FOUR HOTEL FIRES: LESSONS LEARNED

THOMAS J. KLEM and RICHARD BEST

On the morning of November 21, 1980, the public woke up to the hotel fire problem: the high-rise MGM Grand Hotel in Las Vegas was burning. Within a month, the shock of a hotel fire was repeated at the meeting facilities in a Stouffer's Inn in Harrison, New York. Two months later, the Las Vegas Hilton experienced a fire. Roughly a year later, the Westchase Hilton Hotel in Houston also burned.

While these four fires focused public attention on the hotel fire problem, the problem itself is both long-standing and widespread. It is estimated that one hotel out of four will experience a fire severe enough to call the fire department this year.[1] Fortunately, most of these fires will be controlled quickly, with no loss of life. However, some of those fires — like the four above — will grow beyond the "worst-case scenarios" and result in loss of life, injury, and severe property damage.

While the details of severe hotel fires are different in many ways, patterns in hotel fires do exist. Within those patterns are lessons for preventing and controlling future hotel fires.

Overview of Analyzed Fires

At the time of the fire, approximately 3,400 guests were registered at Las Vegas' MGM Grand Hotel, constructed in the early 1970s.[2] The hotel consists of 21 stories of guest rooms above a ground-level complex of a casino, showrooms, convention facilities, jai alai fronton, and a mercantile complex. Although the hotel was partially sprinklered, major areas including The Deli (the area of origin on the Casino level) and the Main Casino were not sprinklered.

As reported by the Clark County Fire Department, the most probable cause of the fire was heat produced by an electrical ground fault within a combustible concealed space in a serving station in The Deli. One hour was required to control the fire; four hours were needed to complete evacuation.[3] Eighty-five hotel guests and employees died as a result of the fire and another 600 were injured. Sixty-one of the 85 fatalities were located in the high-rise tower.

Approximately 95 persons were attending meetings in conference facilities at the Stouffer's Inn of Westchester — a three-story, fire-resistive, nonsprinklered building.[4] An incendiary fire in the exit-access corridor outside third-floor meeting rooms quickly led to untenable conditions. Twenty-six persons died and another 24 were injured in the fire, which did not involve guest-room facilities in the hotel complex.

The 30-story Las Vegas Hilton, the largest hotel in the United States, consists of three towers constructed in three stages between 1967 and 1979.[5] Each tower has different fire protection features, based on changes in code requirements, technology, and construction techniques over the 12-year construction period. The large ground- and second-floor areas house a casino, restaurants, showrooms, assembly rooms, offices, service and mechanical areas, and other function areas. The third through the twenty-ninth floors contain guest rooms and the thirtieth floor contains additional assembly and function areas.

A fire of incendiary origin developed in an eighth-floor elevator lobby that was finished with carpeting on its walls and ceiling. A flame front outside the building led to vertical, exterior fire spread involving 22 floors of the 30-story building. Eight hotel guests died in the fire and another 350 were injured.

On March 6, 1982, approximately 200 guests were registered at the two-year-old Westchase Hilton Hotel in Houston.[6] The hotel consists of a one-story lobby building, a one-story meeting and restaurant building, and a 13-story fire-resistive tower containing 306 guest rooms.

Mr. Klem is NFPA Division Director, Fire Investigations and Applied Research. Mr. Best is Senior Fire Analysis Specialist in the NFPA's Fire Investigations Department.

[1] Thomas J. Klem, "Hotel Fire Safety," unpublished report, Federal Emergency Management Agency, Washington, D.C., 1982.

[2] "Fire at the MGM Grand," FIRE JOURNAL, Vol. 76, No. 1 (January 1982), pp. 19–37.

[3] See the January 1982 issue of *Fire Service Today* for details of fire fighting operations.

[4] James R. Bell, "Investigative Report of Fire at Stouffer's Inn of Westchester," FIRE JOURNAL, Vol. 76, No. 3 (May 1982), p. 37.

[5] "Investigation Report on the Las Vegas Hilton Hotel Fire," FIRE JOURNAL, Vol. 76, No. 1 (January 1982), p. 52.

[6] "Westchase Hilton Fire Claims 12," *Fire Service Today*, Vol. 49, No. 7 (July 1982), p. 17.

A guest returning to the hotel shortly before 2:30 am discovered a small fire in his fourth-floor room. The door to the room was apparently left open during the occupant's escape. The fire was confined to the room of origin and a nearby portion of the corridor.

Nine of the 12 fatalities died in two guest rooms on the floor of fire origin. In addition to the 12 fatalities, three people were seriously injured in the fire.

Discussion

These four hotel fires share some basic similarities. All four hotels were prestigious, relatively new facilities of fire-resistive construction. In each incident, ample fuel in the area of origin permitted rapid fire development and the production of thick smoke. While each hotel provided partial sprinkler protection, the area of origin was unsprinklered. The incipient fire was not extinguished. All four hotel fires resulted in loss of life. Three of the four fires involved fatalities in hotel guest rooms located in high-rise structures, even though the area of origin varied.

The MGM Grand and Westchase Hilton were the most similar of the four fires. Both of these fires were primarily confined to the floor of origin. In both cases, smoke spread through elevator hoistways and other vertical openings to floors above the area of fire origin. There was no evidence of a practiced emergency plan. There was some delay in notifying the fire department in both fires.

Based on NFPA's analyses of these four fires, and other recent hotel fires, a pattern of key fire problems has been identified. Elements of this pattern include:

- Smoke spread exposing large numbers of people in high-rise towers;
- Uncontrolled fire development involving combustible contents and interior finishes in nonsprinklered areas;
- Lacking or inadequate emergency organization plan;
- Inadequate enclosures of stairways and other vertical openings, allowing smoke spread to upper floors and impairment of the means of egress;
- Application of combustible interior finishes, allowing fire development and spread beyond the area of fire origin;
- Need to apply state-of-the-art engineering and technology, along with state-of-the-art requirements of building and fire codes.

Possible Intervention Strategies

Each of the recent hotel fires, along with earlier hotel fires involving large loss of life, illustrates the devastating results that can occur when fires spread beyond predesigned (designated) fire areas (compartments). Fires in modern structures such as hotels are able to spread beyond their compartmented areas for a variety of reasons. Local authorities might accept less than state-of-the-art fire protection features or methods in adopting fire protection codes. Human action — such as blocking fire doors open or locking exits closed — can void local ordinances or firesafe designs. Existing fire protection features may be damaged during renovation or may not receive sufficient maintenance or appropriate care.

For these problem areas, however, there are corresponding intervention strategies.

- Adopt and enforce state-of-the-art codes. Since the development and adoption of fire codes is both complex and time-consuming, some jurisdictions may be reluctant to alter their existing codes. For the fullest possible protection, however, the adoption and enforcement of state-of-the-art codes are necessary.

State and local use of codes must include an assessment of existing "nonconforming" hotels. Where deficiencies are found, the severity of those deficiencies must be determined. In assessing severity, the deficiencies may be compared against requirements for existing hotels, from the NFPA *Life Safety Code*® (NFPA 101), for example, or against deficiencies that contributed to recent hotel fires.

- Educate the public. Recent hotel fires have demonstrated the importance of occupants' emergency behavior. In human behavior studies of guests who survived recent hotel fires, actions such as staying low, feeling the door for heat, and alerting other occupants were a common theme.
- Train hotel staff. Staff action in reporting fires, in alerting guests, and in assisting in evacuation can have significant influence on the outcome of a hotel fire. In emergency situations, guests perceive hotel employees to be "authority figures" and will tend to follow their instructions — even when those instructions are contrary to the guests' planned actions. Adequately trained staff can also assist guests by providing proper instructions and information, such as "Use stairs," "Stay low in smoke," and the location of remote exits.

The staff can also be sensitized to the importance of the hotel's fire protection features, such as self-closing doors, and then report deficiencies to hotel management or fire inspection personnel.

- Prepare for the fire emergency. Fire department personnel and hotel employees need to jointly plan for fire emergencies, including an outline of fire department responsibilities and hotel staff responsibilities. In many cases, joint plans take the form of an "Emergency Evacuation Plan" that specifically assigns responsibilities during fire emergencies. This type of plan should be developed by hotel management, with the cooperation and detailed technical input of the local fire department. Input by the fire department will be based, in part, on the specific fire protection features of the hotel. △