection equipment. They accounted for 49 deaths (11 children under age 6).

Information on detection equipment was reported for 6 of the non-residential properties. Two properties had detection equipment. Both had only partial coverage, and the operation of both was unknown. In one case they were known not to have had coverage in the area of the fire and the deaths, which explains the failure to operate. Four non-residential properties had no detection equipment, and these fires accounted for 23 deaths. Detector presence in one non-residential property was not reported or unknown.

None of the 18 residential and none of the 5 of 7 non-residential properties that reported information had sprinklers.

Smoke alarms have been proven effective in reducing the risk of death in home fires. The most effective arrangement is to use interconnected multiple-station smoke alarms that are supplied by hard-wired AC power, with a battery backup. 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 residential smoke alarms at least monthly. Batteries should also be replaced according to manufacturer's recommendations but at least yearly.

Smoke alarms are only effective if occupants exit the building when they sound.

Children should be familiar with the sound of a properly operating smoke alarm. They should follow a practiced escape plan that emphasizes two exits with a designated meeting place.

Exit drills in the home are part of many school curricula. Practicing the plan helps families determine if children and others readily waken to the sound of a smoke alarm, and that,

along with assistance for family members who require it, can be factored into the plan. Practicing fire prevention principles could have prevented many of the fires.

Where we get our data

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 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 in the U.S. We understand that in many cases, due to ongoing litigation, a department cannot release information. Also, in some cases departments have been unable to determine the information we request.

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Table 1. Residential Fires

Nevada
Date, Time of Alarm, Number of Deaths
October, 10:02 p.m., 12
Number of Stories, Occupancy Type, Construction Type
This three- and four-story, 104-room residential hotel was of unprotected, ordinary construction. There were 83 occupants at the time of the fire.
Smoke Alarm and Other Protection Devices
Complete coverage of smoke alarms and manual pull stations. The smoke alarm system activated in the area of ignition and alerted a central station which in turn notified the fire department. There was no automatic suppression equipment present.
Fire Origin and Path
After an argument in a second-story hallway, a resident placed a mattress in front of a door to another room and ignited it. The fire spread rapidly down the corridor and ignited numerous other mattresses and box springs that were stored temporarily in the corridor. The corridor flashed over and fire spread to the third story and smoke spread throughout the building.
Contributing Factors and Victim Locations
Arriving firefighters found heavy fire conditions, fought the fire, and made searches and many rescues. Victims were located throughout the building, with a total of six on the second story, four on the third story, and the last two on the fourth story. There were 30 civilian injuries. An arrest and conviction has been made in the case.

Tennessee
Date, Time of Alarm, Number of Deaths
March, 6:15 a.m., 9 (4 under age 6)
Number of Stories, Occupancy Type, Construction Type
This two-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
The area of origin appears to be the ceiling/attic area above a second-story bedroom where arcing in the electrical system ignited unknown items. The fire spread throughout the attic, down to the second story and then to the first story.
Contributing Factors and Victim Locations
One family member sleeping on the first story escaped unharmed after he made several unsuccessful rescue attempts. The location of the victims was not reported but a survivor told firefighters that they were on the second story.

Oklahoma
Date, Time of Alarm, Number of Deaths
July, 5 a.m., 7 (1 under age 6)
Number of Stories, Occupancy Type, Construction Type
This one-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
None

Fire Origin and Path
This fire was caused by an overheated refrigerator motor igniting nearby combustibles.
Contributing Factors and Victim Locations
None reported.

Indiana
Date, Time of Alarm, Number of Deaths
March, 4 a.m., 6 (1 under 6)
Number of Stories, Occupancy Type, Construction Type
This one-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
Due to the destruction, the cause and origin of this fire has remained undetermined.
Contributing Factors and Victim Locations
Two adults and two children were found near the back door. The exact locations of the other two victims were not reported.

Florida
Date, Time of Alarm, Number of Deaths
April, 3 a.m., 6
Number of Stories, Occupancy Type, Construction Type
This single-family, double-wide manufactured home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
This fire broke out in a kitchen nook/dining area when a propane lantern ignited unknown combustibles. The fire burned into the bathroom, then above the ceiling throughout the structure. The power to the home had been shut off the day before, so the family lit the lantern when they arrived home late from a trip out of state.
Contributing Factors and Victim Locations
The lantern was left unattended when the family went to bed. Three 20-pound (9.1 kilogram) propane tanks and four oxygen cylinders were found throughout the home and contributed to the fire spread. The victims were located in the bedrooms.

Illinois
Date, Time of Alarm, Number of Deaths
September, 12:18 a.m., 6 (2 under age 6)
Number of Stories, Occupancy Type, Construction Type
This three-story, 12-unit apartment building was of unprotected ordinary construction.
Smoke Alarm and Other Protection Devices
No smoke alarms in the apartment of origin. It was not reported if the rest of the building had any.
Fire Origin and Path
A fire began in a third-story hallway when an open flame contacted class A combustibles and clothing. The smoke and fire were contained to one apartment.

Contributing Factors and Victim Locations
None reported.

Texas
Date, Time of Alarm, Number of Deaths
January, 11:30 p.m., 5 (2 under age 6)
Number of Stories, Occupancy Type, Construction Type
This single-family manufactured home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
There was one smoke alarm in the living room that operated and alerted occupants.
Fire Origin and Path
Fire originated in the living room. Due to ongoing civil suits, information on the origin and path of the fire was not available.
Contributing Factors and Victim Locations
Two other occupants were injured.

Pennsylvania
Date, Time of Alarm, Number of Deaths
February, 1:30 a.m., 5
Number of Stories, Occupancy Type, Construction Type
This four-story, four-unit apartment building was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
Not reported.
Fire Origin and Path
Fire of undetermined cause began in a front room of the first-story apartment.
Contributing Factors and Victim Locations
None reported

North Carolina
Date, Time of Alarm, Number of Deaths
March, 4 a.m., 5 (1 under age 6)
Number of Stories, Occupancy Type, Construction Type
This 1 ½ story, single-family home was of unprotected ordinary construction.
Smoke Alarm and Other Protection Devices
The remains of a smoke alarm was found, with battery installed, but it is undetermined if it activated.
Fire Origin and Path
The fire originated in the living room. A couch was positioned against an extension cord plug. Pressure from the arm support flattened the plug causing a short circuit in the wiring. The short circuit ignited the couch. Fire burned into the fabric and foam cushion, producing heavy black smoke. Four of the victims were located in a first-story bedroom with doors closed. The fifth victim was found near the doorway. He had attempted to extinguish the fire with water from a sink.
Contributing Factors and Victim Locations
There was a delay in reporting the fire, and one occupant attempted to extinguish the fire rather than evacuate.

Pennsylvania
Date, Time of Alarm, Number of Deaths
March, 2:30 a.m., 5 (2 under age 6)
Number of Stories, Occupancy Type, Construction Type
This two-story, single-family row house was of unprotected ordinary construction.
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
An extension cord to a space heater was under a chair and was damaged by the weight of the chair. The damaged overloaded cord ignited the chair. The fire spread to a nearby sofa then vented out the first-story front room. The fire also extended up an open stairway to the second-story hallway.
Contributing Factors and Victim Locations
A heavy security screen and a security storm door hindered escape of the victims and delayed the firefighters in their fire attack and rescue. The only exit was a front door. One victim had jumped and was found outside, while another was located on the first story, and the other three were in a second-story bedroom.

Kentucky
Date, Time of Alarm, Number of Deaths
March, 1:55 a.m., 5
Number of Stories, Occupancy Type, Construction Type
This single-family, double-wide manufactured home was of unprotected wood-frame construction
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
This fire broke out when a cigarette was discarded in trash in a computer room. Firefighters arrived to find the home well-involved in fire.
Contributing Factors and Victim Locations
A woman was found in a bedroom with three children. An adult male was found in the hall way outside the bedrooms. One firefighter was injured.

Pennsylvania
Date, Time of Alarm, Number of Deaths
April, 6:06 a.m., 5 (3 under age 6)
Number of Stories, Occupancy Type, Construction Type
This two-story single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
There were smoke alarms on the second story but none in the area of ignition. The smoke alarms upstairs did not operate because they had no batteries.
Fire Origin and Path
A fire of unknown cause began in the area of a couch in a first-story living room. The fire was contained to the living room.
Contributing Factors and Victim Locations
None reported.

Nebraska
Date, Time of Alarm, Number of Deaths
July, 1:50 a.m., 5 (1 under age 6)
Number of Stories, Occupancy Type, Construction Type
This single-family manufactured home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
None
Fire Origin and Path
This fire began in a crawl space under the manufactured home when a motor on an air conditioner blower overheated and ignited combustibles. The fire spread throughout the underside before burning through the flooring into the living area.
Contributing Factors and Victim Locations
None reported.

Missouri
Date, Time of Alarm, Number of Deaths
August, 4:15 a.m., 5 (4 under age 6)
Number of Stories, Occupancy Type, Construction Type
This one-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
No information reported.
Fire Origin and Path
No information reported.
Contributing Factors and Victim Locations
None reported.

Kansas
Date, Time of Alarm, Number of Deaths
September, 12:42 a.m., 5 (2 under age 6)
Number of Stories, Occupancy Type, Construction Type
This two-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
Two smoke alarms were present, but their location was not reported. One activated, and one was missing its battery.
Fire Origin and Path
The fire started on the front porch. The cause is unknown. The fire entered the house through the front door and spread into the living room and dining room on the first story, then up an open stairway.
Contributing Factors and Victim Locations
The victims, including a sixth person who suffered non-fatal injuries, were located on the second story. One firefighter was injured.

West Virginia
Date, Time of Alarm, Number of Deaths
December, 1:30 a.m., 5 (2 under age 6)
Number of Stories, Occupancy Type, Construction Type
This single-family manufactured home was of unprotected wood-frame construction.

Smoke Alarm and Other Protection Devices
No information reported.
Fire Origin and Path
No information reported.
Contributing Factors and Victim Locations
None reported.

Ohio
Date, Time of Alarm, Number of Deaths
December, 6:12 a.m., 5
Number of Stories, Occupancy Type, Construction Type
This two-story, single-family home was of unprotected wood-frame construction.
Smoke Alarm and Other Protection Devices
Unknown. The fire department had found smoke alarms in the home on a previous inspection, but firefighters found no evidence of any at the time of the fire.
Fire Origin and Path
This fire broke out in the first-story living room. Power to the house had been shut off prior to the fire, and the occupants were using candles throughout the house for light. A candle on a coffee table burned down to the table and ignited it. The smoke and fire spread, blocking egress from the stairs.
Contributing Factors and Victim Locations
A guest fell asleep in the living room, and the candle burned unattended. The guest and four occupants upstairs were killed.

Pennsylvania
Date, Time of Alarm, Number of Deaths
December, 6:30 a.m., 5
Number of Stories, Occupancy Type, Construction Type
This three-story, single-family row house was of unprotected ordinary construction.
Smoke Alarm and Other Protection Devices
There were smoke alarms present, but their location was not reported. None had batteries.
Fire Origin and Path
The fire was caused by a short circuit in a set of light-duty Christmas lights in a first-story living room. The fire burned nearby combustibles as well as wood paneling, then broke out a front window and spread along connected porches. There was heavy smoke and heat but little fire damage on the upper stories.
Contributing Factors and Victim Locations
There were 13 residents in the house. Two victims were located in a second-story bedroom, and three victims were located in third-story bedrooms. The other eight residents were all injured by smoke inhalation.

Table 2. Nonresidential Fires

West Virginia
Date, Time of Alarm, Number of Deaths
January, 6:26 a.m., 12
Number of Stories, Occupancy Type, Construction Type, Operating Status
Underground coal mine. Approximately two miles (3.2 kilometers) in from mine entrance.
Detection Systems and Suppression Systems
None
Fire Origin and Path
Methane gas was ignited by a lightning strike that occurred a distance from the mine and followed a cable into the mine.
Contributing Factors and Victim Locations
The explosion killed one miner and a collapse forced the other 12 miners to retreat and await rescue behind a barricade curtain they built. Rescuers located one survivor and the bodies of the other 11 miners approximately 41 hours after the explosion.

Missouri
Date, Time of Alarm, Number of Deaths
November, 1 a.m., 11
Number of Stories, Occupancy Type, Construction Type, Operating Status
This one-story, 19-bedroom board and care facility was of unprotected ordinary construction. There were 33 occupants and two caregivers in the structure when the fire broke out.
Detection Systems and Suppression Systems
There were smoke alarms in the common areas and three manual pull stations. There was a single horn/strobe in the building. There were no reports of any alarms sounding. No suppression equipment was present.
Fire Origin and Path
An electrical malfunction in a common room area near the north wall has been determined as the most probable cause. The fire spread into the attic and spread to the south end of the building. A neighbor reported the fire after seeing flames coming from the roof. First-arriving firefighters reported fire from the roof and were faced with a multiple-casualty incident.
Contributing Factors and Victim Locations
Firefighters had insufficient resources to conduct simultaneous firefighting and rescue operations. Twenty-four occupants were injured. Locations of the victims were not known as several had been removed from the building before the fire department arrived. One of the caregivers died in the fire; the other victims were residents of the facility.

Kentucky
Date, Time of Alarm, Number of Deaths
May, 1 a.m., 5
Number of Stories, Occupancy Type, Construction Type, Operating Status
Underground coal mine. Approximately 3,200 feet (975 meters) underground.
Detection Systems and Suppression Systems
None. (One portable methane detector was present but it was not used.
Fire Origin and Path
Methane gas that was leaking from a sealed-off area of the mine was ignited by an acetylene

torch two miners were using to cut and remove a metal roof strap, approximately 54 inches long by 5 inches wide (136.2 centimeters by 12.7 centimeters).

Contributing Factors and Victim Locations

Two miners died of multiple blunt force trauma in the explosion, and three died of carbon monoxide poisoning with smoke and soot inhalation. One miner was rescued and treated for smoke and soot inhalation.

West Virginia

Date, Time of Alarm, Number of Deaths

April, 10:30 a.m., 4

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

This was a single-family house under construction. No other details could be reported due to litigation.

Detection Systems and Suppression Systems

No information reported.

Fire Origin and Path

No information reported.

Contributing Factors and Victim Locations

None reported.

Massachusetts

Date, Time of Alarm, Number of Deaths

June, 7:22 p.m., 4

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

This three-story social club was of unprotected wood-frame construction. There were 24 to 30 occupants in the hall. There were two apartments each on the second and third stories. Three of the apartments were occupied.

Detection Systems and Suppression Systems

There were heat and smoke alarms in stairwells and in the apartments and heat detectors in the basement. They were not a factor due to location of the fire. No suppression equipment was present.

Fire Origin and Path

There was a 350-square-foot (32.5-square-meter) religious shrine constructed of wood and paper in a large open meeting room on the ground floor. Candles floated in pans of water in front of the shrine. When someone attempted to light the candles with a match, the head of the match broke off and landed in paper decorations. The decorations on the shrine soon became involved and fire spread rapidly.

Contributing Factors and Victim Locations

The fire broke out between the kitchen where the victims were working and the exit, preventing their escape. The victims were all found in the kitchen. Several code violations were found, but they did not directly cause the deaths. Ten other civilians and two firefighters were injured.

Mississippi

Date, Time of Alarm, Number of Deaths

June, 8:30 a.m., 3

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

Crude oil storage tank. Workers were on top of the tank welding a new pipe to the tank.

Detection Systems and Suppression Systems
No detection or suppression equipment present.
Fire Origin and Path
Welders were working on top of one in a series of crude oil tanks connected by pipelines. They had purged the tank that was being welded, but the other tanks were not purged. The pipes had been disconnected near the tank, left open ended, and not capped. Vapors escaping from the pipes were ignited by the welding.
Contributing Factors and Victim Locations
The explosion blew the workers off the top of the tank. One was saved by his harness.

Wisconsin
Date, Time of Alarm, Number of Deaths
December, 8:07 a.m., 3
Number of Stories, Occupancy Type, Construction Type, Operating Status
One-story warehouse of protected noncombustible construction. Operating.
Detection Systems and Suppression Systems
No detection system was present, and no information on suppression equipment was reported.
Fire Origin and Path
The cause of the explosion and ensuing fire is still under investigation.
Contributing Factors and Victim Locations
Along with the three fatalities, there were at least 40 others injured in the blast. A 60,000-square-foot (5,574-square-meter) building was demolished and another 12 buildings and 100 vehicles in the surrounding area were damaged. The 10-acre (4.04-hectare) site was completely devastated. Firefighters were faced with fire impinging on propane and oxygen tanks.

Table 3. Nonstructural Fires

Kentucky
Date, Time of Alarm, Number of Deaths
August, 6:07 a.m., 24
Setting
Aircraft crash and fire in a farm area past the end of a runway.
Climate
Visibility was 8 miles (12.9 kilometers). No precipitation during takeoff.
Fire Origin and Path
An airplane was cleared for one runway but instead taxied to and attempted takeoff on another runway that was 3,503 feet (1,067 meters) shorter. The aircraft was still on the ground when it reached the end of the runway. Past the end of the runway, the aircraft crashed through a fence, struck trees, and stopped in a field where it caught fire.
Factors Hindering Occupant escape
The impact and post-crash fire destroyed the aircraft. There were 47 passengers and three crew members on board. Fourteen people died of smoke inhalation, 10 died by thermal injuries, and the other 25 died of blunt force trauma injuries. The co-pilot survived.

Texas
Date, Time of Alarm, Number of Deaths
March, 11:07 a.m., 12 (including one firefighter)
Setting
Wildfire. Grass and brush
Climate
Hot and dry. Drought conditions (11 months without rain), and windy.
Fire Origin and Path
This complex consisted of two larger fires and six smaller fires. The larger fire was started when a power line fell igniting dry grass. Destroyed were 89 structures including 9 houses, 5 vehicles, 1,040 electrical poles, and 2,000 miles (3,219 kilometers) of fence, and 907,245 acres (367,149 hectares) were burned. It was estimated that 4,296 head of livestock perished. Eight towns were evacuated and a 90-mile (144.8-kilometer) stretch of the interstate was closed for nine hours due to the blinding smoke condition.
Factors Hindering Occupant escape
A firefighter was killed when the fire apparatus he was riding overturned. Four people died in a nine-vehicle crash on the smoke-covered interstate. Four died when their vehicle ran off the road and the fire overran the occupants attempting to escape the fire. Three died in their homes while preparing to evacuate.

Louisiana
Date, Time of Alarm, Number of Deaths
October, 12:30 p.m., 6
Setting
Tugboat pushing two barges about 1½ to 2 miles (2.4 to 3.2 kilometers) off shore.
Climate
Not reported.

Fire Origin and Path
The aft spud, a five-ton (4535.9-kilogram) steel shaft used as a mooring device on one of the barges, released from a fully upright position, fell into the water, and struck a submerged natural gas pipeline. The released gas ignited in a fireball, engulfing the vessels.
Factors Hindering Occupant escape
The victims had no time to escape the fireball. Two people, one on the tugboat and one on one of the barges, survived the fire.

Arizona
Date, Time of Alarm, Number of Deaths
May, 6 p.m., 5 (1 under age 6)
Setting
Two-vehicle crash and fire on interstate highway.
Climate
Not reported.
Fire Origin and Path
A pickup truck was rear-ended by an 18-wheel semi-tractor trailer. Both vehicles ended up off the side of the highway and exploded in fire as the gasoline and diesel fuel were ignited by sparks.
Factors Hindering Occupant escape
The victims were trapped in the wreckage of the pickup truck. Three died of burns, two by smoke inhalation, and the other two by multiple blunt force trauma.

California
Date, Time of Alarm, Number of Deaths
July, Time not reported, 5 (1 under age 6)
Setting
Two-vehicle crash/fire
Climate
No information reported.
Fire Origin and Path
No information reported.
Factors Hindering Occupant escape
None reported.

Georgia
Date, Time of Alarm, Number of Deaths
July, 12:50 p.m., 5 (1 under age 6)
Setting
Aircraft crash and fire. Plane struck a single-family manufactured home, then crashed and burned in a cornfield.
Climate
Not reported.
Fire Origin and Path
An airplane with five persons on board made a touch down on the runway, then gave power and took off again for a go-around. The aircraft banked, stalled, and collided with a single-family home and caught on fire when it crashed in a cornfield.

Factors Hindering Occupant escape
All five passengers in the aircraft died of thermal injuries or soot inhalation. No one was injured or killed on the ground or in the home.

California
Date, Time of Alarm, Number of Deaths
October, 1:12 a.m., 5 Firefighters
Setting
Wildland fire.
Climate
Santa Ana wind conditions with gusts up to 50 miles per hour (80.5 kilometers per hour). Relative humidity was between 5 percent and 10 percent.
Fire Origin and Path
Incendiary fire. The five firefighters were attempting to protect a home in the Esperanza wildfire. A rapid spread of the fire trapped the firefighters, who had no time to retreat to the fire engine or use their portable fire shelters. Three of the firefighters died at the scene, one died en route to the hospital, and the fifth died five days later.
Factors Hindering Occupant escape
Weather and seasonally dry vegetation with extreme wind conditions produced extreme fire behavior conditions and a rapid rate of spread. A rapid spread of the fire trapped the firefighters. The fire burned over 40,200 acres (16,268.4 hectares) and destroyed 34 homes and 20 outbuildings. Twelve firefighters were also injured.

Maine
Date, Time of Alarm, Number of Deaths
June, 2:10 p.m., 4
Setting
Aircraft crash and fire on mountain side at the 2,070-foot (631-meter) elevation point.
Climate
Warm, clear with a few clouds.
Fire Origin and Path
This aircraft with four persons on board crashed and burned in a heavily wooded area of the mountain side. The cause of the crash has not been determined yet. National Transportation Safety Board is investigating.
Factors Hindering Occupant escape
None reported.

Missouri
Date, Time of Alarm, Number of Deaths
October, 11:12 p.m., 3
Setting
Motor vehicle crash/fire on interstate highway.
Climate
Not reported
Fire Origin and Path
Multi-vehicle collision involving at least three semi tractor-trailers and five cars. It was not reported how the fire originated, but it did involve spilled diesel fuel.

Factors Hindering Occupant escape
The victims were trapped in their vehicles as the fire quickly engulfed them.

Virginia
Date, Time of Alarm, Number of Deaths
November, 12:05 p.m., 3
Setting
Single-vehicle crash and fire, car hit a tree.
Climate
Not reported.
Fire Origin and Path
A car reportedly ran off the road on a curve, struck a tree, and caught on fire.
Factors Hindering Occupant escape
Another person also died of blunt force trauma.

New York
Date, Time of Alarm, Number of Deaths
November, 4:45 a.m., 3
Setting
Single-car crash/fire. Off ramp from expressway.
Climate
No information reported.
Fire Origin and Path
The car reportedly struck a barrier and overturned and caught fire.
Factors Hindering Occupant escape
Another person died of blunt force trauma.