# Selected Published Incidents Involving Fire Doors

**One-Stop Data Shop**
**Fire Analysis and Research Division**
**National Fire Protection Association**

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This report includes articles from NFPA publications about fires involving fire doors. Included are short articles from the "Firewatch" or "Bi-monthly" columns in *NFPA Journal* or it predecessor *Fire Journal* and incidents from either the large-loss fires report or catastrophic fires report. If available, investigation reports or NFPA Alert Bulletins are included and provide detailed information about the fires.

It is important to remember that this is anecdotal information. Anecdotes show what can happen; they are not a source to learn about what typically occurs.

NFPA's Fire Incident Data Organization (FIDO) identifies significant fires through a clipping service, the Internet and other sources. Additional information is obtained from the fire service and federal and state agencies. FIDO is the source for articles published in the "Firewatch" column of the *NFPA Journal* and many of the articles in this report.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7443.

Copies of this analysis are available from:

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**Fire Strikes Business Closed For the Night, Kansas**
A fire in an industrial supply company damaged the company and two other occupancies in the same building. The business was closed for the night at the time of the incident.

The single-story building, which was 400 feet (122 meters) long and 120 feet (37 meters) wide, had masonry walls covered in a brick veneer. Much of the building's flat wooden roof had a built-up covering, but a section over the area of origin had arched roof trusses that failed early in the fire.

Although the building had no sprinklers or fire detection equipment, it was divided into five sections by firewalls. Unfortunately, some of the fire doors were blocked open or held open by chains.

The fire was well advanced by the time a passerby saw it and notified the fire department at 8:32 p.m. Arriving firefighters tried to enter the structure at two locations, but heavy fire and heat and a partial roof collapse them out.

Investigators determined that the fire started on the first floor in the southeast section of the building. From there, it spread to a storage area, then into offices.

Business on either side of the area of origin sustained varying degrees of damage as the blaze spread through open fire doors or the common roof.

The building, valued at $2 million, and its contents, valued at $2.5 million, were destroyed.

Kenneth J. Tremblay, 2005, "Firewatch," *NFPA Journal*, July/August, 22.

**Playing with Lighter, Employee Starts Fire, Ohio**
An employee playing with a lighter caused a fire that heavily damaged a plastic manufacturing plant and warehouse. A 10 to 15-minute delay in alarm allowed the fire to spread. The L-shaped plant consisted of a single-story, masonry-construction manufacturing section approximately 240 feet (73 meters) long, 85 to 100 feet (26 to 30 meters) wide, and 20 feet (6 meters) high, as well as a smaller warehouse. The wood-frame warehouse measured approximately 110 feet by 98 feet (33 by 30 meters). A fire wall with three fire doors separated the sections. There were no fire detectors or sprinklers.

At approximately 5:00 p.m., when the property was in full operation, and employee "playing" with a lighter ignited scrap cardboard in the warehouse. As the fire grew, he became frightened and returned to work without telling anyone. Another employee smelled smoke and discovered the fire, alerting the building's occupants and the fire department at 5:15 p.m.

The fire destroyed the warehouse and spread to the manufacturing area through a fire door that had been left open. Another fire door was only partially closed. Heat and smoke damaged the manufacturing area, resulting in total losses estimated at $3.5 million. Two firefighters and one civilian suffered smoke inhalation injuries.

Kenneth J. Tremblay, 2000, "Firewatch," *NFPA Journal*, September/October, 24.

**Fire Door Contains Apartment Blaze, Maine**
Careless disposal of smoking materials led to an early-morning fire in an occupied apartment building. Fortunately, fire doors kept a well-involved apartment contained, according to a local fire official, who noted that 'fire did not spread to any other apartment and was minimally extended into the roof area when vertical ventilation was done."

The building contained 12 apartments, but for code purposes, it was classified as two six-unit buildings because a fire wall divided it into two. The 70- by 35-foot (21- by 11 meters) three-story building was of wood-frame construction. Each apartment had hard-wired smoke alarms with battery back-up that provided local notification. The building had no sprinklers.

The fire department received a report of a structure fire at 4:10 a.m. and sent three engines, two ladders, a rescue unit, and a deputy chief to the scene. When they arrived three minutes later, firefighters saw flames coming from three windows of a third-floor apartment. Using an aggressive interior attack with simultaneous ventilation and primary search, fire crews found one man who had succumbed to the fire in a small bedroom. Police discovered a man hiding n some bushes 100 feet (30 meters) away. The officers took the man, who suffered from smoke inhalation and burns, to a nearby hospital.

Investigators determined that the fire, which began in the living room near a couch, was probably caused by the improper disposal of smoking materials. Police interviewed two women who said they'd left the apartment nearly two hours before the fire was detected and that they'd been drinking and smoking during the night and early morning with the two men who lived in the apartment of origin. The deceased, who was 40 years old, and the injured man, who was 25 years old, were both intoxicated.

The fire door's performance in confining the smoke, heat, and fire to the unit of origin was remarkable. Firefighters noted that the interior smoke alarms of the other apartments didn't operate until they'd opened the door to the burning apartment to begin extinguishment.

Damage to the building, valued at $150,000, was estimated at $30,000. The value of the contents wasn't reported, but it was estimated at $6,000. No firefighters were injured.

Kenneth J. Tremblay, 2000, "Firewatch," *NFPA Journal*, January/February, 20.

**Nevada**
**Dollar Loss**: $30,000,000
**Month**: June
**Time**: 1:20 a.m.

**Property Characteristics and Operating Status:**
This three-story casino and hotel of protected, noncombustible construction had a ground-floor area of 30,000 square feet (2,787 square meters). The property was operating at the time of the fire.

**Fire Protection Systems:**
The building had no automatic detection equipment in the area of ignition, although a complete-coverage combination heat and smoke detection system installed throughout the rest of the structure activated during the fire. A complete-coverage, wet-pipe sprinkler system also

activated, but it wasn't effective because it didn't extend to the area of origin on the roof and because of the eventual structural collapse. The casino was compartmentalized, but this too, proved ineffective because of the eventual structural collapse. However, a fire door between the casino and hotel worked as designed. Fire spread was too rapid to allow the use of hand held extinguishers.

**Fire Development:**
A fire of unknown cause started on the roof behind the building's façade, spreading through the roof, then down into the structure. One civilian was injured.

**Contributing Factors and Other Details**:
The area of origin was hidden from view, allowing it to spread undetected.

Stephen G. Badger, 1999, "1998 Large-Loss Fires and Explosions," *NFPA Journal*, November/December, 95.

**Fire Spreads Through Apartment Building, New Jersey**
Three occupants and several firefighters were injured in an apartment building fire that spread through fire doors that had been propped open.

The five-story, 50-unit building, which was part of a larger complex, was of unprotected ordinary construction and measured approximately 150 by 150 feet. It contained hardwired smoke detectors and manual pull stations, as well as self-closing doors that opened into protected stairwells. It had no sprinklers.

Wind blowing through an open, second-floor bedroom window caused curtains to billow and knock a lighted candle from a dresser onto a bed, igniting the bedding and several stuffed animals. The apartment's occupant tried unsuccessfully to extinguish the blaze with a pot of water while her son called 911 at 4:14 p.m. When the two finally fled the apartment, they left the door open for firefighters.

As the fire grew, it spread into the hallway, where the stairwell doors had been wedged open with a chock, enabling smoke and flame to spread to the upper floors. Firefighters also found flames traveling in voids accessed through holes in the walls that had been covered for appearance, not for fire protection. This complicated extinguishment. Eventually, fire spread to all five floors, damaging the entire building.

Lost estimates weren't reported. Six firefighters and three occupants were injured.

Kenneth J. Tremblay, 1999, "Firewatch," *NFPA Journal*, March/April, 24.

**Tennessee**
**Dollar Loss**: $6,000,000
**Month**: September
**Time**: 6:10 a.m.

**Property Characteristics and Operating Status:**
This structure housed a food processing plant. No other information was reported.

**The Fire:**
No information was reported on automatic detection systems, and there was no automatic suppression system. A grease fire that started in the cook room spread vertically through the ventilation system, into the ceiling, and throughout the building.

**Contributing Factors and Other Details**:
The absence of a fire door to the cook room and the lack of a sprinkler system allowed rapid fire extension.

Stephen G. Badger, 1998, "Large-Loss and Explosions," *NFPA Journal*, November/December, 85-86.

**Alaska**
**Dollar Loss**: $15,000,000
**Month**: April
**Time**: 8:12 p.m.

**Property Characteristics and Operating Status:**
This two story seafood processing plant was of unprotected, noncombustible construction and covered a ground-floor area of 8,050 square feet (748 square meters). A welding operation was in progress at the time of the fire.

**The Fire:**
The plant had no automatic detection or suppression systems. The fire started when hot stainless steel slag from the welding operation dropped onto a conveyor belt moving through a two-story freezer, measuring 43 by 26 feet (13 by 8 meters), and ignited it. The fire had already burned through the metal overhead into polyurethane insulation before it was discovered. It then consumed plastic and cardboard storage and spread into a second building. It wasn't reported whether this second building was attached, but it had a limited coverage sprinkler system, which operated and helped limit fire spread. Two firefighters were injured.

**Contributing Factors and Other Details**:
A fire door between the two buildings failed to close. The reason for this failure wasn't reported.

Stephen G. Badger, 1998, "Large-Loss and Explosions," *NFPA Journal*, November/December, 84.

**Pennsylvania**
**Dollar Loss**: $25,000,000
**Month**: January
**Time**: 9:05 a.m.

**Property Characteristics and Operating Status:**
This public entertainment center, which ranged room 55 to 71 feet (17 to 22 meters) high, was of unprotected, noncombustible construction with a ground-floor area of 56,100 square feet (5,200 square meters). It included a 1,400-seat auditorium. The property was closed when the fire broke out, but there was ongoing construction, and set-up crews were preparing for an afternoon show.

**The Fire:**
The center had a complete heat detection system, which activated but failed to transmit an alarm to a central station for an unreported reason. There was no automatic suppression system. The fire began when welding sparks ignited scenery stored in a room below a stage.

Unbeknownst to the workers, the sparks fell through bolt holes in the floor, and the resulting fire spread through the storage area and out into other areas of the lower level before entering a tunnel leading to the scenery storage facility. Fire doors and a fire wall kept the blaze from spreading into the lobby, office, and scenery construction area. Six civilians were injured.

**Contributing Factors and Other Details**:
The original smoke detection system had been replaced by a heat detection system, which increased activation time. A heavy fire load and poor storage practices contributed to the fire spread, as did utility holes in a fire wall, a propped open fire door, and holes in the stage floor. Lack of a fire door in the tunnel caused a chimney effect, which gave the fire more oxygen.

Stephen G. Badger, 1998, "Large-Loss and Explosions," *NFPA Journal*, November/December, 92.

**Pennsylvania**
**Date, Time of Alarm, Number of Deaths:**
May 1997, 9:10 p.m. 10 civilian deaths

**Setting**:
Large board-and-care facility; unprotected, wood-frame construction; two stories; operating with 21 residents and 1 staff member.

**Detection and Suppression Systems**
Hardwired smoke and heat detectors were connected to a zoned fire alarm system. The system operated as designed once smoke reached the facility's interior.

A dry chemical fire protection system located in the hood over the stove wasn't a factor because of its location and limited coverage.

**Fire Origin and Path**:
Improperly discarded smoking materials ignited combustibles in a first-floor screened-in porch that was used as a smoking area. Flames spread to exterior wood siding, then inside the facility

through a window that failed. Heat and smoke then spread through open doorways inside the building to an enclosed staircase leading to the second floor.

**Contributing Factors**:
Some of the residents, whose ages ranged from 58 to 99, had mental disabilities. Several were able to escape on their own, and firefighters rescued six others. Those killed included four women, ages 70 to 84, and five men, ages 68 to 87. The age and gender of the 10th victim weren't reported. When the alarm sounded, the only staff member on duty thought it was a false alarm and silenced it. When an occupant confirmed the fire, the staff member reactivated the alarm manually. A steel stairwell door equipped with a self-closing device was later found open; the self-closing device had been deactivated.

Kenneth J. Tremblay and Rita F. Fahy, 1998, "Catastrophic Fires," *NFPA Journal*, September/October 53.

**Four Die in Apartment Blaze, Utah**
Two 35-year-old adults and their two children, ages 5 and 2, died when fire engulfed their four-story apartment building. Several other occupants were injured when they jumped from upper-floor windows.

The 16-unit building was constructed of unprotected wood framing with brick veneer and a flat, built-up composition roof. Unenclosed stairwells were located at each end of the building. Corridor fire doors divided each floor in half, but they were found blocked open. Each apartment contained smoke detectors, which operated, but the hallways and stairwells didn't have detectors. There were no sprinklers.

A second-floor tenant called 911 at 11:03 a.m. to report fire and smoke. While firefighters were en route, other calls came in reporting that conditions were deteriorating and occupants were trapped and jumping from windows. Firefighters arrived six minutes after the call and immediately began rescue operations using ground ladders. Fire in the stairwells made it difficult to enter the building.

Crews eventually made some headway and searched the ground floor, but heavy fire conditions prevented them from reaching the upper two floors. After 45 minutes, fire broke through the roof, forcing the incident commander to switch to a defensive attack, as paramedics treated and transported injured civilians.

The fire started in the basement under the stairs when an undetermined source ignited an upholstered recliner. The fire spread up the north stairwell, down the first-floor hallway, and through the open fire doors to the other stairwell and upper floors.

Firefighters found all four victims in the hallway, where they'd apparently gone to try to escape. The tenants who remained in their apartments and went to windows survived. Two occupants were injured when they jumped from windows, and two sustained smoke inhalation injuries. The building, valued at $600,000, was a total loss. Damage to its contents, valued at $200,000, was estimated at $150,000.

Kenneth J. Tremblay, 1997, "Firewatch," *NFPA Journal*, September/October 21.

**North Carolina**
**Date, Time of Alarm, Number of Deaths:**
March 1996, 10:04 p.m. 8 civilian deaths

**Setting**:
Adult board-and-care facility; protected, wood-frame construction; one story; operating..

**Detection System:**
The fire alarm system was connected to hard-wired corridor smoke detectors, resident room heat detectors, and manual pull stations. Smoke triggered both detectors and the building-wide fire alarm, a cross-corridor smoke and fire door, and the interlocks to HVAC systems.

**Suppression Systems:** None

**Fire Origin and Path**:
A faulty electrical receptacle arced and ignited bedding in a bedroom occupied by two residents. The fire was discovered by one of the room's occupants, who reported it just before a smoke detector outside the room went off. The fire, which spread to other combustibles and vented out a window, consumed the room of origin, and smoke filled the wing protected by the cross-corridor doors.

**Contributing Factors and Victim Locations**:
This wind had 10 rooms housing 18 residents. One of the residents in the room of origin normally used a wheelchair, but he tried to evacuate by walking. He was overcome by smoke and was found in the hallway. Six of the victims were found in their rooms. One resident who was rescued died at a local hospital. The other occupant of the fire room who first detected the fire, and eight others who responded to alarm, survived. All the victims were in their 70s and 80s, except one man, who was 60 years old. Sleeping room doors remained open due to lack of self-closing devices. Occupants and staff failed to respond effectively to alarms.

Kenneth J. Tremblay and Rita F. Fahy, 1997, "1996 Catastrophic Fires," *NFPA Journal*, September/October 52.

**California**
**Date, Time of Alarm, Number of Deaths:**
February 1996, 5:49 p.m. 7 civilian deaths

**Setting**:
Apartment building with more than 20 units; unprotected, wood0frame construction; three stories.

**Detection and Suppression Systems**
There were smoke detectors in the unit of origin, but the types and locations weren't reported. Witnesses said they heard a detector sound inside the unit of origin. A sprinkler system protected a grade-level garage that had apartments on its upper floors. The system didn't activate and wasn't a factor. Corridor fire doors divided the building and were activated by the interior fire alarm system.

**Fire Origin and Path**:
A fire of unreported origin started inside the bedroom of a second-floor, one-bedroom apartment. The fire spread to the unit's hallway, a combination kitchen/dining room, and into the building's common corridor.

**Contributing Factors**:
A 37-year-old adult and six others, ranging in age from 4 to 17 years, died in the apartment of origin. Five died of smoke inhalation and two of thermal burns. Some of the fire doors were found blocked open. Fire damage was limited to the unit of origin with some spread to the corridor. Smoke spread and damage weren't reported.

Kenneth J. Tremblay and Rita F. Fahy, 1997, "1996 Catastrophic Fires," *NFPA Journal*, September/October 53.

**Alaska**
**Date, Time of Alarm, Number of Deaths:**
July 1996, 2:57 p.m. 5 civilian deaths

**Setting**:
Fire broke out on a passenger cruise ship in U.S. waters. Climate conditions: not reported.

**Fire Origin and Path**:
A fire of undetermined origin started in the forward section of the main laundry room three levels below the main deck. The fire consumed dirty table linens and towels, and spread to fiberglass holding bins. Smoke and heat from the fire spread through an open door at the top of a spiral staircase two levels above and into crew deck corridors. Fire screen doors that had been blocked open and open water-tight doors allowed heat and smoke to spread to a galley and second spiral staircase leading to the forward crew quarters. The fire was controlled within an hour by on-board firefighting crews.

**Contributing Factors**:
Five crew members, whose ages ranged from 22 to 52, died of smoke inhalation when they were trapped by smoke and heat in their quarters. Sixty-three crew members were injured during the fire. Passengers were mastered at their abandon ship stations for 7 hours, but they didn't have to use lifeboats. No passengers were killed or injured. A heat detector activated, sending an alarm to the bridge. Because of past false alarms, a crew member was sent to verify the alarm. Delays in reaching the location and communicating with the bridge further delayed the general alarm, which released the fire screen doors' magnetic hold backs, shut down power ventilation systems, and stopped the ship's engines. Some fire screen doors were found tied or blocked open.

Kenneth J. Tremblay and Rita F. Fahy, 1997, "1996 Catastrophic Fires," *NFPA Journal*, September/October 54.

**North Carolina**
**Dollar Loss**: $30,000,000
**Month**: October
**Time**: 7:35 p.m.

**Property Characteristics and Operating Status:**
This Christmas ornament manufacturing facility covered almost 700,000 square feet and was from two to six stories high. It was of unprotected, noncombustible construction with masonry floors and walls with steel trusses. The facility was operating at the time of the fire.

**Detection and Suppression System:**
There was no automatic smoke or heat detection system, although there was a complete wet-pipe sprinkler system with heads rated at 286°F fed by an 8-inch main, which operated and was controlling the fire. After approximately 30 minutes, plant personnel believed that the fire was under control and shut the sprinkler system down. When they discovered that it wasn't under control, the system was reactivated. While it was shut down, however, sprinklers on adjacent systems operated, creating an unanticipated demand on the water supple. The structure was divided by fire walls and fire doors with unreported ratings, but the walls failed due to utility breeches, and the doors failed for unknown reasons.

**Fire Development**
Investigators believe the fire was started in a third-floor product storage room with an open flame in piled corrugated paper boxes containing Christmas ornaments, including satin balls with Styrofoam cores. It is not known if this was accidental or deliberate. The fire spread through open fire doors and penetrations in walls and one elevator shaft.

Interior attack had little effect on the fire, and a partial roof collapse made entry difficult. The interior attack was halted, and a defensive attack was made to protect nearby structures.

**Contributing Factors and Other Details**:
The sprinkler system was shut down prematurely. Open fire doors and breeches in the fire walls allowed the fire to spread.

Stephen G. Badger, "1995 Large-Loss Fires and Explosions," *NFPA Journal*, November/December 103.

**Ohio**
**Dollar Loss**: $10,000,000
**Month**: March
**Time**: 8:20 p.m.

**Property Characteristics and Operating Status:**
This one-story printing plant was of unprotected, noncombustible construction. The ground-floor area wasn't reported. The night shift was at work in another part of the structure at the time of the fire.

**Detection and Suppression System:**
The plant had no automatic fire detection or suppression equipment.

**Fire Development**
The fire started in the printing room.

A passerby discovered the fire. When the fire department arrived, firefighters found flames in the front office. Due to heavy smoke, however, they had visibility problems, and their attempts to enter were restricted by heavy heat and flames. Rolled paper fueled the fire and contributed to its spread.

One firefighter was injured.

**Contributing Factors and Other Details**:
Large amounts of paper, ink, and cleaning solvents fueled the fire.

A fire door didn't operate due to lack of maintenance.

Stephen G. Badger, "1995 Large-Loss Fires and Explosions," *NFPA Journal*, November/December 63.

**Portable Propane Heater Ignites Blaze in Museum under Construction, Oregon**
A small blaze started by a portable propane heater damaged a museum in the final stages of construction. The building's automatic detection and suppression systems had been installed, but they hadn't been placed in service.

The single-story structure, which measured 100 by 30 feet, was of unprotected, wood-frame construction. It contained a smoke detection system and a wet-pipe sprinkler system. However, phone lines for the supervised detection system hadn't been installed, and contractors hadn't hooked up the sprinkler system to the water supply because they were concerned that the pipes would freeze.

The building was closed when a contractor arrived for work and detected the fire at 6:40 a.m. He crossed the street and called the fire department. Firefighters arrived 7 minutes later and found a blaze in a loose pile of wood molding in a corridor. Contractors had tried to put out the flames with portable fire extinguishers, but the blaze wasn't extinguished until firefighters used a pre-connected hose line on it.

Investigators determined that a propane-fueled, portable space heater the contractors used to keep construction materials in the corridor dry started the fire. The heater had been left on overnight, and, apparently, it produced a spark that ignited the protective flooring paper in front of it. The heater's fan then forced flames approximately 40 feet along the corridor to the pile of molding and the wall, where the fire burned until it was discovered.

Self-closing fire doors in corridors that had been propped open allowed smoke to spread throughout the structure. Damage to the building, valued at $800,000, was estimated at $2,000.

Kenneth J. Tremblay, 1995, "Firewatch," *NFPA Journal*, November/December, 35.

**Patient Dies in Arson Fire in Hospital, Illinois**
A former patient of the chemical dependency unit of this hospital intentionally set a fire that killed on patient and severely damaged a room. Building characteristics and quick actions by the hospital staff prevented further injuries and limited damage.

The hospital, which consisted of five stories plus a basement and a penthouse, was of fire-resistive construction and had a ground-floor area of 300 feet by 50 feet. The basement contained labs, offices, maintenance shops, and storage areas, while the first floor contained offices, locker rooms, and a doctors' lounge. The remaining four floors consisted of patient rooms and some additional office space. The penthouse contained mechanical equipment. The fourth floor, where the fire occurred, was reserved for chemically dependent patients.

The building was not equipped with a complete automatic sprinkler system or fire and smoke detection system. There was a heat detector in the corridor near the area of fire origin, and manual fire alarm pull stations were located throughout the floor. Two 4-inch wet standpipes with a 1 ½-inch hose line and a 2 ½-inch hose connection were located in the enclosed stairwells.

Patient of the fourth floor detected a fire in the activities room and reported it to the nursing station. The staff immediately activated the fire alarm system, notified the hospital communications center, and began to evacuate patients from the area. Once the patients had been moved to a safe location, the staff realized that one was missing.

Firefighters arrived at 9:48 p.m., 3 minutes after they were notified. Finding the activities room fully involved in fire, firefighters requested a second alarm and ordered the entire floor to be evacuated. They later evacuated the second and third floors, as well.

Using hose lines from the standpipe system, firefighters took approximately 30 minutes to extinguish the blaze. They found the missing patient dead in the activities room.

Investigators determined that the fire began when a patient who had voluntarily released himself from the hospital against medical advice returned 3 hours later and went to the activities room. He later admitted that he had used a cigarette lighter to ignite magazines, which he placed under an upholstered couch. Apparently, he was unaware that there was another patient in the room, and the flames blocked the exit, trapping the patient.

The building's construction helped prevent the blaze from spreading beyond the room of origin. Automatic fire doors that separated the floor limited smoke spread. A partial sprinkler system that had been installed in a storage closet on the floor of origin did operate, but it had no effect on the fire.

No other patients were injured during the blaze, but one hospital employee and three police officers sustained smoke inhalation injuries. Damage to the hospital was estimated at $300,000. The facility suffered additional losses because some hospital facilities were unavailable for 24 to 36 hours.

Kenneth J. Tremblay, 1995, "Firewatch," *NFPA Journal*, January/February, 31.

**New York**
**Date, Time of Alarm, Number of Deaths:**
September , 5:42 p.m. 10 civilian deaths

**Setting**:
705-bed hospital; fire-resistive construction; 8 stories; operating.

**Detection and Suppression Systems**
Hard-wired smoke detectors were located in corridors, patient rooms, and other occupied spaces, and manual pull stations were located near all exit doors. Both systems were supervised.

A wet-pipe sprinkler system protected corridors and some utility spaces. Stand-pipes for firefighters' use were located in the exit stairways. Both systems were supervised by a central station alarm company.

**Fire Origin and Path**:
The fire was ignited by a undetermined piece of medical equipment I a seventh-floor patient's room and spread to bedding and a ventilator, damaging components containing oxygen. An unrestricted flow of oxygen, operating at a pressure of 50 psi, further intensified the fire. The staff immediately detected the fire and sounded the alarm but the blaze burned intensely, despite the use of fire extinguishers. Sprinklers in the corridors limited fire spread out of the patients' room, and firefighters were able to control the blaze using standpipe hand lines.

**Contributing Factors**:
Two patients in the room of origin died. A third patient located two rooms away died in the bathroom in his room. Apparently, the door to the room had not been closed.

Emergency procedures initiated immediately by the staff closed most of the patient room doors in the affected area.

An estimated 60 patients were relocated to safe areas during the fire.

Automatic-closing corridor smoke doors and fire walls limited fire and smoke spread from the area of fire origin.

Kenneth J. Tremblay, 1994 "Catastrophic Fire Deaths," *NFPA Journal*, September/October 105.

**California**
**Date, Time of Alarm, Number of Deaths:**
May 1993, 4:34 p.m. 12 civilian deaths (5 under age 6)

**Setting**:
69-unit apartment building; unprotected wood-frame construction; 3 stories.

**Detection and Suppression Systems**
An unknown type of detection system was present but not working at the time of the fire. It was not reported why the system was not functioning.

**Fire Origin and Path**:
An incendiary fire started in a second-floor hallway and spread to the third floor through open fire doors and two stairwells.

**Contributing Factors**:
Fire doors protecting the stairwells were blocked open. News accounts stated that some were nailed open and that others were inoperable due to their poor condition.

Occupants of the third floor, where most of the deaths occurred, were trapped by the fire and smoke spreading from the second floor.

Ten to 15 minutes elapsed between the time an occupant detected the fire and the fire department was notified.

Kenneth J. Tremblay, 1994 "Catastrophic Fire Deaths," *NFPA Journal*, September/October 95.

**Indiana**
**Dollar Loss**: $10,850,000
**Month**: July
**Time**: 12:27 p.m.

**Property Characteristics and Operating Status:**
This single-story warehouse was of unprotected ordinary construction with a ground-floor area of approximately 178,000 square feet. Finished color picture tubes were stored in the warehouse, which was in operation at the time of the fire.

**Detection and Suppression System:**
There was no automatic detection equipment in the plant at the time of the fire, although a complete dry-pipe sprinkler system was present and operated..

**Fire Development**
Employees discovered the fire and notified the fire department by phone. Firefighters arrived to find flames spreading through the roof. The sprinkler system was operating, but it failed to control the fire. Burning plastic pallets created dense black smoke, making attempts to locate the seat of the fire difficult. Flames extended into the combustible roof and eventually destroyed both the warehouse and its contents. Arson was determined to be the cause of the fire.

**Contributing Factors and Other Details**:
The fire pump had been removed from the sprinkler system before the fire, resulting in an inadequate water supply to the sprinkler system.

Fire doors in the facility were tied or blocked open.

Dense black smoke reduced visibility and hindered efforts to locate the seat of the fire.
Michael J. Sullivan, 1994, "Property Loss Rises in Large-Loss Fires," *NFPA Journal*, November/December 96.

**Pennsylvania**
**Dollar Loss**: $29,000,000
**Month**: August
**Time**: 9:13 a.m.

**Property Characteristics and Operating Status:**
This one-story building of unprotected noncombustible construction had a ground-floor area of 278,000 square feet. The facility was in operation.

**Detection and Suppression System:**
The building had a partial wet-pipe sprinkler system and a complete smoke and heat detection system.

**Fire Development**
A forklift operator trying to free a skid struck an overhead light fixture, causing sparks to ignite nearby stock. Employees tried to extinguish the fire but were forced out of the building when fire spread through the plastic-wrapped palletized storage. At some point during the fire, the detection system activated, notifying a private fire alarm service, which called the local fire department. The first unit arrived 3 minutes later to find fire extending through the warehouse. The fire was contained more than 2 hours later, but completely destroyed the warehouse and its contents.

**Contributing Factors and Other Details**:
A fire door near the area of origin failed to close completely because it had been damaged in previous forklift collisions.

Partial sprinkler system installed in the warehouse was inadequate for the current occupancy. The fire started in an unsprinklered area and, due to the high fire load of the burning palletized stock, extended into sprinklered areas and overwhelmed the system.

Michael J. Sullivan, 1993, "Large-Loss Fires Rise Slightly While Property Loss Drops," *NFPA Journal*, November/December 85.

**Fire Walls, Doors Limit Damage in Furniture Plant Fire, Pennsylvania**
Although a section of the building collapsed, two-thirds of a furniture manufacturing plant was saved when an accidental fire that began in a parked vehicle spread to the building. Firefighters used exterior hose streams to protect exposed fire walls and doors, preventing the complete destruction of the building.

The single-story building covered an area of more than 20,000 square feet and had 20-foot high ceilings, unprotected steel suppression equipment. Fire doors and walls separated the three areas that housed the furniture manufacturing, finishing, and storage operations, which were closed for the night.

The fire began in the engine compartment of a delivery van that was parked next to an exterior loading-dock door. An electrical extension cord extending from the building to the vehicle was connected to the van's engine block heater.

Officials believe that a short circuit in the cord ignited the engine compartment and that the fire then spread to the back of the van, through the vehicle's open back door, to the door of the loading dock. Once the fire penetrated the exterior door, it spread to the combustible contents of the furniture finishing area.

A passerby reported the fire to the fire department at 4:34 a.m. Because of the extent of the fire, responding firefighters applied exterior defensive master streams to the fire walls and doors of the manufacturing and storage areas. The area that was initially involved was destroyed. Although residential exposures were affected by radiant heat, they sustained only minor damage.

Officials believe the fire burned for at least 45 minutes before it was detected and reported. There were no injuries. Damage was estimated at $1 million, compared to the total value of $4,325 million.

Kenneth J. Tremblay, 1993 "Firewatch," *NFPA Journal*, January/February 28.

**Sprinklers Control Nursing Home Arson Fires, Utah**

The complete automatic sprinkler system in a nursing home extinguished four fires set by an arsonist in the facility during a 43-hour period.

The single-story nursing home, which measured 237 feet by 67 feet, was of brick and wood-frame construction. A wet-pipe automatic sprinkler system monitored by a central station alarm company covered the whole building, including corridors, storage areas, and residents' rooms.

The fire department initially responded to a fire in two laundry bags mounted on wheels under a laundry chute in the nursing home's basement. One sprinkler confined the fire to the two bags; damage was limited. Neither residents nor employees were affected by the 1:22 p.m. incident.

About 4 ½ hours later, a more serious fire occurred in a resident's room after an accelerant was poured on a mattress and bedding and then ignited. Two aides assisted a mentally handicapped occupant from the room. A single sprinkler operated and controlled the fire.

Investigators returned to the nursing home the following morning when employees found bedding in which there had been a failed attempt to ignite a fire the previous night. While investigators were responding to this call, the staff of the nursing home telephoned 911 to report another fire in progress.

Responding firefighters found burning material in a clothes closet. Though one sprinkler contained this fire, smoke was so thick that staff evacuated the building.

At 8:05 a.m. the following day, a fourth and final fire was set in another closet. Again, one sprinkler extinguished the fire, though there was extensive smoke damage.

In each case, the sprinkler system quickly controlled or extinguished the fire. In addition, the activation of self-closing fire doors limited smoke damage in each case, and there was immediate notification of the fire department.

Officials arrested a nursing home employee who confessed to igniting the fires during the 2-day period.

Damage to the building and its contents from the four fires was estimated at $54,612.

Kenneth J. Tremblay, 1992, "Firewatch," *NFPA Journal*, July/August, 27

**Million Dollar Loss to Yacht Assembly Plant, Florida**

A fire that caused extensive damage to a yacht assembly building and minor damage to a 95-foot yacht near completion might have been more destructive if not for the quick action of employees in notifying the fire department and closing a fire door.

The 140- by 75- by 60-foot combination boat storage, repair, and manufacturing bay was constructed of unprotected, heavy steel framing covered by aluminum and fiberglass. Another bay attached to one end of the building housed a workshop constructed of wood framing and wood roof trusses. A roll-type fire door that separated the two bays could be operated manually, by fusible link, or by a smoke detector. The structure had no sprinklers.

An employee detected the blaze in the manufacturing bay and immediately notified a security guard, who called the fire department at 1:30 p.m. Other employees pulled down the fire door, preventing flames from spreading into the workshop.

Firefighters arrived to find heavy fire and smoke venting from melted aluminum side panels and called for an additional alarm. They advanced hose lines into the building as flames reached the 60-foot ceiling and began *to* roll over. Firefighters were able to confine the blaze to one side of the bay.

Investigators determined that the blaze started in a 600- square-foot, wood-framed, plywood structure that housed two large air compressors and an air dryer. A motor on the air dryer malfunctioned and ignited wiring and insulation. Flames spread to the wooden structure and burned for approximately 15 minutes before they were detected. Although heat from the fire buckled and twisted some of the overhead steel frame members, the structure maintained its integrity.

Damage to the building, valued at $7 million, and its contents, valued at $10 million, was estimated at $1 million and $125,000, respectively. There were no injuries.

Kenneth J. Tremblay, 1997, "Firewatch," *NFPA Journal*, January/February, 28.

**Sprinkler Controls Blaze in Cardboard Manufacturing Plant, North Carolina**
A single sprinkler controlled a fire at a cardboard manufacturing plant, preventing a major loss at a property worth more than $6 million.

The single-story, 120,000-square-foot cardboard product manufacturing plant was constructed of concrete block walls and protected steel roof framing. An NFPA 13 wet-pipe sprinkler system and a standpipe system protected the structure, which also contained automatic fire doors, fire walls, and extinguishers.

An employee detected the fire in the boiler room and called 911 at 3:45 a.m. At the same time, the sprinkler system activated, triggering the water flow alarm. A single 165" sprinkler controlled the blaze, allowing fire fighters to use the standpipe system to support a hose line and complete extinguishment.
The fire began when a lack of oil in an operating air compressor's reservoir caused the drive shaft to overheat and lock up. The resulting friction produced an excessive amount of heat, which ignited residual oil on the compressor. Flames then spread to improperly stored combustibles, including spray paint cans.

Fire officials said that if the property had not been protected by sprinklers, there probably would have been "more interior fire loss and down time for the company and possible injury to company employees or fire fighters."

The building, which was valued at $1 million, was not damaged. Damage to its contents, which were valued at $5,267,000, was estimated at $25,000.

Kenneth J. Tremblay, 1995, “Firewatch,” *NFPA Journal*, May/June, 40.

**Residential Sprinkler Extinguishes Fire, Michigan**
An arson fire in this unoccupied health care facility caused only minimal damage because many of the firesafety systems incorporated into the building functioned as intended.

The one-story wood-frame structure, built in 1984, measured 66 by 30 feet, excluding an attached garage. It was one of 200 facilities funded and licensed by the State of Michigan specifically for housing deinstitutionalized mentally retarded clients. The facility also received funding from Medicare/Medicaid as an intermediate health care facility for the mentally retarded.

Because the state program required installation of fire protection systems, a detection system was arranged with hard-wired smoke detectors in the corridor, living room/dining room, and the plenum of the heating system, and heat detectors were located in the kitchen, the garage, and the attic. The four-bedroom sleeping area was separated from the living room by a 20-minute fire-rated door that was held open by a magnetic device connected with the alarm system. Interior partitions were rated at one hour. The building was also equipped with a residential sprinkler system that provided coverage in all the heated areas of the facility, including the two bathrooms and all the closets.

On the morning of the incident, the building manager arrived at the facility, found smoke in the building, and telephoned the fire department at 9:35. Responding firefighters entered the facility through smoke to find that an operating sprinkler head in a bedroom had already extinguished a fire on a bed. The smoke and flames had also activated the alarm system, and the magnetic door holder had released the fire door, thus containing the smoke to one area of the building.

Investigators found three other points of origin in this incendiary fire, all in the building's curtains. Fire did not spread from these points because the curtains were made of a flame-resistant material. In fact, the same type of curtains, hung near the bed on which the fire was set, showed no evidence of burning or heat distortion.

There were no injuries in this fire as none of the six residents was home at the time, and an estimate of the dollar loss involved was not available. An individual was arrested in this case for breaking and entering and for arson.

Neil Courtney, 1987, "Fire Record" *Fire Journal*, September/October, 22