

CATASTROPHIC MULTIPLE-DEATH FIRES IN 2010

**Stephen G. Badger
September 2011**



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

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CATASTROPHIC MULTIPLE-DEATH FIRES IN 2010

Headlines from around the country during 2010 read a lot like these: “Two children survive fire that kills rest of family”; “Adult care home fire kills three”; “Motel fire kills four college students,” and so on. If they sound familiar, it’s because they could have been written in any previous year. When it comes to these kinds of fires, history truly repeats itself.

According to *U.S. Fire Loss for 2010*, by Michael J. Karter, Jr. of NFPA, firefighters in the United States in 2010 responded to an estimated 1,331,500 fires, 384,000 of which were in residential structures, 98,000 of which were in nonresidential structures, and 849,500 of which were outside of structures. These fires accounted for an estimated 3,120 deaths, 2,665 of which occurred in residential structures, 90 in non-residential structures, and 365 in fires outside of structures.

Twenty-nine of the 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 as fires or explosions in all other structures, as well as outside of structures such as wildfires and vehicle fires, that claim three or more lives.

These 29 fires accounted for 175 fire deaths, including 30 children under the age of six. They accounted for 0.002 percent of the total estimated fires and 5.6 percent of the total fire deaths for 2010. By comparison, there were 21 catastrophic multiple-death fires in 2009, resulting in 103 deaths, including 26 children under age six.

The largest loss of life in a fire or explosion in the United States in 2010 was a mine explosion. At approximately 3 p.m. on April 5, 2010, a powerful explosion occurred in a coal mine almost 1,000 feet (305 meters) below the surface of the Coal River and mountains in West Virginia, killing 29 miners and seriously injuring at least one other. The Mine Safety and Health Administration (MSHA), the State of West Virginia, the Governor’s Independent Investigation Panel, and the United Mine Workers of America conducted a joint investigation, and the Governor’s Panel report (see nttc.edu/ubb/) identified several mining system failures that led to, and contributed to, the devastating explosion and fire. “The company’s ventilation system did not adequately ventilate the mine,” the report found. “As a result, explosive gases were allowed to build up. The company failed to meet federal and state safe principal standards for the application of rock dust. Therefore, coal dust provided the fuel that allowed the explosion to propagate through the mine. Also, water sprays on equipment were not properly maintained and failed to function as they should have. As a result, a small ignition could not be quickly extinguished.”

The mine had been closed on April 4, which was Easter Sunday, and re-opened the following day, with 45 workers underground by 7 a.m. During what seemed to be a “normal and typical” day, several problems that arose were reported and being dealt with by the miners before the explosion occurred.

The conclusion reached by the Governor’s Panel was that “the ignition point for the blast was the tail of the longwall [the machinery for shearing off coal from the wall]. As the shearer cut into

the sandstone mine roof, the resulting sparks ignited a pocket of methane, creating a fireball. The fireball in turn ignited the methane that had accumulated in the gob [an area filled with rock waste] during the Easter weekend and leaked onto the longwall face. The fireball traveled into the tailgate area, where accumulations of coal dust provided fuel for a second, more deadly, force. This dust-fueled blast ricocheted in multiple directions, traveling across the longwall face, into the tailgate entry, and through more than two miles [3 kilometers] of the mine.”

According to MSHA, several miners who were near the portals were able to evacuate when the explosion occurred. Those who could not ranged from 20 to 61 years old. It was several days before conditions in the mine were safe enough for the bodies to be removed, and several weeks before the conditions were safe enough for investigators to enter the mine.

Catastrophic Home Structure Fires

Two-thirds, or 65.5 percent, of the catastrophic multiple-death fires occurred in homes. Of the 19 such fires in these properties in 2010, 15 occurred in single-family homes, five of which were manufactured homes; one occurred in a duplex; three occurred in apartment buildings, one of which had six units, one of which had four units, one of which occurred in a building whose size was not reported. This is an increase of nine from 2009. There were 101 deaths in these catastrophic multiple-death home fires in 2010, up from 59 in 2009. Of the 101 fatalities, 28 were children under six, three more than 2009.

The cause or origin was reported for just five of these 19 fires. One fire was deliberately set. One each involved abandoned or improperly disposed of smoking materials, combustibles too close to a heat source, a short circuit in a damaged electric cord, and defective wiring in a ceiling. Fifteen of the fires broke out between the hours of 11 p.m. and 7 a.m., resulting in 81 deaths, including 22 children under age six.

In 14 cases, the cause and origin was listed as undetermined. In some cases, this was due to destruction of the property. In others, fire investigators were unable to determine the cause or eliminate all potential causes. In four incidents, the authorities provided no details.

The largest loss-of-life fire in a home killed seven people, including two children under age six. This arson fire was set on the first floor of a two-story apartment building of unprotected wood-frame construction. There were smoke alarms, which operated and alerted occupants. It was not reported why the occupants were unable to escape.

Four fires killed six people each. The first fire broke out on the second floor of a two-story, six-unit apartment building of unprotected ordinary construction that had a business on the ground level. This fire killed three children under age six. The building had some smoke alarms, but they did not operate for an unreported reason, and others had been removed. The victims were all found on the second story.

The second fire, which killed two children under the age of six, broke out on the first floor of a two-story, single-family home of unprotected wood-frame construction. The cause was not determined, and no information was reported on the presence or absence of smoke alarms. One

child was found in a first-floor bedroom, and the other fatalities were found on the second story. Three other people in the house were injured.

The third fire, which killed two children under age six, broke out in a two-story, single-family home of unprotected wood-frame construction. No information was reported on smoke alarms. The fire was electrical in nature and broke out in the first-floor living room.

The fourth fire broke out in a one-story, single-family home, killing two children under age six. No other additional information was reported.

Fourteen fires killed five people each. Seventeen children under age six died in these fires; one fire alone killed four children. These fires occurred in 12 single-family homes, five of which were manufactured homes; one duplex; and one apartment building, with an unreported number of units. In eight of these fires, the buildings had no smoke alarms. In two fires, smoke alarms were present. In one of the two, the victims were under the influence of drugs, and in the second, the family was trying to open doors and windows and became trapped. No information on smoke alarms was reported in four fires.

Catastrophic Non-Home Structure Fires

Eight of the 29 fires occurred in non-home structures. There was one fire each at a chemical manufacturer, a refinery, a care-for-the-aged facility, a motel, a coal mine, a tool shed, a vacant building, and a building under construction. These accounted for 63 of the 175 deaths, compared to 20 in 2009. None of the victims was under age six. In 2009, there were five fires in the non-home category. Part of the large increase in deaths was due to the West Virginia coal mine explosion and fire that killed 29 people, or 46 percent of the deaths in this category.

Seven of the properties were operating to some extent, and the status of the eighth was not reported. The cause—a mechanical breakdown—was reported for just one of the fires.

The largest loss-of-life incident was the coal mine explosion and fire. Eight people were also killed in a vacant warehouse that was being used by the homeless for shelter and sleeping, but no further information was reported.

Seven people were killed at a hydrocarbon refinery when a heat exchanger ruptured, releasing hydrocarbon and naphtha vapors that ignited almost immediately. The heat exchanger, which was almost 40 years old, was being returned to service after maintenance. The rupture occurred at cracks in welds caused by the stresses that heat exchangers experience over years of operation.

Six people died in an explosion and fire in an electric power generation plant that was under construction. The explosion occurred as a large quantity of natural gas was being used in a blowout being conducted to clean out pipes.

Four people died in a two-story motel. No information was released due to ongoing civil suits.

Three people died in each of three incidents. The first, whose cause and origin were not reported, occurred at a one-story chemical manufacturing plant. The second, also of unknown cause, occurred in a one-story, 144-square-foot (13-square-meter) tool shed. The third fire broke out in the living room of a one-story, 2,100-square-foot (195-square-meter) care-for-the-aged facility. The cause of this fire was undetermined and is still under investigation.

Catastrophic Non-Structure Fires

There were two non-structure incidents, one in a passenger vehicle crash and fire, and the other in a gas distribution system. The incidents killed 11 people, two under age six. This is four fewer incidents than occurred in this category in 2009 and 10 fewer deaths. Vehicle crashes and fires are included in this study if the fire in the vehicle caused the crash or if the local coroner or medical examiner confirms that the victims died of thermal injuries or inhalation of products of combustion, rather than from impact injuries.

One of the fires killed eight people. An explosion and fire erupted in a natural gas distribution system when a 30-inch (76.2-centimeter) gas transmission pipeline developed a leak under a street in a residential area. An unknown source ignited the explosion of approximately 47 million cubic feet (1,331,000 cubic meters) of natural gas. The fire destroyed 38 homes and damaged 63 others. The victims were at various locations in the area.

Three members of one family, including two children under age six, died in a multi-vehicle crash and fire on an interstate highway when a tractor trailer struck their passenger car from behind, pushing it into another tractor trailer. Fuel from a breach in the car's fuel system, as well as fuel from a saddle tank on the tractor trailer that hit the car, was ignited by heat from the tractor's engine. Another family member in the car died of blunt force trauma.

The Role of Smoke Detection and Suppression Equipment

In 12 of the 19 home fires, information was available on automatic smoke detection equipment. Four were equipped with smoke alarms. Two systems operated, one didn't, and it was not known if the fourth did or not. The reason the occupants failed to evacuate in one home that had operational smoke alarms was not reported. The other fire in which operational smoke alarms were present occurred in a four-unit apartment building where the fire department reported the exits were blocked by smoke and flames. Eight structures had no smoke alarms at all. In these fires, 40 people died, including three children under the age of six.

Information on detection equipment was reported for only one of the eight non-home structures. The care-for-the-aged facility was equipped with smoke alarms that operated and alerted the residents. The fire department reported that the age of the victims was a factor in preventing escape.

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 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 home smoke alarms at least monthly. Batteries should also be replaced according to manufacturer's recommendations; conventional batteries should be replaced at least yearly. If an alarm "chirps," a warning that the battery is low, the battery should be replaced right away. All smoke alarms, including alarms that use 10-year batteries and hard-wired alarms, 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, one that emphasizes two exits from any location, as well as a designated meeting place once they have evacuated the structure. Exit drills in the home are part of many school 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, 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 report.

No suppression equipment was reported to have been present in any of the fires. 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 your home decreases by about 80 percent when sprinklers are present, and sprinklers reduce the average property loss by 71 percent per fire. More information about home fire sprinklers is available at www.firesprinklerinitiative.org.

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 United States. We understand that, in many cases, a department cannot release information due to ongoing litigation. In other cases, departments have been unable to determine the information we request.

Stephen G. Badger, a fire data assistant with NFPA's Fire Analysis and Research Division, is retired from the Quincy, Massachusetts, Fire Department.

TABLE 1. HOME STRUCTURE FIRES

Illinois

Date, Time of Alarm, Number of Deaths

February, 6:30 a.m., 7 (2 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was an occupied two-story, four-unit apartment building that covered 2,250 square feet (210 square meters) and was of unprotected wood-frame construction.

Smoke Alarm and Other Protection Devices

Smoke alarms were present and alerted the occupants. The fire department reported the occupants were unable to escape because exits were blocked by smoke and flames. There was no automatic suppression equipment.

Fire Origin and Path

This fire was set on the first story using available combustibles. No additional information was reported.

Contributing Factors and Victim Locations

Three firefighters were also injured. No information was reported on the victim's locations. An arrest has been made in this case.

Minnesota

Date, Time of Alarm, Number of Deaths

April, 5:59 a.m., 6 (3 under age 6)

Number of Stories, Occupancy Type, Construction Type

The two-story, six-unit apartment building with a pub on the first floor covered 7,200 square feet (670 square meters). It was of unprotected, ordinary construction. The second-story apartments were occupied, and the pub was closed.

Smoke Alarm and Other Protection Devices

Smoke alarms, though present, did not operate for unreported reasons, and some had been removed. There was no automatic suppression equipment.

Fire Origin and Path

The only information reported was that the fire began on the second story.

Contributing Factors and Victim Locations

The victims were all located on the second story. An additional five people, as well as four firefighters, were injured.

New York

Date, Time of Alarm, Number of Deaths

June, 6:51 a.m., 6 (2 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a two-story, single-family home of unprotected wood-frame construction.

The ground floor area was not reported.

Smoke Alarm and Other Protection Devices

No information was reported on smoke alarms. There was no automatic suppression equipment.

Fire Origin and Path

The only information reported was that the fire started on the first floor.

Contributing Factors and Victim Locations

Five of the victims were located on the second story, and one child was in a bedroom on the first story. In addition, three other people were injured.

Oklahoma

Date, Time of Alarm, Number of Deaths

August, 5:13 a.m., 6 (2 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a one-story, single-family home of unprotected ordinary construction.

Smoke Alarm 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.

Maryland

Date, Time of Alarm, Number of Deaths

December, 4:35 a.m., 6 (2 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a two-story, single-family row house of unprotected wood-frame construction that covered approximately 1,000 square feet (93 square meters).

Smoke Alarm and Other Protection Devices

No information was reported on smoke detection equipment. There was no automatic suppression equipment.

Fire Origin and Path

This fire broke out in a first-story living room and was electrical in nature. No additional details were reported.

Contributing Factors and Victim Locations

No information was reported.

Missouri

Date, Time of Alarm, Number of Deaths

January, 4:59 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a one-story, single-family home of unprotected wood-frame construction. The ground floor area was not reported. There were seven occupants in the home at the time.

Smoke Alarm and Other Protection Devices

There were no smoke alarms or suppression equipment present.

Fire Origin and Path

The fire broke out in the finished basement near a couch. The cause was undetermined.

Contributing Factors and Victim Locations

The five victims were found in a bathroom in the basement. Two other people were injured but escaped from the first floor. Firefighters responding to the scene were slowed due to icy roads and snow drifts.

California

Date, Time of Alarm, Number of Deaths

January, 5:15 a.m., 5

Number of Stories, Occupancy Type, Construction Type

This single-family, single-wide manufactured home of unprotected wood-frame construction covered 648 square feet (60 square meters) and had an addition that contained a bedroom.

Smoke Alarm and Other Protection Devices

Neither smoke alarms nor suppression equipment were present.

Fire Origin and Path

The fire started in the bedroom in home's addition. The cause was undetermined.

Contributing Factors and Victim Locations

These were not reported.

Tennessee

Date, Time of Alarm, Number of Deaths

January, 6:46 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This two-story duplex of unprotected wood-frame construction covered 1,690 square feet (157 square meters). The unit of origin was occupied by seven people at the time of the fire.

Smoke Alarm and Other Protection Devices

Neither smoke alarms nor suppression equipment were present.

Fire Origin and Path

The fire broke out in a first-floor bedroom, but the cause was undetermined.

Contributing Factors and Victim Locations

No information was reported on victim location or fire spread. An eight-year-old who escaped on her own was taken to a hospital, as was another child who was in critical condition.

New York

Date, Time of Alarm, Number of Deaths

January, 2:31 a.m., 5

Number of Stories, Occupancy Type, Construction Type

This three-story apartment building of unprotected ordinary construction had businesses on the ground level and covered 4,000 square feet (372 square meters). The number of apartments in the building was not reported.

Smoke Alarm and Other Protection Devices

There were no smoke alarms or suppression equipment.

Fire Origin and Path

The fire broke in a second-story apartment. No additional information was reported.

Contributing Factors and Victim Locations

Three additional people and 14 firefighters were injured.

Arkansas

Date, Time of Alarm, Number of Deaths

February, 3:57 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a one-story, single-family home of unprotected wood-frame construction that covered 1,200 square feet (111.5 square meters)

Smoke Alarm and Other Protection Devices

Neither detection nor automatic suppression equipment were present.

Fire Origin and Path

The fire was caused by a short circuit in a lamp's electrical cord, which had been damaged by a sofa resting on it. The short circuit ignited the sofa, and the fire spread throughout the house.

Contributing Factors and Victim Locations

A man and a four-year-old girl were found in a bedroom. A woman was found in a bathroom off a bedroom. Two more children were found in a hallway at the entrance to a bathroom.

Rhode Island

Date, Time of Alarm, Number of Deaths

February, 12:10 pm, 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This two-story, single-family home of unprotected woodframe construction covered 1,224 square feet (114 square meters).

Smoke Alarm and Other Protection Devices

There were smoke alarms, but it is not known if they operated. There was no automatic suppression equipment.

Fire Origin and Path

Defective wiring in a first-story ceiling ignited wooden structure supports. Fire damage was confined to the ceiling/floor assembly and a second-floor bedroom.

Contributing Factors and Victim Locations

Two victims were found in each of two bedrooms on the second floor. The fifth victim was also found on the second floor, but the location was not reported. All four adults had drugs in their systems.

Alabama

Date, Time of Alarm, Number of Deaths

March, 12:15 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

The ground floor area of the single-family manufactured home of unprotected wood-frame construction was not reported.

Smoke Alarm 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.

Kentucky**Date, Time of Alarm, Number of Deaths**

April, 2 a.m., 5 (3 under age 6)

Number of Stories, Occupancy Type, Construction Type

The ground-floor area of the single-family manufactured home of unprotected wood-frame construction was not reported.

Smoke Alarm and Other Protection Devices

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

Seven people were also injured.

Idaho**Date, Time of Alarm, Number of Deaths**

June, 4:02 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This single-family manufactured home of unprotected wood-frame construction covered 600 square feet (55.7 square meters). It was occupied by a family of two adults and three children.

Smoke Alarm and Other Protection Devices

Neither smoke alarms nor automatic suppression equipment were present.

Fire Origin and Path

The fire began on the porch when a can of discarded cigarette butts ignited the wooden decking. The fire spread into the house and to two vehicles parked outside.

Contributing Factors and Victim Locations

All five victims were found in a rear bedroom.

Washington**Date, Time of Alarm, Number of Deaths**

June, 10:04 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This two-story townhouse of unprotected woodframe construction covered 476 square feet (44 square meters). It was one unit of a three-unit building that covered 1,800 square feet (167 square meters).

Smoke Alarm and Other Protection Devices

Two smoke alarms were present. An alarm on the second floor activated. There was no suppression equipment.

Fire Origin and Path

The fire broke out in a first-floor living room closet when the closet's hot light bulb ignited one end of a foam rubber mattress that had been pushed inside. Residents pulled the mattress from the closet and left it in the living room as they opened doors and windows to help silence the alarm, but the cross ventilation caused the smoldering mattress to flare up and ignite nearby furniture. The fire then spread up the stairwell to the second story.

Contributing Factors and Victim Locations

The fire blocked the victims' means of egress. All five were found in a second-floor bathroom; three were in the bathtub. Another person was injured.

Tennessee

Date, Time of Alarm, Number of Deaths

September, 2:38 a.m., 5 (2 under age 6)

Number of Stories, Occupancy Type, Construction Type

This single-family, double-wide manufactured home covered 1,404 square feet (130 square meters).

Smoke Alarm and Other Protection Devices

Neither smoke alarms nor automatic suppression equipment were present.

Fire Origin and Path

The cause and origin of this fire is undetermined.

Contributing Factors and Victim Locations

When the fire department arrived, the house was 50 percent involved in fire. Firefighters made three attempts to rescue the trapped occupants, but they were forced into a defensive attack as conditions worsened. One other person was injured.

Ohio

Date, Time of Alarm, Number of Deaths

October, 2:12 a.m., 5 (1 under age 6)

Number of Stories, Occupancy Type, Construction Type

This two-story, eight-bedroom, single-family home of unprotected wood-frame construction covered 5,720 square feet (531 square meters).

Smoke Alarm and Other Protection Devices

Information on detection equipment was undetermined due to the destruction of the house.

Investigators found no automatic suppression equipment.

Fire Origin and Path

The fire began in the living room when an electric space heater ignited an unknown wooden item. How the item was ignited was not reported. The fire spread throughout the first story and up the stairway to the second floor, destroying the home.

Contributing Factors and Victim Locations

All the victims were located in four of the bedrooms on the second story, but they were found on the first floor after the house burned to the ground. A second-story balcony had no ladder or stairs allowing for egress, and the fire blocked the main means of egress. Seven civilians and a firefighter were injured.

Pennsylvania

Date, Time of Alarm, Number of Deaths

October, 7:30 p.m., 5 (4 under age 6)

Number of Stories, Occupancy Type, Construction Type

This was a three-story, single-family row house of unprotected wood-frame construction. The ground floor area was not reported.

Smoke Alarm 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.

Florida

Date, Time of Alarm, Number of Deaths

November, 10:35 p.m., 5

Number of Stories, Occupancy Type, Construction Type

This one-story, single-family home covered 1,434 square feet (133 square meters) and was of unprotected wood-frame construction.

Smoke Alarm and Other Protection Devices

Neither smoke alarms nor suppression equipment were present.

Fire Origin and Path

No information was reported on the cause and origin of the fire.

Contributing Factors and Victim Locations

Two of the victims were found in bedrooms. No information was reported as to the locations of the other three. An additional person received life-threatening smoke inhalation and burn injuries.

TABLE 2. NON-HOME STRUCTURE FIRES

West Virginia

Date, Time of Alarm, Number of Deaths

April, 3 p.m., 29

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

This explosion and fire occurred in a coal mine consisting of approximately 2.5 miles (4 kilometers) of tunnels approximately 1,000 feet (395 meters) under the surface. It was at full operation at the time.

Detection Systems and Suppression Systems

No information reported.

Fire Origin and Path

A low volume of methane and/or methane from natural gas was the fuel for the initial ignition of the explosion. Friction or sparks from a worn bit on a mining machine contributed to the ignition. This explosion initiated a secondary coal dust explosion.

Contributing Factors and Victim Locations

Water sprayers that cooled the wall and the mining machine as it sheared away coal were missing, allowing a spark or heat from friction to ignite the gasses present. The mine's ventilation and air moving systems were not working correctly, so methane gas and coal dust accumulated over the weekend. More information can be found at the Mine Safety and Health Administration website at msha.gov. The report from the Governor's Independent Investigation Panel is available at nttc.edu/ubb/. Investigations are ongoing.

Louisiana

Date, Time of Alarm, Number of Deaths

December, 1:30 a.m., 8

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

This one-and-a-half-story vacant warehouse of unprotected noncombustible construction was being used by homeless men and women for shelter. The floor area was not reported.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

No information was reported.

Washington

Date, Time of Alarm, Number of Deaths

April, 12:40 a.m., 7

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

This hydrocarbon refinery was of unprotected noncombustible construction. The height and floor area were not reported. It was operating at the time of the fire.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

A heat exchanger ruptured, releasing hydrocarbon and naphtha vapors that were almost immediately ignited. The heat exchanger, which was almost 40 years old, was being brought back in service after being down for maintenance and cleaning. The leak or leaks were found in cracks in welds. During operations, heat exchangers go through many changes in temperature and pressure, causing such cracks. For further information on the investigations, visit the Washington Department of Labor and Industry at lni.wa.gov/ and the Chemical Safety Board at csb.gov/.

Contributing Factors and Victim Locations

No information was reported.

Connecticut

Date, Time of Alarm, Number of Deaths

February, 11:15 a.m., 6

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

This was an explosion at a power generating plant construction site. No information on the construction, ground floor area, or height of the plant was reported.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

The explosion occurred when a large quantity of natural gas was being used in a blowout conducted to clean out pipes. It is not known what the ignition point was.

Contributing Factors and Victim Locations

Fifteen natural gas blows were completed within four hours of the explosion from an open-ended 20-foot (6-meter) pipe located between two large structures known as heat recovery steam generators. It is probable that the proximity of the buildings and the location of the vent pipe affected the dispersion of the natural gas. Up to 50 other workers were injured. Additional information can be found at the Chemical Safety Board at csb.gov/. At least five of the fatalities were located in the power generation building and were involved in the gas blow. The location of the other victim was not reported.

Alabama

Date, Time of Alarm, Number of Deaths

January, 8 p.m., 4

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

This was a two-story motel of unprotected wood-frame construction. No further information was reported.

Detection Systems and Suppression Systems

No information was released due to ongoing civil suits.

Fire Origin and Path

No information was released due to ongoing civil suits.

Contributing Factors and Victim Locations

No information was released due to ongoing civil suits.

California

Date, Time of Alarm, Number of Deaths

September, 12:51 p.m., 3

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

This was a one-story, 144-square-foot (13-square-meter) tool shed of unprotected wood-frame construction.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

No information was reported on the victims' locations or what they were doing at the time. One firefighter was injured during the fire.

Michigan

Date, Time of Alarm, Number of Deaths

October, 1:57 a.m., 3

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

This one-story adult care home covered 2,100 square feet (195 square meters) and was of unprotected wood-frame construction. The facility was occupied at the time of the fire.

Detection Systems and Suppression Systems

There were smoke alarms in each room. The system operated and alerted the occupants. There was no automatic suppression equipment.

Fire Origin and Path

The cause of the fire, which broke out in the first-story living room, is undetermined and still under investigation.

Contributing Factors and Victim Locations

The age of the victims was reported as a factor in preventing their escape. An additional four people were injured.

West Virginia

Date, Time of Alarm, Number of Deaths

December, 1:23 p.m., 3

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

This was a one-story chemical manufacturing plant of unprotected noncombustible construction.

Detection Systems and Suppression Systems

No information was reported.

Fire Origin and Path

No information was reported.

Contributing Factors and Victim Locations

No information was reported.

TABLE 3. NON-STRUCTURAL FIRES

California

Date, Time of Alarm, Number of Deaths

September, 6:12 p.m., 8

Setting

This was a 30-inch (76-centimeter) natural gas transmission pipeline that ran under the roadway in a residential neighborhood.

Climate

Winds were at 20 miles (32 kilometers) per hour, the temperature was 65° F (18°C), and humidity was at 58 percent.

Fire Origin and Path

A rupture of the gas transmission pipeline released over 47 million cubic feet (1,330,892 cubic meters) of natural gas. The release was ignited by an undetermined source and created a crater approximately 76 feet (23 meters) by 26 feet (8 meters), with a fireball reported to be 200 feet (61 meters) high.

Factors Hindering Occupant Escape

The explosion and ensuing fire destroyed 38 homes and damaged 63 others. It also damaged or destroyed 74 vehicles. Fifty people were injured. An investigation is ongoing by the National Transportation Safety Board (ntsb.gov/).

California

Date, Time of Alarm, Number of Deaths

February, 12:35 p.m., 3 deaths (2 under age 6)

Setting

This crash, which occurred on an interstate highway, involved a passenger car that was struck from behind and became partially wedged under another tractor trailer.

Climate

It was not reported.

Fire Origin and Path

The fire broke out when fuel spilled from a breach in the car's fuel system and fuel from a damaged saddle tank on the truck that struck the car was ignited by the truck's engine.

Factors Hindering Occupant Escape

A passenger vehicle with four occupants became wedged under a tractor trailer truck after it was struck from behind by another tractor trailer truck. The four occupants were trapped in the car when it caught fire. One of the four died of blunt force trauma injuries, and the other three died of burns or smoke inhalation. Passersby tried to rescue the victims, but they were driven back by the heat and flames.