Ten people died and 82 others were injured in a fire in the Cambridge, Ohio, Holiday Inn on July 31, 1979. The fire was almost a carbon copy of the Holiday Inn fire that killed ten in Greece, New York, on November 26, 1978. In both cases, the primary factors that led to deaths were combustible interior finish, unprotected vertical openings, and inadequate notification of the occupants.

Open stairway at northeast corner of north wing. Area of fire origin was at the right of the stairs.  

Familiar Problems Cause 10 Deaths In Hotel Fire

DAVID P. DEMERS

The hotel was constructed about 1968, and was reportedly redecorated and refinished in 1975. There were several other national-chain hotels and fast-food restaurants in the vicinity.

The guest-room wings of the two-story building formed a wide V configuration (see Figure 1). A passageway connected the northeast end of the guest-room wings with the restaurant-registration area of the building. The latter part of the building was not directly involved in the fire, but did receive smoke damage.

The building had 107 guest rooms and an interior corridor system. There were three stairways in the guest-room wings, one at each end and one approximately in the middle.

Each floor of the guest wings of the building had an approximate gross area of 25,000 square feet. The distance from grade to the average height of the flat roof was 15 to 16 feet. Stairways were 190 feet apart, resulting in a total undivided corridor length of about 380 feet.

Building Details

The building was constructed of masonry and would be classified as protected noncombustible. Exterior walls were concrete masonry units faced with brick. Partition walls between guest rooms were eight-inch concrete masonry units, and the partition between guest rooms and the corridor was gypsunboard on steel studs. There was fiberglass sound insulation in the stud channels. The ceiling-floor system and ceiling-roof system consisted of poured-in-place reinforced concrete. All ceilings were plastered concrete, with the exception of the first-floor corridor. The first-floor corridor had a suspended ceiling of acoustical tile in metal channels. The tile was of limited combusibility. Utilities were placed in the concealed space above the first-floor ceiling.

The three stairways were about five feet wide and were constructed of steel and masonry. An enclosed storage closet was constructed underneath at least one of the stairways. There was no barrier to fire spread at the end of the corridors, resulting in open stairways.

The 32-inch-wide doors of guest rooms were of solid composition construction. There were no self-closing devices on guest-room doors. Also, there were no smoke barriers within the corridors.

On the exterior wall of each guest room were two 32-inch-by-77-inch factory-assembled, nonopenable windows. These windows had two 3/16-inch plate-glass...
lights with a ⅜-inch air space ("thermopane"). The lights were mounted in a flexible gasket. The windows had the appearance of sliding glass doors, but they could not be opened. Above one of the windows in each room was a manually-operated louver to provide fresh air.

The interior wall covering of the guest-room wings included two types of combustible vinyl. A plain vinyl was used on most of the corridor walls. Around guest-room doors, a striped vinyl material was utilized. Under these solid vinyl wall coverings were several thicknesses of material, which included vinyl, fabric, and paper. The substratum was either gypsumboard or masonry. The surface vinyl materials behaved quite differently during the fire incident. The striped vinyl melted, dripped, and burned, while the plain vinyl burned in place.

The floor covering consisted of nylon shag carpeting with a jute backing and pad. The carpeting did contribute to the fire. There was no furniture in the corridors.

The means of egress from guest rooms was into the central corridor system, through the stairwells, and to the exterior on either side of the building.

At the entrance to the passageway from the northeast end of the guest-room wings was a double-door assembly with self-closing devices. These doors were 1½-hour, B-labeled and were held open with fusible-link releasing devices. There was no emergency lighting in the hotel.

The building was equipped with a fire alarm system that had manual pull stations as initiating devices. One six-inch gong was provided for each 190 feet of corridor, with a total of four gongs for the entire corridor system of the guest-room wings. The alarm system was set up for a local alarm only and was not connected to the Cambridge Fire Department.

At the time of the fire, there were approximately 200 registered guests in the 107 rooms of the hotel. Only four of the guest rooms were unoccupied. The number of staff members at the hotel is unknown. Data were not available regarding hotel emergency planning, or the extent and frequency of staff training.

At the time of the fire, weather conditions were not a significant factor, according to local fire officials.

Fire Suppression

The city of Cambridge was protected by the career Cambridge Fire Department. There were six fire fighters on duty at a time, with a full-time chief and inspector on duty during the day. The fire fighters operated a two-piece engine company, a ladder company, and a reserve pumper. There were no means, other than telephone, for alerting off-duty fire fighters of a major fire incident. Mutual-aid agreements existed with volunteer fire companies in the areas around Cambridge.

Code Enforcement

At the time of the fire and at the time the Holiday Inn was built, the city of Cambridge did not have a state-accredited building department. As a result, the State Building Code was enforced by the Ohio Department of Industrial Relations, Division of Factory and Building Inspection. The Ohio State Building Code in effect at the time of construction was unique to Ohio and was not based on a model building code. An adapted
version of the BOCA Basic Building Code replaced the Ohio State Building Code before the July 31, 1979 fire.

At the time of the fire, both the State Fire Marshal's Office and the Cambridge Fire Department enforced the State Fire Prevention Code. In addition, certain regulations for hotels and motels were required by state statute.

Interior view of first floor of north wing. Area of fire origin was within this area.

Fire Ignition Sequence and Discovery

The fire was discovered at approximately 3:25 am by two people playing a pinball machine in the passageway that connected the guest-room wings and the lobby-restaurant area. These youths were employees of a nearby all-night restaurant, and had entered the hotel after finishing work.

They smelled smoke and saw it traveling at ceiling level in the guest-room corridor, which was visible from the passageway. They sounded the building's fire alarm, and then ran back into the hotel lounge to ask a hotel employee to call the fire department.

Fire Growth and Development

Specific ignition details on this fire were unavailable to the NFPA. Fire growth and development was rapid. The fire apparently started in the corridor on the first floor. The shag carpeting and combustible wall covering ignited and spread the fire, and produced heavy smoke. The fire and products of combustion traveled horizon-

tally down the corridor and then into the open stairway at the north end of the north guest-room wing. Fire caused the plate-glass exterior windows of the stairway to break out, providing a fresh supply of oxygen to the fire. The fire quickly spread up the combustible wall covering of the stairway and down the second-floor corridor of the north wing.

Initial efforts of people on the scene before fire apparatus arrived consisted of banging on windows on the outside of the building or breaking them with various implements, including iron bars and golf clubs. Apparently hotel room occupants became trapped in their rooms fairly early in the fire, and thus they tried to escape through the heavy plate-glass exterior windows. These windows were extremely difficult to break, and in some cases occupants made several attempts to break them out with furniture. The NFPA study at this time has been unable to locate any survivors who actually used the corridors for evacuation. So far as is known, all survivors escaped only after exterior windows were broken by occupants, other civilians on the fireground, police, and fire fighters.

Fire Fighting and Rescue

On receipt of the alarm, the Cambridge Fire Department dispatched the six fire fighters on duty with the two-piece engine company and aerial ladder.

On arrival, fire fighters found an extremely serious rescue situation, with heavy smoke involving the entire guest-room corridor system. Initial rescue efforts involved breaking out the very thick plate-glass exterior windows, raising ladders for rescue operations, and assisting guests on the lower floor out of windows. They entered the building wearing self-contained breathing apparatus shortly after arrival. There was not a great deal of open flame in the building, but there was a moderate amount of heat.

Volunteer fire companies from surrounding areas provided a great deal of manpower very early in the fireground operation. Volunteer companies that responded or assisted in some way during the incident were from Antrim, Barnesville, Byesville, Caldwell, Cassell Station, Cumberland, Lore City, New Concord, Old Washington, Pleasant City, Quaker City, and Senecaville. Off-duty Cambridge fire fighters were eventually notified of the incident either by personally owned scanners or by telephone.

Casualties

There were 10 fatalities and 82 people injured as a result of this fire. Injuries to guests included smoke inhalation, injuries sustained in jumping from the second floor, and serious cuts resulting from efforts to break out windows of rooms.
Cause of death of all 10 fatalities was listed by the county coroner as smoke inhalation and carbon monoxide poisoning. Two of the fatalities were found in guest rooms with the doors open, five were found in the second-floor corridor in positions that indicate they were heading toward the north stairway, two victims were found on the first floor of the north stairway, and one victim died in a hospital four days after the fire (see Figure 2). All of the fatalities were occupants of guest rooms on the second floor in the north-wing corridor.

Damage

Fire damage was extensive in the first floor of the north corridor and extended into the second floor via the open stairway. Where it was not burned, the striped vinyl wall finish had pulled away from the wall and melted throughout the north wing. The plain vinyl burned and charred in place in the area of fire origin, the stairway at the north end, and partly into the second floor. It remained fairly intact and in place in other parts of the building. The type of adhesive may have been one reason for this difference. The shag carpet burned along the surface in the area of origin, but the fire did not spread very far down the corridor.

Smoke damage was extremely heavy throughout the guest-room wings and passageway. There were very heavy smoke deposits in all guest rooms where doors had been left open during the fire. Rooms that remained closed were relatively clean.

Analysis

Testing by the National Bureau of Standards indicated that the “plain wall covering would likely be a Class B material and the striped wall covering would be Class C or D.” These ratings indicate flame spread only. The smoke ratings established by the NBS testing were established by test ASTM E662, which is the same as NFPA 258–1976, _Standard Test Method for Measuring the Smoke Generated by Solid Materials_. This test gives a specific optical density (Dm) for materials. The values obtained do not correlate with the values for smoke density from NFPA 255–1972, _Method of Test of Surface Burning Characteristics of Building Materials_ (the Tunnel Test). NFPA 255 or its equivalent — not NFPA 258 — is the test used for rating interior wall finish for

Melting and running of one type of vinyl wall covering. One fatality was found inside Room 213.
the Life Safety Code® and model building codes. NFPA 258 is intended for research and development purposes only, not as a basis for ratings for building codes. It is important to note that the vinyl wall coverings when tested under NFPA 258 (ASTM E662) behaved worse when the entire wall assembly was tested than it did when compared to the respective wall coverings alone.

Carpeting did not pass the “pill test” or the flooring radiant panel test. No predictions were made of the performance of the interior finish materials under actual fire conditions.

The initial fire development created untenable conditions in the corridors before the manual alarm system was activated. Even when the manual alarm system was sounded, it was apparently ineffective because it was not loud enough to be heard in guest rooms. Reportedly, many guests thought an alarm clock was going off or a telephone was ringing; they did not recognize the fire alarm signal.

The lack of early warning detection resulted in the fire spreading undetected for some time. A contributing factor to the early development of untenable conditions in the exit access corridors was the lack of any type of “smokestop barriers” (not necessarily “horizontal exits”). Products of combustion traveled without restriction, creating untenable conditions at the extreme southern end of the south guest-room wing. This was nearly 400 feet from the northeast end of the north wing where the fatalities were concentrated.

A large number of injuries occurred when occupants escaped through the inoperable window assemblies that contained thick plate glass. This glass was difficult for occupants and emergency personnel alike to break. When it was broken, long shards of glass fell and caused a large number of lacerations. However, because of prompt and effective emergency medical care, there were no fatalities from this type of injury.

Another factor that helped limit further life loss was the strong construction and compartmentation of the building, including the guest room door assemblies. Even though these solid doors and frames were not fire-rated assemblies, they did provide an effective means of keeping out fire and products of combustion. Doors that were kept closed provided extra time for evacuation and rescue by the limited manpower of initially responding emergency forces.

This fire again illustrates common problems associated with hotel fires. A hotel incident that took place on November 26, 1978 in Greece, New York, and took ten lives had primary factors leading to the fatalities that were similar to those in the Cambridge, Ohio, fire. These included combustible interior finish, unprotected vertical openings, and inadequate alerting of occupants. Both incidents further point out that no matter how many “exits” a building provides, once the exit access becomes untenable, the means of egress system is unusable for escape.

Code Review

In the interest of comparing life safety problems exemplified in this incident to current national consensus standards, the 1976 edition of NFPA 101, the Life Safety Code (the Code) was utilized for analysis purposes. The Life Safety Code was not in effect in Cambridge, however, and did not apply to this hotel at the time of the fire. The following summary of requirements from the Code have particular relevance to this fire incident because the building did not meet any of these requirements. It is not intended to be a complete description of all parts of the Code that pertain to this hotel.

Chapter 5 — Means of Egress
Par. 5-1.3.1: Requires the exit component of the means of egress to be separated from the building by construction having at least 1 hour fire resistance when the exit connects three stories or less. Any openings in the exit enclosure must be protected by an approved self-closing fire door. Openings in the exit enclosure shall be limited to those necessary for access from normally occupied spaces and for egress from the enclosure.
Par. 5-1.3.2: Interior finish in exit enclosures shall be limited to flame spread Class A or B. (A smoke produced rating of 450 or less is part of this classification for new interior finish only. Existing interior finish has no smoke produced rating requirement.)
Par. 5-2.2.2.2: “There shall be no enclosed usable space under stairs in an exit enclosure nor shall the open space under such stairs be used for any purpose.”

Chapter 6 — Features of Fire Protection
Par. 6-1.1.1: Requires stairways and other vertical openings between stories to be enclosed or protected to prevent the spread of fire or smoke.

Chapter 11 — Residential Occupancies
Section 11-2, HOTELS
Par. 11-2.2.6.1: The maximum travel distance to reach the nearest exit is 100 feet.
Par. 11-2.2.8.1: It is required that doors between guest rooms and corridors be self-closing.
Par. 11-2.3.1.1: Further requires that vertical openings shall be enclosed or protected.
Par. 11-2.3.2.1: Requires Class A or Class B interior finish in exits or exit access. Class C finish is allowed in some other areas.
Par. 11-2.3.3.2: Sounding devices for alarm systems must be of such character and so located as to alert all occupants of the building or section thereof endangered by fire.
Par. 11-2.3.3.3: Facilities are required for immediate notification of the public fire department if there is an alarm.