In the early-morning hours of December 13, 1977, a fire occurred at Aquinas Hall, a dormitory at Providence College in Providence, Rhode Island. This fire resulted in the deaths of ten female students who were residents of the fourth floor.

The primary fuel for the fire was highly combustible Christmas decorations that had been put up in the corridors. The extremely rapid fire development and a dead-end corridor were the most significant factors that contributed to the multiple loss of life.

Built in 1938, Aquinas Hall was a U-shaped building of mixed construction; the major portion of the building was of protected noncombustible construction. It was a four-story building with the first floor used for classrooms and a chapel, and the second, third, and fourth floors used for girls' dormitory space. Floor systems were of reinforced concrete, and interior partitions, including corridor walls, were of plastered concrete-masonry units.

There were three enclosed stairways in the building. The center stairway had an elevator in the center of it. The stairs in this stairtower were 32 inches wide. The two other stairs were Class A stair arrangements as defined in NFPA 101—1976, the Life Safety Code. Dead-end corridors approximately 61 feet long existed at each end of the dormitory. These dead-ends were allowed by the Rhode Island Building Code in effect at the time when building renovations were made in 1972. The Rhode Island Code had a maximum travel distance to exits requirement of 75 feet, but no provision pertaining to dead-ends. (The 1967, 1970, 1973, and 1976 Life Safety Codes do not allow any dead-end corridors in dormitory occupancies.)

Interior finish was primarily noncombustible, with the exception of a concealed, high-density fiberboard ceiling above a suspended, noncombustible mineral-tile ceiling in the corridors. Room doors were wood composite; some of them had air transfer grills located approximately five feet from the floor. Doors were not self-closing. The transfer grills were made of combustible pressed board with holes in it ("pegboard"). Heat for the dormitory spaces was provided by hot-air supply ducts and air registers in the exterior walls. Return-air grills were located in the corridors; however, their exact loca-
tions were undetermined. Air movement was therefore generally from the rooms and into the corridors of the dormitory.

Aquinas Hall had a fire alarm system that consisted of manual pull stations, three combination rate-of-rise, fixed-temperature (135°F) heat detectors, and interior alarm horns. One heat detector was located at the top of each stairway. The system was connected to the Providence Fire Alarm and Communications Center through a master fire alarm box. There were no smoke detectors or automatic sprinklers in the building. Portable fire extinguishers were provided on each floor in break-glass cabinets located in the corridors.

For the 1977 Christmas holiday, a decoration competition with cash prizes was being held. The contest was for both corridor and individual room decorations. Materials used included natural evergreen Christmas trees and wreaths, brown paper and crepe paper applied to the walls and ceiling with “rolled” masking tape, and cotton

Remains of Christmas decorations on second floor. Note typical combustible air transfer grill on door.

Corridor wall arrangement on fourth floor.

and other paper decorations applied to the paper that covered the walls and ceilings. All of this provided continuous fuel essentially for the entire length of the north-wing corridor. There is no evidence to indicate that any of these materials were flame-retardant treated. The paper used to decorate the walls of the corridors covered up the fire alarm pull stations, and gift-wrapping paper was applied to the glass fronts of the fire extinguisher cabinets.

Classes were not in session at Providence College during the week of the fire, as it was a study period prior to final examinations. As a result, some students were not at the school and the building was not fully occupied. (Table 1 indicates the occupant load of the fire area.) At the time of the fire, many of the residents were sleeping.

The Fire

The Providence Communications Center was notified of the fire at 2:57 am by the activation of a fire alarm pull

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1 The method of applying the paper to the walls is simulated in Figure 2. Pieces of masking tape were rolled, forming rings of tape with the adhesive on the outside surface. This “rolled” masking tape allowed an air space of approximately one-half inch between the plastered surface and the paper wall covering. This air space would allow for a much higher flame spread than for paper applied directly to a plaster surface.
stations located on the fourth floor of Aquinas Hall, near the center stairway.

The physical evidence indicates that the fire started within Room 406, near the closet. The exact source of ignition has not been determined by local authorities.

As the fire began developing, the three occupants of Room 406 woke up, went to the window, and opened it. Due to the air movement caused by the building's heating system (from the rooms and into the corridor), the fire movement was toward the corridor. Two of the girls in Room 406 jumped from the fourth-floor window as Providence Fire Department apparatus was arriving on the scene. Both of them died as a result of the injuries from their fall. The third girl waited in the window and was rescued by fire fighters who took her down an aerial ladder; she was not injured.

The fire was able to spread into the corridor through the combustible transfer grill in the closed door. Highly combustible Christmas decorations became ignited, and the fire spread down the corridor in both directions.

Rescue and Fire Fighting

On the initial alarm, three engines, two ladders, and a battalion chief from the Providence Fire Department responded. When the first engine arrived, a second alarm was sounded immediately because of the obvious rescue problems involved. In all, eleven engine com-
Bunk beds in room of fire origin.

Casualties

Two of the ten student fatalities died from injuries received when they jumped, four died of carbon monoxide poisoning and smoke inhalation, and four died as a direct result of burns. Some of those who died of carbon monoxide poisoning were also burned. Figure 1 indicates both the locations of the victims prior to the fire and also where their bodies were found by fire fighters. Twelve students and one fire fighter were injured. Table 1 shows the status of the occupants of each of the rooms of the north wing of Aquinas Hall just prior to the fire and after the fire.

Analysis

The most significant factor that contributed to the deaths of eight of the ten students was the presence of highly combustible decorations in the corridor. These decorations provided ample fuel in a continuous chain, allowing rapid fire spread through the fourth-floor corridor. However, the Christmas decorations most likely did not contribute to the deaths of the two girls who jumped from the fourth floor.

A factor contributing to four of the remaining eight deaths and several of the injuries was the long, dead-end corridor. Residents who left their rooms in this dead-end were forced away from their only exit. (One girl, although injured, was able to run down the dead-end corridor and into the stairway very early in the fire development sequence.)

The failure to contain the fire to the room of origin was the result of the design of the heating system, which resulted in return-air movement to the corridor through the air transfer grill in the room of fire origin's door. NFPA 90A—1975, Standard for the Installation of Air Conditioning and Ventilating Systems, prohibits the use of public corridors in institutional and residential occupancies as a portion of the return-air system.

Fire drills had been held in the building during the fall semester. Building residents had been advised not to open doors to corridors if the doors were warm. Students who kept their doors closed were rescued by fire fighters and were not injured. A few residents who left the building very early in the fire were able to use the corridor.

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1977 US Multiple-Death Fires
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penetrating a severe thunderstorm area, which resulted in the ingestion of massive amounts of water and hail into the engines. The presence of this precipitation contributed to severe stalling. Without thrust power, the aircraft glided for approximately 33 miles while gradually losing altitude. The Captain’s last air-to-ground radio transmission was recorded as “Uh, we’re putting it on the highway, we’re down to nothing.”

Following initial wing impact with treetops, the aircraft traveled along the ground for about 1,800 feet, during which it struck a combination gasoline station-grocery store, five automobiles, and a truck. Fire then involved the gasoline station-grocery store when power lines inside the building short-circuited. Gasoline from the damaged pumps provided additional fuel for the fire, which eventually involved the automobiles and the truck.

The NFPA thanks individual fire departments, state fire marshal offices, and others who contributed fire incident reports to the preparation of this study. Their continued contributions are essential to an improved understanding of multiple-death incidents, leading to a reduction in the tragic loss of life from fire.

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Providence College Dormitory Fire
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As the fire spread on the continuous decorations in the corridor, the probability of survival of those in the corridor or with their room doors open was greatly diminished.

This fire has important technical significance. There has not been a multiple loss-of-life fire reported to the NFPA in recent years in which a dead-end corridor was an important factor in the deaths.2

The fire in Aquinas Hall reinforces the need to regulate dead-end corridors by minimizing their length or prohibiting them.

The highly combustible decorations that were present in the corridor indicate the need for continuous firefighting inspections and public fire safety education, especially during the Christmas holiday season.

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2 Two previous fires are of particular interest with regard to dead-end corridors. On January 1, 1966, a fire in an apartment building in Kansas City, Missouri, resulted in the death of one occupant and injuries to 18 others. The building configuration was almost identical to that of Aquinas Hall at Providence College. Two men from an apartment adjacent to a stairway ran the wrong way and were trapped at the end of one of the dead-end corridors. One died and one was seriously injured. (See “Bimonthly Fire Record: Dead-End Corridors, Kansas City, Mo.,” FIRE JOURNAL, Vol. 60, No. 3 [May, 1966], p. 48.)

The second fire occurred in a dormitory at Cornell University in Cayuga Heights, New York on April 5, 1967. Nine students died. There were several factors resulting in the deaths; however, dead-end corridors were one of those factors. (See “Dormitory Fire Kills Nine,” FIRE JOURNAL, Vol. 61, No. 4 [July 1967], pp. 5-9.)

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