

# **CATASTROPHIC MULTIPLE-DEATH FIRES FOR 2008**

**Stephen G. Badger**

**September 2009**



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

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## **Acknowledgments**

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## CATASTROPHIC MULTIPLE-DEATH FIRES IN 2008

Shortly after seven in the evening, a massive dust-initiated explosion ripped through a Georgia sugar refinery. The plant and complex covered 160 acres, and the building of origin was 9 stories high, covered 75,000 square feet (7,000 square meters), and was of brick, cement and metal construction. A second explosion soon followed, igniting fires in several stories of the plant, in an area of the product distribution warehouse and in two silos. The explosions destroyed the plant and three sugar elevators. At the time of the explosions, 121 people were working in the plant; 36 of them were injured and transported to hospitals. Nineteen of the 36 were sent to a burn center in the area. Searchers located and removed the remains of eight workers over the next week. Six more victims died over the next month of burns and traumatic injuries, bringing the toll to 14.

The cause of the initial explosion is still under investigation. The secondary dust explosion entered the dust handling system of the packing section of the plant. This explosion set fires throughout the plant, and destroyed the electrical system, the fire alarm system and the wet and dry sprinkler systems, which operated after the first explosion.

Firefighters responding to calls about an explosion arrived to find fires burning in several structures, as well as massive destruction of the plant and nearby structures, many walking wounded and many trapped in debris. The fire department requested emergency medical units, air units, a triage doctor and nursing staff shortly after arrival. Search and rescue crews entered the first and second stories of the packing section and removed several injured employees. Due to the extent of damage, poor visibility and the possibility of further structural collapse, suppression crews were kept outside the structures.

During the following days, firefighters worked on extinguishing the fires and search teams entered the structures in an effort to locate and remove the missing workers.

This explosion and fire was just one of the 1,451,500 total fires and explosions that firefighters in the United States responded to in 2008. Of these, 515,000 were in structures, 403,000 were in residential structures, and 112,000 were non-residential structures. Another 936,500 were non-structural fires, with 236,000 in vehicles and 700,500 outside fires. These fires caused 3,320 deaths. Of these deaths, 2,900 were in structures (2,780 in residential structures, and 120 in non-residential structures). Another 420 were in non-structural fires, with 365 in vehicle fires and 55 in outside fires.<sup>1</sup>

Nineteen of these incidents are classified as catastrophic multiple-death fires, defined as a fire in which there are five or more fire-related deaths in residential properties, and three or more in non-residential and non-structural properties. Of these, 13 occurred in residential properties, three in non-residential properties, and three in non-structural properties. These 19 fires killed 114 people including 12 firefighters and 26 children under age six. This is .001 percent of the total fires and 3.4 percent of the total deaths in the United States in 2008.

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<sup>1</sup> Michael Karter, "Fire Loss in the United States During 2008", NFA Journal, September/October 2009

Nineteen is the lowest number of such fires, and the 114 deaths are the fewest in such fires, since 1987, when the criterion to be considered a multiple-death incident was increased to five deaths in residential properties. In the past 10 years, the average number of catastrophic multiple-death fires annually was 34. Last year, the total was down 15, or 44 percent below the average. The average annual loss of life in catastrophic multiple-death fires in the past 10 years was 193 deaths, meaning last year was down 79 deaths, or 41 percent below the average.

### **Catastrophic Residential Structure Fires**

Of these 19 catastrophic multiple-death fires, 13 (or 68 percent) occurred in residential properties. Eleven of these were in single-family-homes, including four manufactured homes; and two were in apartment buildings, one of which was a three-unit building and one was an 18-unit building. This is four fewer than the 17 residential structure fires in 2007. There were 79 deaths (69 percent) in these fires. This is 30 fewer deaths than in 2007. Of these victims, 26 were under the age of six (23 percent of the catastrophic multiple-death fire victims). This is nine fewer than in 2007. See Table 1 for additional information.

All but one of the residential fires broke out between 11 p.m. and 7 a.m. These 12 fires killed 72 people, 25 of whom were under the age of six.

The largest loss-of-life fire in a residential property killed 10 people, including four children under the age of six. At 2:42 a.m., firefighters were called to a fire in a two-story single-family home of unprotected wood-frame construction. A fire had broken out in a first-story living room and spread by way of an open stairway to the second story. At the time, 12 people occupied the house. Firefighters arrived to find the house heavily engulfed in fire. Fire crews found two people had escaped the blaze; one went out a second-story window and one through a kitchen door. Both the window and door were left open and provided the fire with needed oxygen in a natural draft. Six of the victims were located on the second story, with four in one bedroom, one in a hallway, and one in a second bedroom. The other four victims were located on the first story -- two in a back bedroom, one in the living room, and one in the kitchen near the back door. All were dead at the scene. Two smoke alarms were found, one at the top of the stairs leading to the second-story and one at the top of the basement stairway. Both were found to be missing batteries. The cause of the fire was not determined.

There were three fires with seven deaths each. The first fire killed three children under age six. At 1:42 a.m., firefighters responded to a fire in a two-story single-family home of unprotected wood-frame construction. This incendiary fire had been set at the rear of the home. Poor housekeeping and clutter enhanced the fire spread and hindered the firefighters in their search for victims and extinguishment of the fire. Three of the victims were found outside, having been removed by passersby prior to the arrival of the firefighters. Two victims were located on the second story, one each in a bedroom and hallway. Two more were located on the first story at the base of the stairs. Four died at the scene and three died over the next four months. A smoke alarm was located on the first story at the base of the stairway. It was not known if the detector operated.

The second fire broke out at 5:40 a.m. and killed three children under age six. Ten people occupied this two-story single-family home of unprotected ordinary construction. A fire of

still undetermined cause broke out in a second-story bedroom, and burned up to and through the attic. During the fire, a roof and floor collapse at the rear of the house hampered firefighters in their attempts to access the structure from that point. The location of the victims was not reported. No smoke alarms were found.

The third seven-fatality fire broke out at 10:55 p.m. and killed one child under age six. This fire started in the basement of a three-story single-family home of unprotected ordinary construction that was being used, illegally, as a boarding house. Spilled gasoline ignited when an occupant filled a kerosene heater while it was turned on. The gasoline had been bought mistakenly. The user knew it was the wrong fuel but used it anyway. The incident report mentioned that several illegal modifications to the dwelling allowed for rapid fire spread, but the specific modifications were not described. The fire blocked the escape of the seven victims, who were all located in the basement. At least one occupant of the apartment escaped by running through the fire. It was not reported if there were any additional residents in the rest of the building. There were no smoke alarms present.

Three fires killed six occupants each. The first fire broke out at 5:29 a.m. and killed three children under age six. This was a two-story single-family house of unprotected wood-frame construction. An incendiary fire was set on the front porch as the family slept. The fire extended into the living room on the first story through a window and then up an open stairway to the second story, blocking the escape of the residents. Firefighters reported the home fully involved upon their arrival. Multiple attack lines were used to make way to the stairway and second story, where the victims were reported to be located. All the victims were found dead on the second story. Firefighters were hindered in accessing the home as a front door was partially blocked by a couch and a side-door was partially blocked by a hutch, but these factors did not affect the escape of the occupants. No smoke alarms were located.

The second fire broke out at 6:33 a.m. in a six-story, 18-unit apartment building of unprotected ordinary construction, killing two children under the age of six. A juvenile playing with an open flame ignited paper goods on a kitchen table. All the victims were located in this apartment. It was not reported how many residents were in the other apartments at the time of the fire. Smoke alarms were found, but they were disconnected from the electrical system and the backup batteries were missing.

No information was reported on the third six-fatality fire, other than that it broke out at 4:16 a.m. in a single-family manufactured home of unprotected wood-frame construction.

There were six fires that killed five people each. The first fire broke out at 12:02 a.m. and killed two children under age six. This was a single-family manufactured home of unprotected wood-frame construction occupied by five residents at the time. The fire involved lamp oil in a middle bedroom near the entrance door, but the ignition sequence was listed as undetermined. The fire was in the smoldering stage and had almost self-extinguished due to lack of oxygen when firefighters arrived. There was fire damage in the middle bedroom and heavy black soot was evident throughout the rest of the home. The victims were located in a front bedroom with the door in the closed position. Three of the victims were dead at the scene and two died later. There was a smoke alarm in the living room but its battery was missing.

The second fire broke out at 1:49 a.m. in a single-family manufactured home of unprotected wood-frame construction and killed four children under age six. At the time of the fire there were 11 occupants in the home. The cause and origin were listed as under investigation. Six people, three adults and three children, escaped the fire. The five victims were located in one bedroom. There were no smoke alarms.

The third fire broke out at 1:22 a.m. in a two-story single-family home of unprotected wood-frame construction and killed one child under age six. The family was asleep when overheated wires ignited structural members in a wall between a second-story bedroom and stairway. The fire spread to an attic crawl space. Fire gases entered duct work to the registers in the second-story bedrooms where the victims were located. Investigators found two smoke alarms on the second story. Both were missing batteries. An alarm on the first story activated and woke the parents who were in a bedroom on that level and they were able to escape.

The fourth fire broke out at 4:34 a.m. when an electrical short circuit occurred in the laundry room of a 660-square-foot (61-square-meter) single-family manufactured home of unprotected wood-frame construction. No smoke alarms were found and no information was reported on the victims' locations. One of the victims was under age six.

The fifth fire broke out at 12:56 a.m. in a three-story, three-unit apartment building. The first-story apartment was occupied but no information was reported on the other units. This fire of undetermined cause broke out in the first-story apartment. There was a delay in reporting the fire but no reason was given. On their arrival, firefighters found heavy fire issuing from the building. A frozen hydrant resulted in an inadequate water supply to the fire at first. No information was reported on the victims or their locations. There were no smoke alarms located in the apartment of origin.

The last five-fatality fire broke out at 4:34 a.m. in a single-family home of unprotected wood-frame construction. Two of the victims were under age six. No additional information was reported.

### **Catastrophic Non-Residential Structure Fires**

Of the 19 catastrophic multiple-death fires, three occurred in non-residential properties -- a sugar refinery, a pulp storage tank, and a restaurant with a living area attached. Two of the incidents were explosions, one with an after fire and one without an after fire. This is down five from the eight in 2007. There were 20 deaths or 17.5 percent of the total deaths in catastrophic multiple-death fires. This was down 14 deaths from the 34 deaths in 2007. None of the 20 victims was under age six. See Table 2 for additional information.

The largest loss of life fire or explosion (14 deaths) was at the sugar refinery in Georgia in February discussed above. The other two fires both claimed three lives.

An explosion with no after fire occurred in a pulp storage tank at a cardboard manufacturing plant at 1:30 p.m. The diameter of the tank was not reported but it was 80 feet (24 meters) in height. The plant was in operation and welding was being done near a vent on the top of the tank that exploded. Flammable gases ignited outside the tank and the flame entered through vent into the tank, causing the explosion. Three workers were on a catwalk above the tank.

The explosion tore open the tank lid, throwing two of them to the ground while the third was killed on the catwalk. OSHA is still investigating this incident.

The other three-fatality incident occurred at 2:00 a.m. when a fire in a restaurant extended into the attached living quarters. No other information has been reported.

### **Catastrophic Non-Structural Fires**

There were three non-structural multiple-death fires, nine fewer than the 12 in 2007. There were 15 deaths (13.2 percent of the total deaths in catastrophic multiple-death fires). This is 32 fewer than the 47 deaths in 2007. Two of these were wildfires that resulted in aircraft crashes. For the purpose of this study, they fall in the wildland category because all 12 victims were firefighters responding to or returning to camps when the crashes occurred. The third incident was an aircraft crash followed by fire. See Table 3 for additional information.

The largest loss of life incident in this category was a nine-fatality helicopter crash. At 7:30 p.m., a helicopter shuttling fire crews from a wildfire scene crashed on takeoff. Eight firefighters and the pilot were killed. The co-pilot and three other firefighters were injured. The helicopter had made two trips and had refueled before picking up the third crew. On take-off, the main rotor lost power on its initial climb and the vehicle crashed. The helicopter was consumed by a post-crash fire. The reason for the loss of power was not available. A National Transportation Safety Board investigation is ongoing.<sup>2</sup> For further information refer to [http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080820X01266&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080820X01266&key=1).

The second incident involved the deaths of three firefighters when at 6:10 p.m., their air tanker crashed just after take-off on its way to drop a load of fire retardant on a wildland fire. An engine fire was observed just before the plane crashed. An NTSB investigation is ongoing.<sup>2</sup> For further information refer to [http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080905X01397&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080905X01397&key=1).

The third incident killed three civilians and occurred on takeoff at 3:24 p.m., when the aircraft collided with the top of a 49-foot (15-meter) tall instrument landing system antenna then crashed to the ground. The plane landed right side up but caught fire immediately. The medical examiner was contacted and determined the cause of deaths to be thermal injuries. For further information refer to [http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080806X01167&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080806X01167&key=1).

### **Role of Smoke Alarms and Sprinklers**

Information on detection equipment was reported for 11 of the 13 residential fires. Five of the properties had at least one smoke alarm. The alarm in one fire operated, but it was not in the area of ignition or where the victims were located. It was not reported if this had any

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<sup>2</sup> Rita F. Fahy, Paul R. LeBlanc, Joseph Molis, "Firefighter Fatalities in the United States – 2008. Full report available at: <http://www.nfpa.org/assets/files/PDF/osfff.pdf>.



effect on the fatalities. Alarms in three fires did not operate; in two incidents the batteries were missing, and in one case the alarms were disconnected and the backup batteries were missing. Six properties had no coverage at all. In these fires, 35 people died.

Information on property protection was only available for two of the three non-residential structures. One of the two had no detection or sprinkler protection. The other had a partial coverage heat and smoke alarm system and a complete coverage combination wet and dry sprinkler system. Both systems activated after the initial explosion but were destroyed in the second explosion.

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, in the case of conventional batteries, 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 from any location in the home 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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*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. RESIDENTIAL STRUCTURE FIRES**

**Pennsylvania**

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

April, 2:42 a.m., 10, (4 under age 6)

**Number of Stories, Occupancy Type, Construction Type**

This was a two-story, 1,800-square-foot (167-square-meter) single-family home of unprotected wood-frame construction. The house was occupied by 12 residents.

**Smoke Alarm and Other Protection Devices**

There were two smoke alarms located in the house. One alarm was at the top of the basement stairs and the other was on the second story at the top of the stairway. The batteries had been removed. There was no suppression equipment.

**Fire Origin and Path**

This fire broke out in a first-story living room. The cause has not been determined. The fire spread throughout the living room and up an open stairway to the second story.

**Contributing Factors and Victim Locations**

The house was heavily involved in fire upon arrival of firefighters. Two people managed to escape the fire, one exited the house through the rear kitchen door and one went out a second-story window. Both the door and window were left open, creating a natural draft that provided the fire with needed oxygen. Four of the victims were found on the first story, one in the kitchen at the back door, one in the living room and two in a back bedroom. The other six victims were located on the second story, one in the hall way, one in one bedroom, and four in a second bedroom. All the victims were dead at the scene.

**Ohio**

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

March, 1:42 a.m., 7 (3 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**

A smoke alarm was located on the first story at the base of the stairs. It was not known if it activated.

**Fire Origin and Path**

This was an incendiary fire set at the rear of the structure. No additional information was reported as it is still under investigation.

**Contributing Factors and Victim Locations**

Poor housekeeping and clutter enhanced the severity and rapid spread of the fire. This also hindered firefighters in their search for victims and extinguishment of the fire. Passersby had removed three of the victims to the outside of the structure. Two other victims were found on the first story at the base of the stairs, and two were located on the second story, one in a bedroom and one in the hallway. Four of the victims were dead at the scene, and three died over the next four months.

## **Tennessee**

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

August, 5:40 a.m., 7 (3 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a two-story, 1,800-square-foot (167-square-meter) single-family home of unprotected ordinary construction. The home was occupied by 10 people at the time.

### **Smoke Alarm and Other Protection Devices**

There was no smoke detection or automatic suppression equipment present.

### **Fire Origin and Path**

The cause of this fire is undetermined but it broke out in the area of a second-story bedroom and burned into the ceiling/attic area. It then burned throughout the second story and attic.

### **Contributing Factors and Victim Locations**

A floor and roof collapse at the rear of the home blocked the back door, hampering firefighters in their attempts to access the structure from the rear. During their interior attack, firefighters discovered the seven victims. Their locations were not reported.

## **Pennsylvania**

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

December, 10:55 p.m., 7 (1 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a three-story, 1,200-square-foot (111-square-meter) single-family home of unprotected ordinary construction, being used illegally as a boarding home.

### **Smoke Alarm and Other Protection Devices**

No automatic detection or suppression equipment was present.

### **Fire Origin and Path**

Spilled gasoline ignited when an occupant filled a kerosene heater while it was turned on. The gasoline had been bought mistakenly. The user knew it was the wrong fuel but used it anyway.

### **Contributing Factors and Victim Locations**

Several illegal modifications to the structure allowed for a rapid fire spread. (The report did not detail the modifications.) The victims were all located in the basement. It was not reported if there were additional occupants throughout the rest of the dwelling. The fire blocked the escape of the occupants. One did manage to escape by running through the fire.

## **Ohio**

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

January, 5:29 a.m., 6 (3 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a two-story 952-square-foot (88-square-meter) single-family home of unprotected wood-frame construction. The occupants were asleep at the time of the fire.

### **Smoke Alarm and Other Protection Devices**

There was no detection or suppression equipment present.

### **Fire Origin and Path**

This incendiary fire was set on the front porch of the house. The fire extended to the interior through a living room window and up the open stairway to the second story, blocking the escape of the residents.

**Contributing Factors and Victim Locations**

All six victims were located on the second story, two in one bedroom and four in a second bedroom. Firefighters reported the house fully involved in fire on their arrival. Multiple attack lines were established to make way to the second story where the victims were reported to be. The front door was blocked by a couch, leaving a side door, which was partially blocked by a hutch, the only other exit. These factors had no effect on the deaths, other than hindering access by firefighters. Six firefighters were injured. One civilian was injured while escaping the house.

**Louisiana**

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

June, 4:16 a.m., 6 (None were under age 6)

**Number of Stories, Occupancy Type, Construction Type**

This was a single-family mobile home 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**

No information reported

**Texas**

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

January, 12:02 a.m., 5 (2 under age 6)

**Number of Stories, Occupancy Type, Construction Type**

This was a 720-square-foot (67-square-meter) single-family manufactured home of unprotected wood-frame construction. The home was occupied with five residents at the time of the fire.

**Smoke Alarm and Other Protection Devices**

There was a smoke alarm in the living room but it had no battery.

**Fire Origin and Path**

A fire involving lamp oil broke out in the middle bedroom near the entrance door. The investigators were unable to locate an ignition source.

**Contributing Factors and Victim Locations**

Due to the air tightness of the home, the fire was in a smoldering stage when firefighters arrived. Fire damage was only found in the middle bedroom but heavy black smoke soot was evident throughout the interior. The victims were located in a front bedroom with the door closed. Three of the victims were dead at the scene and two died later.

## **Texas**

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

January, 1:49 a.m., 5 (4 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a 1,280-square-foot (119-square-meter) single-family manufactured home of unprotected wood-frame construction. At the time of the fire there were 11 occupants in the home.

### **Smoke Alarm and Other Protection Devices**

No detection or suppression equipment was present.

### **Fire Origin and Path**

The cause and origin of the fire was listed as undetermined and still under investigation.

### **Contributing Factors and Victim Locations**

The victims were located in a bedroom. Another six of the occupants (three adults and three children) managed to escape the fire.

## **Michigan**

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

February, 4:34 a.m., 5 (2 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a two-story, single-family home 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**

No information reported

## **Arkansas**

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

March, 1:22 a.m., 5 (1 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a two-story, 769-square-foot (71-square-meter), single-family home of unprotected wood-frame construction. The family was home and asleep at the time of the fire.

### **Smoke Alarm and Other Protection Devices**

Five battery-operated smoke alarms had been installed in the house eight months earlier – three on the second story and two on the first story. Investigators found two on the second story, both missing batteries. The third was not located. Alarms on the first story activated and woke the parents who were asleep in a bedroom on that level.

### **Fire Origin and Path**

Overheated electrical wires ignited wood structural members in a wall between a bedroom and stairway on the second story. The fire spread to an attic crawl space. Fire gases spread via ducts and registers to the bedrooms where the victims were located.

### **Contributing Factors and Victim Locations**

All five victims were located in one second-story bedroom, on two different beds.

## **Ohio**

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

April, 4:34 a.m., 5 (1 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a 660-square-foot (61-square-meter), single-family manufactured home of unprotected wood-frame construction.

### **Smoke Alarm and Other Protection Devices**

There was no automatic detection or suppression equipment present.

### **Fire Origin and Path**

This fire was caused by an electrical short circuit in wiring in a laundry room. No other information was reported.

### **Contributing Factors and Victim Locations**

No information was reported.

## **New York**

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

October, 6:33 a.m., 5 (2 under age 6)

### **Number of Stories, Occupancy Type, Construction Type**

This was a six-story, 3,700-square-foot (344-square-meter), 18-unit apartment building of unprotected ordinary construction. The apartment of origin was occupied. No information was reported on the other units.

### **Smoke Alarm and Other Protection Devices**

There were smoke alarms present but they were disconnected from the electrical system and the backup batteries were missing.

### **Fire Origin and Path**

The fire broke out on a table in the kitchen where one of the children in the family was playing with a match or lighter and ignited paper products.

### **Contributing Factors and Victim Locations**

All the victims were located in their sixth-story apartment.

## **Ohio**

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

December, 12:56 a.m., 5

### **Number of Stories, Occupancy Type, Construction Type**

This was a three-story, three-unit apartment building of unprotected wood-frame construction. Its ground floor area was not reported. One apartment was reported to be occupied and no information was reported on the other units.

### **Smoke Alarm and Other Protection Devices**

There was no automatic detection or suppression equipment present in the unit of origin. No details were available on the other apartments.

### **Fire Origin and Path**

A fire of unknown cause broke out on the first story.

### **Contributing Factors and Victim Locations**

There was a delay in reporting the fire but no reason was given. When they arrived, firefighters found heavy fire issuing from the building. A hydrant used for a supply line was found to be frozen, causing an inadequate water supply at the fire. The locations of the victims were not reported.

## TABLE 2. NON-RESIDENTIAL STRUCTURE FIRES

### Georgia

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

February, 7:18p.m., 14

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

This was a 97-foot-high (30-meter-high), 75,000-square-foot (7,000-square-meter) sugar refinery of brick, cement and metal construction. The plant and complex, which covered 160 acres (65 hectares) was in full operation with 121 workers at the time of the explosion and fire.

#### **Detection Systems and Suppression Systems**

There was a system of heat and smoke alarms in the packing house – the main building involved in the incident. The system activated after the initial explosion. A secondary explosion destroyed the electrical power system and the operating fire alarm system. There was a complete coverage combination wet and dry sprinkler system. This system alerted on-site personnel by way of a central station staffed 24 hours a day. The secondary explosion destroyed the operating sprinkler systems.

#### **Fire Origin and Path**

A massive dust-initiated explosion occurred in the packing house. Its cause is still under investigation by state and federal authorities. A secondary dust explosion followed and ignited fires on several stories in the plant that spread throughout the entire packing house. Also ignited were two sugar silos and an area of the distribution warehouse.

#### **Contributing Factors and Victim Locations**

Upon arrival, firefighters were faced with the massive destruction caused by the explosions, a large amount of fire in several buildings, and a large number of victims located in many different areas. Several victims were not removed from the debris for several days due to unsafe conditions. Eight of the victims were dead at the scene and the other six died over the next few months. Another 36 workers were injured, with 19 of them sent to an area burn center.

### Wisconsin

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

July, 1:30 p.m., 3

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

This explosion with no fire after occurred at a pulp storage tank at a cardboard manufacturing plant. The tank was 80 feet (24 meters) in height; its diameter was not reported. The plant was in operation with work being performed on the storage tank at the time of the explosion.

#### **Detection Systems and Suppression Systems**

There was no automatic detection or suppression equipment present.

#### **Fire Origin and Path**

Welding work was being done near a vent on the top of this pulp storage tank. Flammable gases outside the tank ignited and the flame traveled through the vent into the tank, causing the explosion.

### **Contributing Factors and Victim Locations**

The three workers killed were on a catwalk above the tank when the explosion ripped open the tank lid. Two of them were found on the ground and one was still on the catwalk after the explosion. Another worker was injured. This explosion is under investigation by the Occupational Safety and Health Administration (OSHA).

## **Colorado**

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

November, 2:00 a.m., 3

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

This was a restaurant with attached single-family residence.

### **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**

August, 7:30 p.m., 9 firefighters

**Setting**

Wildfire

**Climate**

Weather conditions were deteriorating

**Fire Origin and Path**

This fire originated when a lightning strike ignited grass and leaves.

**Factors Hindering Occupant escape**

Firefighters were being evacuated via helicopter from this wildfire due to worsening weather conditions. The helicopter had flown two trips and refueled. After picking up the third load of passengers, its main rotor lost power and the vehicle crashed to the ground. The helicopter was consumed by a post-crash fire. Four firefighters survived. The National Transportation Safety Board investigation is ongoing. The NTSB preliminary report is available at

[http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080820X01266&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080820X01266&key=1)

**Nevada**

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

September, 6:10 p.m., 3 firefighters

**Setting**

Wildfire

**Climate**

No information reported

**Fire Origin and Path**

No information reported

**Factors Hindering Occupant escape**

The air tanker that crashed and killed the three firefighters was on its way to drop a load of fire retardant over a wildfire. An engine fire was observed just before the aircraft crashed.

The National Transportation Safety Board investigation is ongoing. The NTSB preliminary report is available at [http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080905X01397&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080905X01397&key=1)

## **Florida**

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

July, 3:24 p.m., 3

### **Setting**

Airport

### **Climate**

Light wind, scattered clouds.

### **Fire Origin and Path**

The National Transportation Safety Board reported the crash to be adjacent to the runway on takeoff. The aircraft collided with the top of a 49-foot (15-meter) tall instrument landing system antenna then crashed to the ground. The plane landed right side up and caught fire immediately.

### **Factors Hindering Occupant escape**

The victims were trapped inside the plane and were determined by the medical examiner to have died of thermal injuries. The NTSB preliminary report is located at

[http://www.nts.gov/ntsb/brief.asp?ev\\_id=20080806X01167&key=1](http://www.nts.gov/ntsb/brief.asp?ev_id=20080806X01167&key=1)