

THE STATION

LIVE MUSIC

NFPA Case Study: Nightclub Fires

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NFPA

Fire Investigations Department
One Batterymarch Park
Quincy, MA 02169 USA

Phone: (617) 984-7263

Fax: (617) 984-7110

Email: investigations@nfpa.org

Web site: www.nfpa.org

In the late evening hours of February 20, 2003, a fast-moving fire spread through The Station nightclub in West Warwick, Rhode Island. At the time that the fire began there were reportedly over 440 occupants in the club. This fire completely destroyed the building and resulted in 100 fatalities and over 200 injuries, becoming the fourth deadliest nightclub fire in U.S. history.

This fire immediately invoked memories of other tragic fires in assembly occupancies, such as the Coconut Grove, the Rhythm Club, and the Beverly Hills Supper Club. Many common factors can be found when analyzing these tragedies, including combustible interior finish, overcrowding, and problems with egress.

Following several months of study and analysis, several changes to key NFPA codes were completed resulting in new requirements that would help to mitigate similar occurrences in the future. These changes were made to NFPA 101®, *Life Safety Code*®, and NFPA 5000®, *Building Construction and Safety Code*®, relating to Assembly Occupancies and included provisions for crowd managers, added further restrictions on festival seating unless a life safety evaluation had been completed, required facilities to conduct egress inspections before opening for business, and added provisions that would require automatic sprinklers in existing nightclub-type assembly occupancies with occupant loads of over 100 and in all new nightclub-type assembly occupancies. The Tentative Interim Amendments (TIAs), which were approved by the NFPA Standards Council as interim requirements in July of 2003 became permanent provisions of the 2006 editions of NFPA 101, *Life Safety Code*, and NFPA 5000, *Building Construction and Safety Code*, as well as NFPA 1, *Uniform Fire Code*™.

Additionally, the 2006 editions of NFPA 101 and NFPA 5000 require the main entrance/exit of new nightclub-type assembly occupancies to accommodate not less than two-thirds of the total occupant load. Other exits must accommodate not less than one-half the total occupant load. Thus, the total egress capacity must accommodate 117% of the total occupant load.

This case study will review historic fires in assembly occupancies as well as review The Station nightclub fire and the response of NFPA to this tragedy. In addition, changes made by the states of Rhode Island and Massachusetts as well as an investigation completed by the National Institute of Standards and Technology are also summarized.

Historical Perspective

Fires resulting in large losses of life in assembly occupancies have been occurring for hundreds of years. In the 19th century, theatres were the most common assembly location where major fires resulting in large numbers of fatalities occurred. Some examples are:

- Richmond Theatre, Richmond, VA – December 26, 1811 – 72 Fatalities
- Conway Theatre, Brooklyn, NY – December 5, 1876 – 295 Fatalities
- Ring Theatre, Vienna, Austria – December 8, 1881 – 794 Fatalities
- Comiqué Opera House, Paris, France – May 25, 1887 – 200 Fatalities
- Royal Theatre, Exeter, UK – September 4, 1887 – 187 Fatalities

As the 20th century began, the fire at the Iroquois Theatre in Chicago, IL, on December 30, 1903, resulted in 602 fatalities, making it the deadliest fire in an assembly occupancy in the United States.

Common contributing factors in these fires were lighting (candles, gas lamps, or electric stage lights) igniting combustible materials on or near the stage; inadequate, blocked/locked, or poorly designed egress systems; and combustible interior finish. In each of the cases previously mentioned the fire began in the area of the stage as a lighting fixture came in contact with combustible materials nearby and spread rapidly, spreading heat and smoke over the audience, resulting in a rush to the exits. In these examples, egress systems were often inadequate in number or design, if not blocked or otherwise nonfunctional. These conditions led to many occupants being overcome before they could reach an exit, resulting in large losses of life. In the case of the Iroquois Theatre, the facility was touted as “Absolutely Fireproof” as a way to ease the concerns of patrons. While the building itself may have been noncombustible, the interior finish, contents, and other furnishings were not.

In the years that followed the Iroquois Theatre fire, deadly assembly occupancy fires began to occur in clubs as these establishments became a popular form of entertainment and socializing.

The following are some examples of fatal fires in club settings. The accounts are taken from NFPA reports on the incidents.



Rhythm Club Natchez, Mississippi

April 23, 1940

A fire in the Rhythm Club in Mississippi took 207 lives and injured over 200 more of the 700 people that were in the building that evening to listen to a popular Chicago orchestra.

The Rhythm Club was a single-story, wood-framed building measuring 120 ft (36.6 m) x 38 ft (11.6 m). (See Figure 1.) The roof and sides of the converted garage building were covered with corrugated metal sheets. The structure contained approximately 24 windows (most of which apparently were shuttered or nailed shut at the time of the fire).

The club had only one exit, a door measuring 38 in. (0.9 m) wide. This door opened inward.

Inside the main entrance foyer was a pair of doors measuring 6 ft (1.8 m) wide, which also opened inward. These doors opened into a lobby area. Proceeding through the lobby one would enter the dance floor, which constituted the majority of the floor space. At the far end of the club, opposite the entrance, were the orchestra platform and the bar.

The interior of the club was decorated with dried Spanish moss, which was hung on wires from the ceiling joists above the dance floor. The interior walls were constructed of wooden shiplap boards up to 5 ft (1.5 m) from the floor. The floor was composed of wood planks over concrete.

At the time of the fire, 700 patrons and staff and musicians were reportedly in the building.

At approximately 11:15 p.m., a fire started near the hamburger stand, which was located adjacent to the only exit from the building. The fire quickly involved the Spanish moss, spreading the fire rapidly throughout the building, and above the crowd.

Patrons in the vicinity of the entrance were able to escape. However, those beyond the lobby area were quickly trapped by the fire, as pieces of the burning moss began to drop onto the fleeing occupants, igniting their clothing. The fire forced those who remained inside deeper into the building toward the orchestra platform.

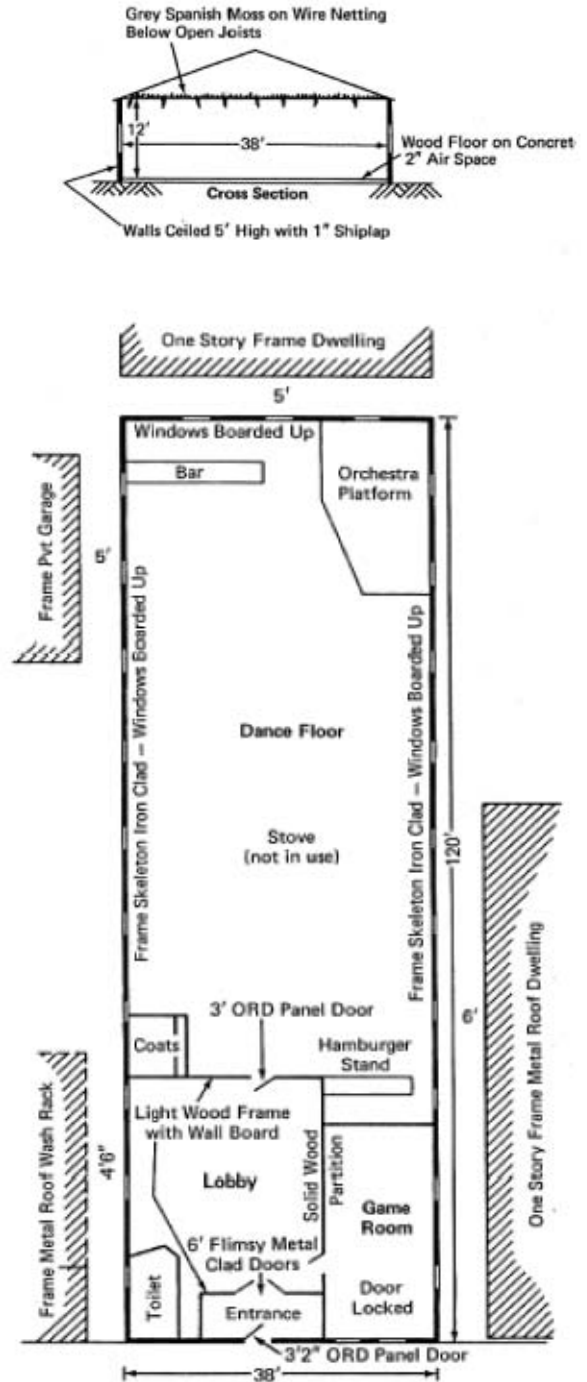


FIGURE 1 Layout of Rhythm Club (NFPA)

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It was in this location where the majority of the victims' bodies were found.

The fire department was notified and responded, extinguishing the fire quickly. During the overhaul of the fire, they made the grisly discovery of dozens of victims within the charred remains of the building.

The contributing factors leading to the loss of life in this incident were the lack of required exits and the highly combustible interior decorations. Less than three years later, these factors would again contribute to a large loss of life in another tragic fire.

**Cocoanut Grove
Boston, Massachusetts**

November 28, 1942

The Cocoanut Grove nightclub was a popular destination in Boston in 1942. The club offered entertainment in a nightclub on the street level as well as more intimate surroundings in a small lounge on a lower level. In the months leading up to the fire, another lounge (Broadway Lounge) had been opened adjacent to the club on the main level by renovating several adjacent buildings and adding them to the club's footprint. This renovation gave the facility the shape of two overlapping rectangles.

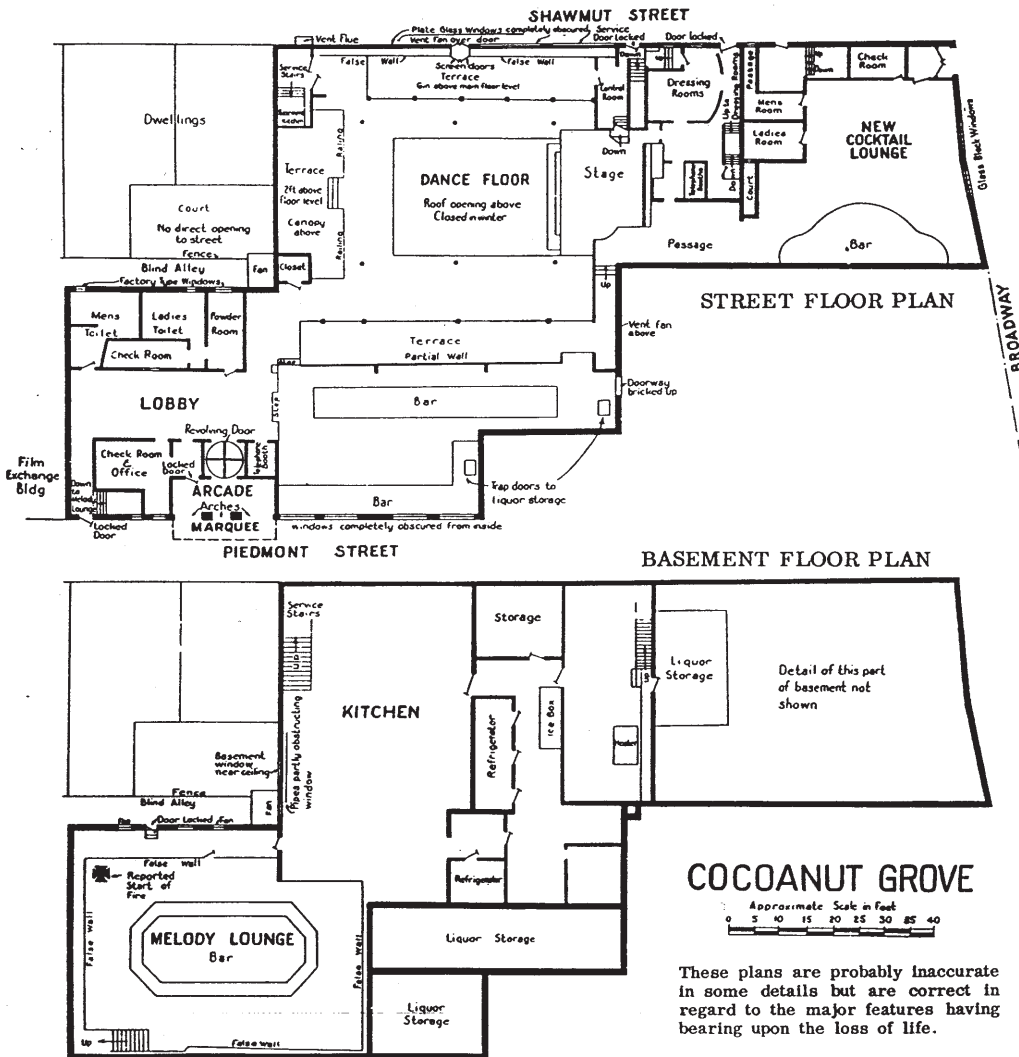


FIGURE 2 Layout of the Cocoanut Grove (NFPA)

The original building was constructed of concrete in 1916. In the years prior to its transformation into a nightclub, the building was used as a garage and film storage facility. It was bordered on three sides by Piedmont Street, Shawmut Street, and Broadway.

The building measured 100 ft x 90 ft (30.5 m x 27.4 m) in an irregular shape. (See Figure 2.)

The building was mainly a single story (with a partial lower level), except for a small upper level above the new lounge that contained dressing rooms and restrooms.

The lower level contained the Melody Lounge as well as the kitchen and liquor storage for the club.

The main club area measured approximately 60 ft x 60 ft (18.3 m x 18.3 m). The Broadway Lounge measured 40 ft x 40 ft (12.2 m x 12.2 m), and the Melody Lounge measured 55 ft x 35 ft (16.8 m x 10.7 m).

Exits from the facility were located on the Piedmont Street, Shawmut Street, and Broadway sides of the building. The main entrance was through a revolving door arrangement on Piedmont Street. This entrance opened into the lobby of the club. Access to the Melody Lounge was via a single set of stairs from the lobby. There were no other means of egress from this portion of the club. The Shawmut Street exit was located approximately halfway along the wall in the main club area. Another door on the Shawmut Street wall, adjacent to the stage, was locked. The Broadway exit was located in the new cocktail lounge. A single door, in the lounge, leading to the outer doors on Broadway opened inward.

All other doors within the building that would have provided access to the outside were locked or obscured at the time of the fire. One of these locked doors was located on the Piedmont Street side, to the left of the marquee over the main entrance. Had this door been unlocked at the time of the fire, it would have provided a means of egress for the patrons in the Melody Lounge, without them having to travel into the lobby and use the revolving door. (See Figure 2.)

Exits from the dressing rooms on the upper level were via stairs that terminated at the locked Shawmut Street door.

Windows on the Piedmont Street and Shawmut Street sides of the building were covered so as not to be visible from the inside of the building.

The interior of the nightclub was decorated with numerous fabrics and materials. These included artificial leather on walls and the bars, and cloth on the ceilings. Suspended ceilings and false walls throughout the facility covered the original construction features of the building. Artificial palm trees were placed in the club and in the Melody Lounge. Lighting and the associated wiring were incorporated into these trees. The Melody Lounge also contained rattan wood wall coverings.

Many of the furnishings within the club and lounges were covered in artificial leather material, as well.

Reportedly, just eight days before the fire, fire department inspectors found “no flammable decorations” and sufficient exits and fire extinguishers. The only deficiency the city building inspector found in an inspection just prior to the fire was the lack of a steel fire door between the Broadway Lounge and the main dining area.

After the addition of the Broadway Lounge, the club had applied for a license as a restaurant with a capacity of 490 patrons. The reported capacity of all areas was approximately 600. On the night of November 28, 1942, the Coconut Grove was well over capacity, with estimates of over 1,000 occupants in the building at the time of the fire.

The fire began in the area of an artificial palm tree in the Melody Lounge. A popular account was that a busboy used a match to provide light as he investigated a faulty light bulb within the tree. Within seconds the tree had ignited. The smoke, heat, and flames spread rapidly throughout the lounge, forcing patrons to flee, using the only exit passage toward the stairs and the lobby. Many were overcome before they could reach the exit.

The first indication of trouble for occupants on the main floor was when a young woman ran screaming through the lobby with her hair on

fire, immediately followed by a wave of smoke and heat from the stairwell. Many headed toward the exit on Piedmont Street, having entered the club earlier through the revolving door at that entrance. The revolving door quickly became jammed as patrons pushed toward the door.

Others within the main club headed toward the door on Shawmut Street. Many were able to exit through this door until smoke and toxic fumes, along with the tangle of hundreds of tables and chairs, overcame those remaining in the building.

Those in the Broadway Lounge were the last to know of the fire, being the most remote from the lobby area. Approximately 4–6 minutes from ignition, occupants from the main club area began to rush into the Broadway Lounge seeking an exit from the building. The smoke, heat, and fumes followed rapidly. The only remaining viable exit from the building was quickly jammed as the inward-opening door was forced closed by the crush of people attempting to exit.

The fire department, which had several units on the block for an automobile fire, was alerted by a passer-by to the commotion at the Cocomanut Grove. Arriving within seconds, fire fighters immediately went to work rescuing patrons near the entrances. Additional alarms were sounded as the magnitude of the situation became apparent. Windows were broken on the Shawmut Street side in an attempt to gain access to the building and as a means of removing victims. Fire fighters and civilians began to pull bodies from the building through any accessible point. Victims, suffering burns and smoke inhalation injuries, were transported by all available means to city hospitals.

At this point the fire had consumed the combustible interior finish and furnishings and was extinguished rapidly by the fire department.

Once fire fighters were able to gain access to the interior of the building they were met with a horrific sight: bodies piled several feet high at the revolving door and near the exit in the Broadway Lounge. Approximately 200 bodies were found at the revolving door and 100 more were found at the Broadway entrance. The remaining fatalities were found throughout the

facility, many at their tables, overcome so rapidly that they were unable to make an effort to escape.

In the days and weeks following the fire, the death toll became a staggering 492, making the Cocomanut Grove the deadliest nightclub fire in U.S. history.

In the months following the Cocomanut Grove fire, changes were made to building codes across the country. The most notable advances were made in the areas of exits, combustible materials, emergency lighting, and automatic sprinklers. The definition of places of public assembly was also expanded. Before the fire at the Cocomanut Grove, many jurisdictions did not consider restaurants and nightclubs to be places of public assembly. Notably, the 1942 edition of the NFPA *Buildings Exit Code* (the early version of today's *Life Safety Code*) did consider nightclubs to be essentially places of public assembly, in the same class as a theatre, but having a greater possibility of fire.³

Today it is recognized that all assembly occupancies should have at least two separate and remote means of egress, and the necessary number, width, and types of reliable exits based on the expected occupancy should be available. After the fire, Robert Moulton, NFPA's Technical Secretary and the secretary of the NFPA Committee on Safety to Life, indicated in a newspaper interview: "The most glaring feature of this tragedy was the lack of proper exits. Revolving doors have long been considered by the National Fire Protection Association Committee on Safety to Life as a menace under fire and panic conditions."⁴

That same edition of the *Code* required that "decorations of theatres and assembly halls shall be of fire-resistive or nonflammable materials. Fabrics and papers used for such purposes shall be treated with an effective flame-proofing material." A cautionary note warned: "Paper and cloth decorative materials should be kept to a minimum in places of assembly since such flimsy materials increase the hazard of the kindling and spread of fire."

Largely as a direct result of the Cocomanut Grove fire, the *Building Exits Code* was adopted by many more jurisdictions across the country, due

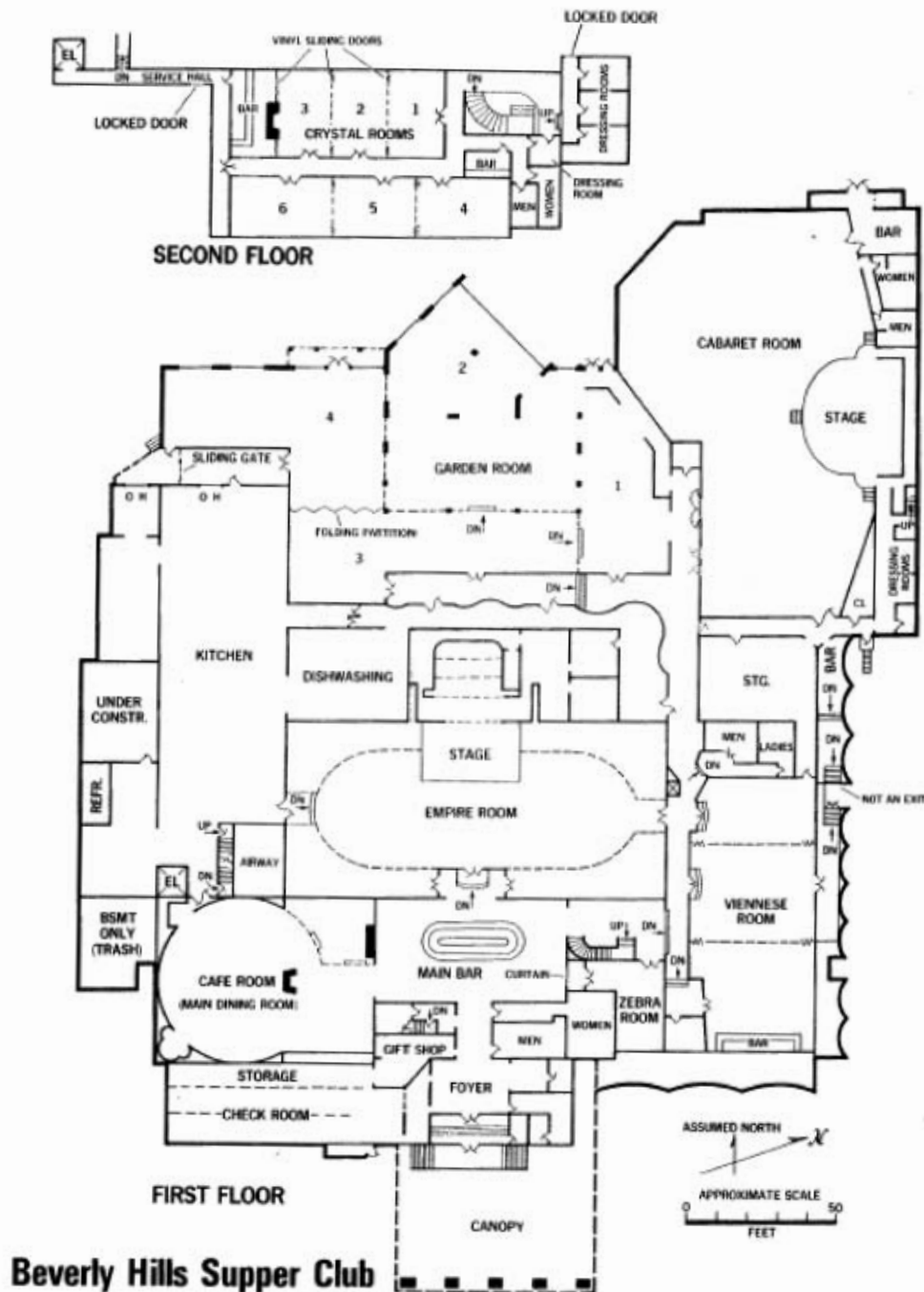


FIGURE 3 Beverly Hills Supper Club Layout (NFPA)

in large part to the efforts of the fire service. The Committee on Safety to Life reported on that increased usage at the 1945 NFPA Annual Meeting.

It was during the 1945 NFPA Annual Meeting that the Committee on Safety to Life also rec-

ommended a change in the method of exit measurement, clarification of the need for stair-way enclosure, provisions regulating loose chairs in nightclubs, and changes in lighting and signs. Those changes were incorporated into the 1946 edition of the *Code*, as was a special note on interior finish.⁵

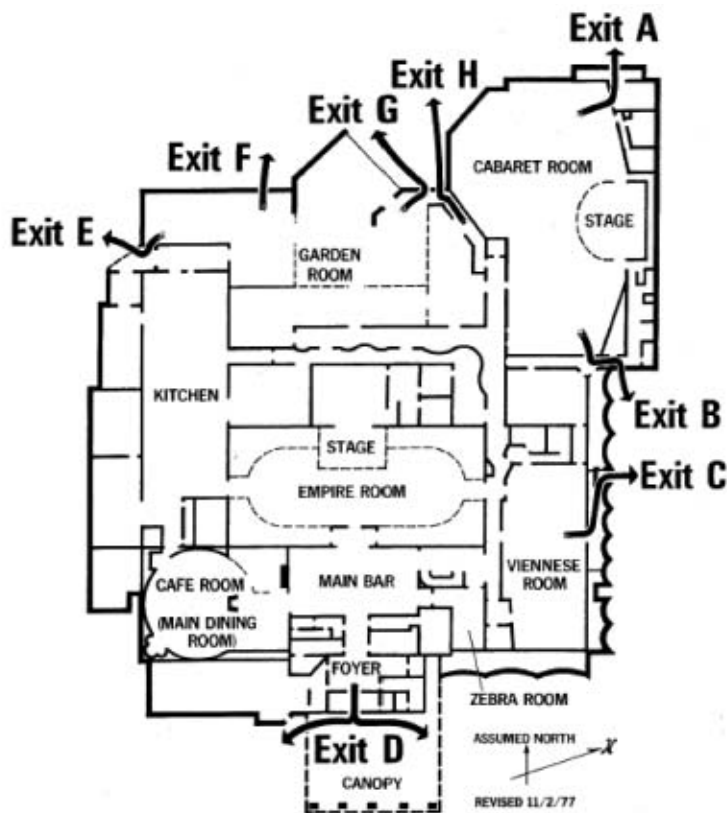


FIGURE 4 Exit Locations in the Beverly Hills Supper Club (NFPA).

Beverly Hills Supper Club Southgate, Kentucky

May 28, 1977⁶

On Saturday, May 28, 1977, approximately 2,400 to 2,800 people were attending several functions within the Beverly Hills Supper Club, an expansive banquet and nightclub facility. By the end of the night, 164 patrons and employees would die when a fire that began in an unattended room, and quickly spread throughout the facility, trapped many before they could exit the complex.

The Beverly Hills Supper Club was a mostly one-story facility that covered over 65,000 sq ft (6,039 sq m) of total floor space [ground level: 240 ft x 260 ft (73.1 m x 79.3 m)] and contained numerous function and meeting rooms as well as a large showroom (the Cabaret Room, which could seat over 1,200 people). (See Figure 3.) A second level was located above the Main Bar in the original portion of the complex and a partial basement was located

beneath the south portion. The original facility was constructed in 1937 and several additions and renovations were completed in the next 33 years until a major rebuilding project was undertaken after a fire in the complex in 1970.

The construction of the facility was classified as noncombustible (steel framing, masonry walls, poured concrete floors, and a built-up roof system on a steel deck). Throughout the facility, there were suspended ceilings of mineral tiles installed beneath the original plaster and fiber tiles. Wood framing was utilized for interior partitions in several areas in the complex, and floor joists in the two-story section (above the Zebra Room) were constructed of plywood and lumber.

The interior of the facility was decorated with wood paneling, draperies, and carpeting, among other combustible finishes.

Fire protection within the facility consisted only of portable fire extinguishers. The building was not equipped with automatic sprinklers or

standpipe systems. The complex did not contain an alarm system or fire/smoke detection devices.

There were eight exit discharge points from the complex. (See Figure 4.) However, one located in the Viennese Room (C), was “disguised” as a window, even though there was an exit sign installed above the door. Another door adjacent to the Cabaret Room was reportedly locked at the time of the fire (H). This door was adjacent to another exit, equipped with a double door (G).

At approximately 8:45 p.m. on the evening of May 28, a fire was discovered by a staff member in the Zebra Room, which had been unoccupied since a wedding party had left sometime before 8:00 p.m. Employees alerted managers to the fire, as other staff attempted to battle the fire using portable fire extinguishers. As they continued to fight the fire, other employees began to assist patrons in exiting the building.

Customers in the rooms closest to the Zebra Room (Viennese, Empire, and Café) became aware of the fire first, as smoke traveled down the corridors and as the staff began to notify them to exit immediately.

The fire department was notified of a fire at the complex at 9:01 p.m.

Patrons in the Crystal Rooms on the second floor above the Zebra Room became aware of the fire when smoke and heat began to travel up the open stairway from the first level. All but two of the occupants on the second level escaped by using an unblocked stairwell into the kitchen. The remaining two were overcome and perished in the dressing room area on this level.

Those in the Cabaret Room were notified to exit by a staff person at approximately 9:06 p.m. Smoke and heat quickly began to fill the room, as the fire began to travel down the corridor from the Zebra Room. The smoke and flames rapidly filled the Cabaret Room and Garden Room, trapping many of the patrons before they could reach an exit. Two of the exits from the Cabaret Room (B and H) became blocked by smoke and heat, rapidly forcing almost all of the patrons (estimated at 1,200 to 1,300) in the room to attempt to reach the only remaining exit (A).

As the initial fire department units were responding to the scene, smoke was visible from a distance. Upon arrival, the Southgate fire chief reported smoke issuing from the main entrance, several injured people gathered near the building, and occupants still exiting the complex. The magnitude of the situation quickly became apparent and the chief requested additional resources. Several hose lines and aerial streams were put in service as more and more apparatus arrived. Rescue efforts concentrated on those victims still in the complex, as personnel attended to those who had exited or had been removed and were lying injured outside the complex.

A decision was made at approximately 11:30 p.m. to evacuate all fire personnel from the building as the fire continued to spread throughout the massive complex.

Eventually the incident involved every fire department in the county. Twenty-four fire departments responded with ambulances or rescue units from surrounding counties as well. In total, approximately 522 fire fighters responded to the fire.

The fire was placed under control at approximately 2:00 a.m. on May 29. The search for victims began again at daylight.

The fire was not declared completely extinguished until Monday, May 30.

The majority of the victims were removed from the Cabaret Room on the night of the fire. They included 99 victims that were located in the vicinity of Exit A, the double swinging doors to the left of the stage. Another 34 victims were located in the vicinity of Exit B, to the right of the stage, near the dressing rooms. An additional 26 victims were recovered after the fire from the area around Exit A. Two victims were located in the Viennese Room after the fire. Three injured victims eventually died at the hospital, resulting in a total of 164 fatalities.

The complex was completely destroyed by the fire. The vast majority of the roof structure collapsed into the building as a result of the fire damage.

The team conducting the investigation of the fire determined that the most probable cause of the fire was an electrical malfunction in the

concealed space at the ceiling of the Zebra Room. The exact fixture or appliance could not be determined due to the damage in the area of origin.

The NFPA report on the Beverly Hills Supper Club fire found that the following factors contributed to the loss of life:

- Delayed discovery of fire in the Zebra Room
- Attempts by employees to extinguish the fire before notifying occupants
- No Emergency/Evacuation Plan to train employees in proper actions in the event of a fire
- Overcrowding: At the time of the fire the Cabaret Room contained almost three times the number of occupants that the space could safely accommodate. At the time of the fire the entire facility contained almost twice the number of occupants that the facility could safely accommodate.
- The capacity of the means of egress for the facility and especially the Cabaret Room was not adequate for the occupant load when calculated based on the square feet per person or the actual number of occupants.
- The interior finish in the main north-south corridor exceeded the flame spread allowed for assembly occupancies in the *Life Safety Code* and contributed to the rapid fire spread from the Zebra Room to the Cabaret Room.
- The complex was not provided with automatic sprinkler protection as would have been required by the building code and fire codes in effect at the time.

In the next edition of the *Life Safety Code* (1981) following the fire, changes were made in the following areas:

- Both new and existing assembly occupancies with occupant load exceeding 300 were required for the first time to have a fire alarm system, complete with a voice message form of occupant notification. Therefore, a large facility such as the supper club (new or existing) in this case, would be required to have a fire alarm system.

- New assembly occupancies with occupant load exceeding 300 (regardless of building construction type) were required for the first time to be sprinklered (exemptions included: auditoriums with fixed seating, multipurpose auditoriums less than 12,000 sq ft in educational occupancy buildings, restaurants with an occupant load of fewer than 1,000 persons, passenger terminals at or above grade, and gymnasiums used for no other purpose). Therefore, a new facility like the one involved in this fire would be required to have a sprinkler system installed.

When reviewing these three incidents, some common contributing factors can also be found:

- Combustible Interior Finishes
- Inadequate Egress Capacity
- Overcrowding

With the exception of the ignition sources being open flame in earlier incidents, the contributing factors are the same as those from the incidents over 100 years ago.

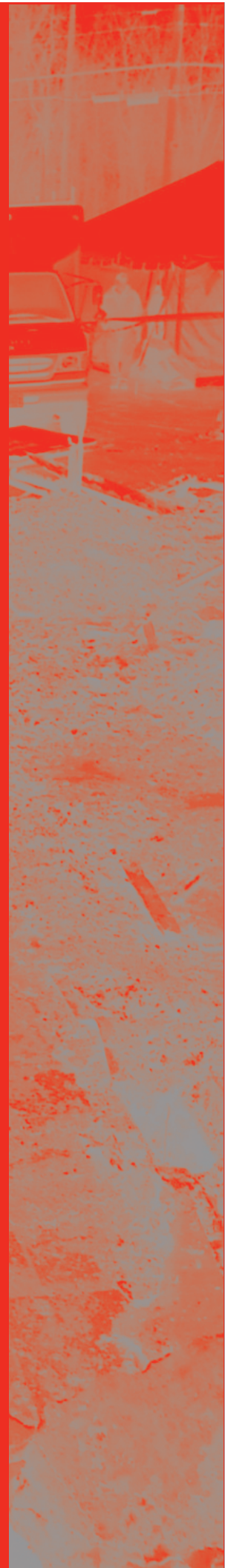
The Station

NFPA became aware of The Station nightclub fire in the early morning hours of February 21, 2003. As the magnitude of the incident became clearer, NFPA Senior Fire Investigator Robert Duval traveled to West Warwick, RI, that morning, at the request of the Rhode Island State Fire Marshal's Office, to provide assistance immediately following the tragedy.

While on the scene in the hours and days following the incident, opportunities were taken to meet with investigators, fire officers, and fire fighters; to view the scene; and to perform an on-site study of the incident. The information gathered during the on-site activities and subsequent analysis of that information is the basis for this report. Entry to the fire scene was made through the cooperation of the Rhode Island State Fire Marshal's Office.

The information in this report is intended to serve as an aid to researchers, safety specialists, the fire service, and to the codes- and standards-development activities conducted by NFPA and other organizations. The opinions expressed and conclusions drawn are those of the NFPA staff who prepared this report and do not, therefore, necessarily represent the official position of NFPA or of the NFPA Technical Committees that develop NFPA codes and standards. *(See NFPA Regulations Governing Committee Projects 6-1.1.)*

All information and details regarding the fire safety conditions gathered in this report are based on the best available data and observations made during the on-site data collection phase and on any additional information provided during the report development process. It should be noted that the ability of NFPA staff to collect all relevant facts and draw definitive conclusions may be limited by a variety of factors, including available time and access. This report is not intended to comprehensively document or analyze this fire incident. For such a report, see the National Institute of Standards and Technology (NIST) technical investigation report summarized in the Appendix. Rather, this report focuses on some of the contributing factors that have been seen in the other nightclub fires summarized in the first part of this study. The purpose of the report is not to pass judgment on or fix liability for the loss of life and property resulting from the fire but is rather to provide documentation and discussion that may help to better the understanding of how to minimize or prevent such losses in the future.



The 2003 editions of relevant NFPA codes and standards were used as the basis for this analysis so that the information gathered about the fire could be reviewed in light of the most current editions of NFPA codes and standards available at the time of the fire. It is recognized, however, that these codes and standards may not have been in effect during the design, construction, and operation of the building. NFPA has not analyzed the building in West Warwick regarding its compliance with the local codes and standards in existence when the building was constructed and during its operation. In addition, NFPA reviewed information included in the NIST–National Construction Safety Team report on the fire.

The cooperation of the Rhode Island State Fire Marshal's Office is greatly appreciated. The author would also like to extend his appreciation to former Rhode Island State Fire Marshal Irving Owens, Chief Deputy State Fire Marshals Michael DiMascolo and Richard James, and their staff for their assistance during the on-scene portion of the investigation and in preparing this report.

Building Construction and Occupancy

The building that contained The Station nightclub was constructed in approximately 1946. The structure was utilized as a restaurant, tavern, and nightclub under various owners. Numerous renovations and repairs were completed on the building in the time since construction.

A fire damaged the club in March of 1972. The building remained closed until November 1974, when repairs were completed on the fire damage. At this point the building was converted

from a club into a restaurant, and reopened. In February 1985, a change of ownership occurred and the facility was converted once again to a “pub.” According to records, in 1991 the facility was converted to nightclub use.⁷

The building was a wood-framed structure with a mansard-type roof façade on the north side. The walls were of wood construction, with wooden exterior shingles. The wood frame roof structure was mostly flat with a built-up asphalt covering.

A partial basement was located beneath the eastern portion of the building.

Windows were located mainly on the north face of the building. Windows on the east side of the front entrance consisted of double-hung type, while the west side contained a “sunroom-type” window assembly. Small windows were located in the restrooms and office areas on the south wall of the building. These windows contained security bars.

The interior of the building was arranged into two distinct areas: the bar and the club. The bar area was located in the northeastern portion of the building (to the left as one entered the front entrance). This area also included the kitchen and dart room portion of the facility. The club portion, which encompassed the majority of the facility, was located west (right) of the front entrance. This area of the facility included the dance floor, the platform, and the sunroom, which contained billiard tables. (See Figure 6.)

The entrance to the facility was arranged with a short corridor, approximately 15 ft (4.6 m) in length and 6 ft 6 in. (2 m) in width. At the end of this corridor there were doorways to the right and left. The bar area was located to the left, while the club area occupied the space to the right of this corridor.

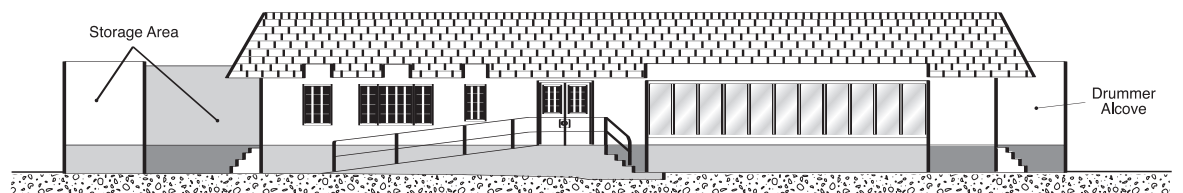


FIGURE 5 Front (north) View of The Station Nightclub.

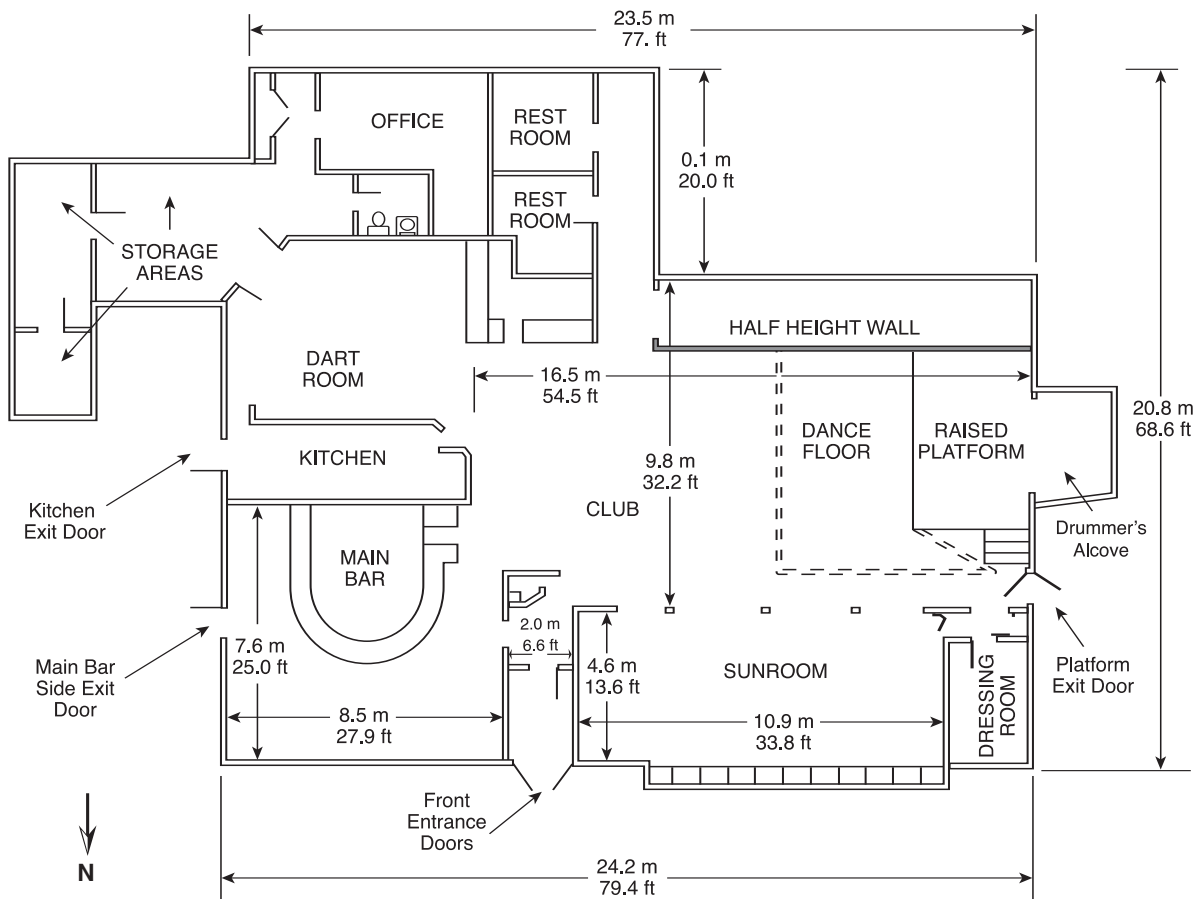


FIGURE 6 The Station Building Floor Plan.

The bar area contained a horseshoe-shaped bar in the northeast portion of the building. The kitchen was located immediately behind the bar. A room referred to as the dart room was located behind the kitchen. Access to the food and beverage coolers was located through the dart room.

The southeast corner of the building contained the business office and the club restrooms.

The club area of the facility contained small tables with chairs and a small number of booths along the southwest wall of the area. The tables and chairs could be rearranged or removed from the building in the event a large crowd was anticipated for a show. The billiard tables could be moved against the walls in the sunroom in order to make room for additional patrons. On the night of the fire, the tables were moved to allow for extra room.

A raised platform was centrally located on the west wall of the club area. An alcove was located to the rear of the platform to allow for additional room on the platform. When bands performed, the drummer was usually located in this alcove. The ceiling area directly above the platform was raised slightly to allow for the installation of a stage lighting unit.

The interior finish at the time of the fire reportedly consisted of painted surfaces, wooden paneling, and expanded foam plastic insulation. In an effort to lessen the noise on the exterior of the club when bands performed at the club, expanded foam insulating material was installed on the walls of the building interior, around the platform and within the drummer's alcove. The exact extent of the expanded foam plastic insulating material installation and its composition is not known.

Egress Arrangement

The building contained four exits:

- Front (main) doors
- Bar side exit door
- Platform exit door
- Kitchen exit door

The front entrance contained two doors (each 36 in. [0.9 m] wide) that swung outward. A ramp and step arrangement was located at the front entrance. A railing on the platform was installed parallel to the front wall of the building, making the platform at the entrance 6 ft 6 in. (2 m) wide. A single, outward swinging door was located approximately 6 ft (1.8 m) into the corridor as measured from the front doors. The cross-corridor door was approximately 36 in. (0.9 m) wide. The corridor measured 6 ft. 7in. (2 m) in width.

The front entrance corridor contained two openings into the main portion of the building, one on the bar side of the corridor and the other into the club. A counter for a ticket taker was located to the left at the end of the corridor.

The bar and kitchen exits each contained a door 36 in. (0.9 m) wide that swung outward. Both doors were equipped with panic hardware.

The exit near the platform measured 36 in. (0.9 m) wide and contained two doors mounted in series in the door opening: one interior and one exterior. At the time of the fire, the interior door swung inward, while the metal-clad outer door swung outward. The exterior door was equipped with panic hardware.

Illuminated exit signs were located above each exit.

Fire Alarms

The building was equipped with a fire alarm system consisting of manual fire alarm boxes, heat detectors, and horn/strobe notification units. The heat detectors were located throughout the facility, including above and below the platform in the club area.

The fire alarm system was not connected to a central station service or to the local fire department alarm office.

Fire Protection

This facility was not protected with automatic sprinklers.

Portable fire extinguishers were located throughout the facility, although the exact distribution and type could not be determined.

The kitchen contained a chemical extinguishing system for the cooking area, as well.

The Incident

On the evening of the fire, the nightclub was hosting a program with several bands, including a headlining act. The headlining band took the stage at approximately 11:07 p.m. Several seconds into the act, pyrotechnic devices called gerbs⁸ were activated in the center of the platform, directly in front of the drummer's alcove.

A local television station was filming the evening's activities for an upcoming story on nightclub safety in the days following the fatal crowd crush incident at the Chicago E2 nightclub, which claimed the lives of 21 on February 17, 2003. This news video provided a firsthand account of the activities inside the club in the moments leading up to the fire, as well as the first terrifying moments after the fire. (A video account of such a tragic incident is rare, but has occurred before as in the case of the Bradford Soccer Stadium Fire in England on May 11, 1985.)



In the news video, the viewer can see the lights dim as the band takes the stage and begins the first song. As the pyrotechnic devices activate, the sparks emanating from the gerbs ignite the material on the walls around the platform, near the opening to the alcove. Flames begin to expand slowly at first, at the two ends of the alcove opening, spreading upward. For the first few seconds, the crowd seems to think the fire is part of the pyrotechnic special effects and the band seems unaware of the fire. Within 10 to 20 seconds, crowd members begin pointing at the spreading flames on the walls, as members of the band become aware of the fire. The band stops playing and leaves the platform in less than 30 seconds. At this point the crowd begins to react and to attempt to egress the building.

The cameraman's viewpoint is from the rear of the dance floor area and the video clearly shows patrons beginning to egress the building using the main entrance, which is to the cameraman's right. The fire alarm sounds at approximately 40 seconds from the time of ignition. The horns and strobes can be clearly heard and seen in the video. The cameraman merges into the exiting patrons and leaves the building approximately 70 seconds from the time of the ignition. As the cameraman exits, the video shows the fire growing rapidly on the walls near the platform and the smoke layer growing thicker throughout the building. As the cameraman enters the corridor near the front entrance, smoke can be seen on the video, growing heavier, from a light haze to a darker gray.

Once the cameraman is outside, the video displays the smoke growing thick and black and billowing out the front doors and windows as patrons use both to escape. Within seconds, escaping patrons begin to pile up at the front doors, as those behind them struggle to escape. Those who have escaped attempt to free those trapped in the pile, as heavy smoke pours out over their heads.

The video then shows the scene as the cameraman walks around to the west from the front of the building. As he trains the camera in the platform door opening, the viewer sees thick black smoke within 12 inches of the floor, and bright orange flames deep within the building.

Approximately 4 minutes and 30 seconds have elapsed from the time of ignition.

At this point, sirens can be heard. As the cameraman walks back toward the front of the building, the situation has worsened. The black smoke has turned to flame at the front entrance and at the open windows along the front of the building. As the first fire apparatus arrives on the scene, a hoseline is stretched to the front entrance and water is aimed into the front corridor in an effort to save those trapped in the entrance corridor.

From the time of ignition to the point where the facility was well involved in flames less than 6 minutes passed.

The initial 911 calls for assistance were received from cellular phones at the scene. The police officer stationed at the club on a paid detail notified his dispatcher of the fire as well.

The West Warwick Fire Department, upon notification of the severity of the situation, requested mutual aid from surrounding communities for both fire apparatus and ambulances. A Multiple Casualty Incident (MCI) was declared and the local MCI plan was put into effect.

A triage area was established in a restaurant across the street from the nightclub. As fire and rescue units converged on the scene, victims were transported to nearby hospitals and trauma centers, quickly filling many to capacity. Over 200 victims were treated on the scene and transported to several medical facilities in the area in under 2 hours from the time of the fire.

The initial death toll was 96 on the day after the fire. This rose to 100 over the course of the 70 days following the fire, as four of the most severely injured died in hospitals in Rhode Island and Massachusetts.

With the transport of the last of the injured, the task of recovery of the victims within the building began, with units from the State Fire Marshal, State Medical Examiner's Office, and a task force of law enforcement agencies (local, state, and federal) taking part. The recovery phase was completed late in the day on February 21. (The last victim was identified on February 25.) The scene was secured as the investigation process began.

NFPA Timetable

Elapsed Time	Event
0	Pyrotechnics Activated
9 seconds	Flame Visible on Wall
19 seconds	Flames Progressing Upward – Crowd Begins to React
25 seconds	Flames at Ceiling
35 seconds	Band Stops Playing
48 seconds	Alarms Heard
1 minute	Smoke at Ceiling Throughout Room
1:15	Cameraman at Front Door (Smoke at Ceiling and Out Front Door)
1:30	Fire Visible at Platform Door
1:43	Black Smoke at Bottom of Sunroom Windows
1:53	Black Smoke at Front Door – Occupants Piled at Door
2:00	Alarms No Longer Audible from the Outside of the Building
2:23	Occupants Exiting at Windows Near Bar (Left of Front Exit)
3:00	Black Smoke at All Front Openings (Windows and Doors)
3:25	Black Smoke Fills Entire Front Door (Victims Still Piled at Door)
4:00	Black Smoke Thickening at All Front Openings
4:30	Sirens Audible in Background
4:30–4:45	View of Platform Door – Fire on Floor, Heavy Black Smoke, and Dripping Materials from Ceiling
5:00	Fire Visible at Restroom Wing
5:23	Flames at Front Openings (Doors and Windows)

NFPA Timetable Based on TV News Video

The Aftermath

The investigation into The Station nightclub tragedy involved many local, state, and federal agencies. Under the direction of the State Attorney General's office and State Fire Marshal, an investigative team composed of investigators from the State Fire Marshal's office and a statewide task force of law enforcement agencies, as well as investigators from the Bureau of Alcohol, Tobacco and Firearms (ATF) was formed to conduct the detailed examination of the fire.

The fire scene was processed and witnesses interviewed by the members of the investigative team. The scene processing included the involvement of a forensic archeologist from Brown University, whose team divided the scene into small grids and further processed the site for articles of evidence and personal effects of victims.

In the days following the fire, representatives from NIST (National Institute of Standards and Technology) operating under the National Construction Safety Team (NCST) Act visited the scene as well to gather preliminary information that would lead to a full report on the fire that was released in June 2005 (*see Appendix*).

On December 9, 2003, a state Grand Jury handed up indictments against the two owners of the nightclub and the manager of the headlining act. Each was charged with 200 counts of manslaughter. On February 7, 2006, the band manager plead guilty to 100 counts of involuntary manslaughter in a plea agreement. The trial for the club owners was slated to begin in mid-2006.

When comparing The Station incident with the other historic fires in assembly occupancies, one of the common factors among them is the presence of combustible interior finish, contents, and furnishings. The presence of combustible interior contents can be linked to the fire spread in the Rhythm Club (dried Spanish moss hung from the ceiling rafters), the Cocoanut Grove (furnishings and decorations), and the Beverly Hills Supper Club (wall and floor coverings). In The Station fire, expanded foam insulating materials were reportedly in place on



FIGURE 7 View from Interior of Club Showing the Platform and Drummer's Alcove (NFPA).



FIGURE 8 Exterior View of Exit Adjacent to Platform Area (NFPA).



FIGURE 9 Exterior View Showing the Kitchen Exit Looking Toward the Platform Area (NFPA).



FIGURE 10 Exterior View Showing Both the Bar and the Kitchen Exits (see arrows) (NFPA).



FIGURE 11 Interior View of Front Entrance Corridor Facing North Through the Main Entrance (NFPA).

the walls adjacent to the platform and in the drummer’s alcove space.

NFPA 101, *Life Safety Code*, has addressed interior finish in all occupancies, including assembly, for many editions of the document.

The classes of interior finish (A, B, and C) are based on a Flame Spread and Smoke Development Indexes. These indexes are determined by testing a material in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* (similar to ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*; or UL 723, *Standard for Test for Surface Burning Characteristics of Building Materials*).

In the 2006 edition of NFPA 101 the subject of interior finish is outlined in the following areas:

Chapter 10 Interior Finish, Contents, and Furnishings

10.1 General.

10.1.1 **Application.** The interior finish, contents, and furnishings provisions set forth in this chapter shall apply to new construction and existing buildings.

10.2.3.4 Products required to be tested in accordance with NFPA 255, ASTM E 84, or UL 723 shall be classified as follows in accordance with their flame spread and smoke development, except as indicated in 10.2.3.4(4):

(1) Class A interior wall and ceiling finish shall be characterized by the following:

- (a) Flame spread, 0–25
- (b) Smoke development, 0–450
- (c) No continued propagation of fire in any element thereof when so tested

(2) Class B interior wall and ceiling finish shall be characterized by the following:

- (a) Flame spread, 26–75
- (b) Smoke development, 0–450

(3) Class C interior wall and ceiling finish shall be characterized by the following:

- (a) Flame spread, 76–200
- (b) Smoke development, 0–450

Existing interior finish shall be exempt from the smoke development criteria of 10.2.3.4(1)(b), 10.2.3.4(2)(b), and 10.2.3.4(3)(b).

Chapter 13 Existing Assembly Occupancies

13.3.3 Interior Finish.

13.3.3.1 Interior finish shall be in accordance with Section 10.2.

13.3.3.2 Interior wall and ceiling finish materials complying with Section 10.2 shall be Class A or Class B in all corridors and lobbies and shall be Class A in enclosed stairways.

13.3.3.3 Interior wall and ceiling finish materials complying with Section 10.2 shall be Class A or Class B in general assembly areas having occupant loads of more than 300, and shall be Class A, Class B, or Class C in assembly areas having occupant loads of 300 or fewer.

Interior finish played a significant role in The Station fire in two ways. Not only was the interior finish easily ignited but it also allowed for the rapid spread of the fire within the building.

According to the *Life Safety Code*, the interior finish is required to be Class A or B for general assembly areas with occupant loads of more than 300. Class C interior finish is permitted if the occupant load is 300 or fewer. In addition, the expanded foam insulating materials attached to the walls near the platform would be subject to the provisions for cellular or foamed plastic, which prohibit the use of this particular material as interior finish unless it is utilized with insignificant amounts or the material has been subjected to fire testing that substantiates the combustibility characteristics for the use intended under actual fire conditions.

The presence of combustible interior finish in the area of the fire's origin affected the ability of the occupants to egress the building that night. The fire created conditions within the building that prevented many from reaching an exit before being overcome by smoke and heat. When viewing the video taken that night in the club, one can see that most of the occupants headed for the main (front) exit when the fire began. This exit and its corridor soon became jammed as occupants rushed to escape the worsening conditions in the building. The bottleneck at the corridor and the extremely rapidly growing fire conditions within the building forced occupants to attempt to use windows as a means of escape.

NFPA 101, *Life Safety Code*, has, for many generations of the document, addressed main entrance/exit requirements in existing assembly occupancies. In the 2003 edition, this requirement is outlined in the following paragraph:

13.2.3.6 Main Entrance/Exit. Every assembly occupancy shall be provided with a main entrance/exit.

13.2.3.6.1 The main entrance/exit shall be of a width that accommodates one-half of the total occupant load and shall be at the level of exit discharge or shall connect to a stairway or ramp leading to a street.

The rapid spread of the fire and the large volume of smoke is validated by the research and modeling conducted by NIST during its investigation.

When examining ignition sources from other historic fires in assembly occupancies, common forms were found to be lighting (gas, and then later, electric) coming in contact with combustible materials, or open flame, as was suspected in the Coconut Grove fire. However, The Station fire resulted from a form of ignition not often seen when comparing other fires in assembly occupancies: pyrotechnics.

NFPA 101, *Life Safety Code*, addresses pyrotechnics in existing assembly occupancies, as well as referencing NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*, in Chapter 13 on Existing Assembly Occupancies.

Chapter 13 Existing Assembly Occupancies

13.7.2 Open Flame Devices and Pyrotechnics.

No open flame devices or pyrotechnic devices shall be used in any assembly occupancy, unless otherwise permitted by the following:

(1) Pyrotechnic special effect devices shall be permitted to be used on stages before proximate audiences for ceremonial or religious purposes, as part of a demonstration in exhibits, or as part of a performance, provided that both of the following are met:

(a) Precautions satisfactory to the authority having jurisdiction are taken to prevent ignition of any combustible material.

(b) Use of the pyrotechnic device complies with NFPA 1126, *Standard for the Use of Pyrotechnics before a Proximate Audience*.

A similar requirement is also located in NFPA 1, *Uniform Fire Code* (1:20.1.4.2).

NFPA's Response

The inferno at The Station nightclub (February 20, 2003) claimed 100 lives in the fourth-deadliest nightclub fire in U.S. history. Only a few days before, on February 17, 2003, a crowd-crush incident at the E2 nightclub took 21 lives in Chicago.

In the immediate aftermath of these incidents, NFPA made available a wide range of safety information relating to public assembly occupancies. This included safety tips for club-goers, statistical and historical information about other major nightclub fires, *NFPA Journal*[®] articles, and links to NFPA fire investigation summaries of similar events. In addition, portions of relevant codes and standards were made available online, as was an inspection checklist for assembly occupancies.



The most important follow-up in the aftermath of these tragedies fell to the many volunteers that participate in the development and updating of NFPA codes and standards. NFPA consensus codes and standards are developed through a process that brings together volunteers representing varied viewpoints, experience, and expertise, to achieve a consensus of the affected interests on fire and other safety issues. NFPA staff do not determine the content of these codes and standards, but, instead, administer the process and establish rules to promote fairness, openness, and due process in the development of consensus. Many times in the past, the codes and standards development process has responded to and incorporated the lessons learned from major loss incidents. The response to The Station nightclub fire and to The E2 nightclub crowd-crush incident was no exception and yielded, in short order, new additional code provisions for fire sprinklers, crowd management, and increased main entrance/exit width in nightclub-type venues.

Three weeks after the Rhode Island nightclub fire, on March 13, 2003, the NFPA Technical Committee on Assembly Occupancies and Membrane Structures held a special meeting in Boston. Some 30 committee members and alternates, as well as survivors of The Station nightclub, victims' families, and members of the fire-safety community, gathered to discuss the Station fire as well as the crowd-crush incident at Chicago's E2 nightclub. The committee held a follow-up meeting on July 8–9, 2003, at NFPA Headquarters.

The committee proposed that NFPA issue emergency code amendments, called Tentative Interim Amendments (TIAs). TIAs, which are processed in accordance with Section 5 of NFPA's Regulations Governing Committee Projects, are emergency changes to an NFPA document code or standard that occur between the current edition and next edition of that particular document. These code changes are considered tentative because they have only been approved by the technical committee and NFPA's Standards Council, but have not yet gone through the full codes- and standards-making process that includes a review by the public through the proposal and comment phas-

es in the revision process. The TIAs are effective only between editions of a document and automatically become proposals for the next edition, when the document is then subjected to all of the procedures of the entire NFPA open-consensus revision process.

As a result of the tentative nature of these amendments, jurisdictions must adopt TIAs independently of their adoption of the relevant NFPA document if they so choose. At this point, some jurisdictions opt to use TIAs as guidance towards establishing their own legislation. In an effort to provide jurisdictions with codes and standards addressing the latest issues in building and life safety, NFPA offers support services, including free training, to assist state and local officials with adoption of these TIAs as well as the adoption of major NFPA codes and standards.

On July 25, 2003, the NFPA Standards Council reviewed and issued the technical committee's recommended TIAs for NFPA 101, *Life Safety Code*, 2003 edition, and NFPA 5000, *Building Construction and Safety Code*, 2003 edition.

The TIAs, which went into effect August 14, 2003, includes the following for assembly occupancies:

- A requirement that fire sprinklers be installed in new nightclub-like assembly occupancies (such as bars, dance halls, discotheques, nightclubs, and assembly occupancies with festival seating) [NFPA 101, 12.3.5.1] and in existing nightclub-like assembly facilities that accommodate more than 100 [NFPA 101, 13.3.5.1] [NFPA 5000 – 16.3.5.1.1]
- A requirement that, before opening to the public, building owners must inspect all means of egress to ensure that they are free of obstructions and functioning, and to maintain records of each inspection [NFPA 101, 12.7.1 and 13.7.1]
- A requirement that at least one trained crowd manager be present for all gatherings, except religious services. For larger gatherings, additional crowd managers are required at a ratio of 1:250 [NFPA 101, 12.7.5 and 13.7.5]
- A prohibition on the use of festival seating for crowds of more than 250 unless a life-safety

evaluation approved by the authority having jurisdiction has been performed [Festival seating, according to NFPA 101, is a form of audience/spectator accommodation in which no seating, other than a floor or ground surface, is provided for the audience to gather and observe a performance.] [NFPA 101, 12.2.5.4.1 and 13.2.5.4.1; NFPA 5000, 16.2.5.4.1]

On June 9, 2005, at the annual NFPA World Safety Conference and Exposition, the members of NFPA approved these recommendations based on the TIAs for the 2006 editions of NFPA 1, *Uniform Fire Code*, NFPA 101, *Life Safety Code*, and NFPA 5000, *Building Construction and Safety Code*. The NFPA Standards Council issued these revised codes on August 11, 2005.

An additional requirement that was not part of the TIAs was added to the 2006 edition of NFPA 101, *Life Safety Code*. The main entrance/exit width for new nightclub assembly occupancies was increased from a minimum of one-half to two-thirds of the total occupant load, while the other exits are required to accommodate a minimum of one-half of the total occupant load, for a total egress capacity of 117% of the occupant load.

Chapter 12 New Assembly Occupancies

12.2.3.6.2 The main entrance/exit width shall be as follows:

(1) The main entrance/exit shall be of a width that accommodates two-thirds of the total occupant load in the following assembly occupancies:

- (a) Bars with live entertainment
- (b) Dance halls
- (c) Discotheques
- (d) Nightclubs
- (e) Assembly occupancies with festival seating

12.2.3.7 **Other Exits.** Each level of an assembly occupancy shall have access to the main entrance/exit and shall be provided with additional exits of a width to accommodate not less than one-half of the total occupant load served by that level.

The Continuing Challenge

On February 20, 2003, a fire in a small club in Rhode Island once again reminded us that history can and will repeat itself. Throughout history, major fires resulting in large losses of life have occurred that have not only stirred the public conscience, but also moved the fire protection community to continue to refine our codes.

Refining the codes and standards is only part of the solution. These tragic fires and the accompanying loss of life often result from the same contributing factors which include highly combustible interior finish, combustible contents including decorative features, lack of properly designed and adequate egress systems, and overcrowding of occupants. In assembly occupancy fires, many of these contributing factors have been addressed in the codes for generations. The methods in our existing codes are based on sound protection principles that have stood the test of time.

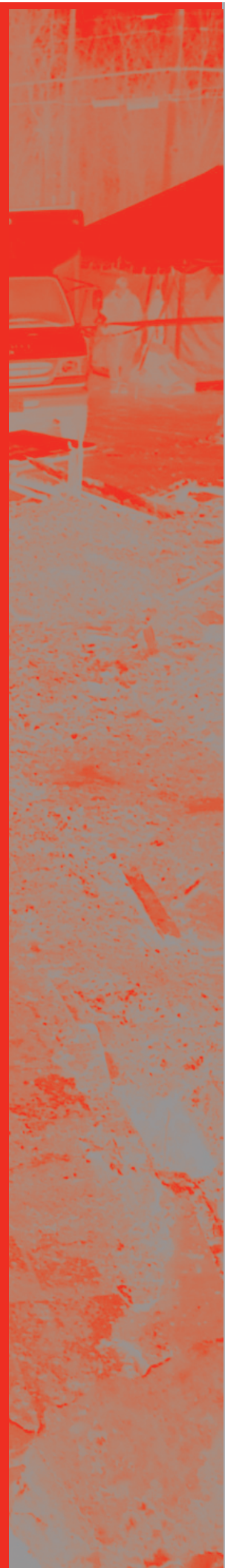
Refining the codes is a continuing process that combines the technical advances of today with present-day societal attitudes. The second part of the solution is getting the codes adopted. The third, and perhaps most important part, is enforcing these codes.

The Station nightclub fire adds to the long list of tragic nightclub fires. Even with the strides made toward improving safety in assembly occupancies, we are reminded that this battle is far from won. On December 30, 2004, a fire caused by pyrotechnics (fired by a patron of the club) resulted in 194 deaths and over 700 injuries in an overcrowded club in Buenos Aires, Argentina.

Appendix

In the time following the Station nightclub fire, the state of Rhode Island and the Commonwealth of Massachusetts moved rapidly, convening a commission and task force, respectively, to hear testimony regarding fire safety in assembly occupancies. Both Rhode Island and Massachusetts, as a result of this work, drafted legislation to improve fire safety in nightclubs. The governors of Rhode Island and Massachusetts each signed the improved protection into law. NFPA participated directly in both State's efforts by testifying before the commission in Rhode Island on April 30 and May 8, 2003, and before the Massachusetts task force on June 4, 2003.

The states of Maryland and New Hampshire adopted the TIA provisions as part of the state adoptions of the 2003 edition of NFPA 101, *Life Safety Code*, in July and October 2004, respectively.



The Rhode Island Response

In the weeks following the fire, the Rhode Island General Assembly created a 17-member commission to study changes in state law related to existing fire codes. This commission, entitled the Special Commission to Study All Aspects of Law Concerning Pyrotechnics and Fire Safety, consisted of members of the state legislature, representatives of the state fire service, the State Fire Marshal, the Lt. Governor, the Adjutant General of the State, the Director of the Department of Public Health, the Executive Director of the State Fire Code Board of Appeal and Review, and representatives from the hospitality and real estate industries.

Over the course of several weeks, the Commission heard and read testimony from victims and their families, the fire service, fire protection and life safety experts, and members of the entertainment and hospitality industries.

The Commission submitted several recommendations to the Governor in a report dated June 5, 2003. These recommendations can be summarized as follows:

- Eliminate the “grandfather clause” in the existing fire code, effective February 20, 2004.
- Require adoption of National Fire Protection Association (NFPA) codes NFPA 1, *Uniform Fire Code*[™], and NFPA 101[®], *Life Safety Code*[®], 2003 editions, for new and existing buildings, effective February 20, 2004.
- Require the Fire Safety Code Board of Appeal and Review and the State Building Code Commission to integrate administration of the fire and building codes by July 1, 2004, and conduct training needed for such purposes.
- Require fire alarms that are municipally connected in concentrated use places of assembly that are defined as “special amusement buildings” in the Rhode Island State Code (i.e., nightclubs) with occupancies of 150 or greater and in all Class A and Class B places of assembly,⁹ by July 1, 2004.
- Require sprinklers in all “special amusement buildings,” as defined in the Rhode Island Code [nightclubs] as places of assembly buildings with occupancy of 150 or greater, by July 1, 2006, and in Class A and Class B places of assembly, except fully alarmed places of worship and state and municipal buildings used for governmental purposes, by July 1, 2005.
- Require either an occupancy adjustment of minus 20% for the lack of sprinklers and 10% for the lack of fire alarms or a fire fighter on duty at any special amusement building as defined in the Rhode Island State Code with an occupancy of 150 or greater that is without sprinklers and fire alarms during periods of special amusement.
- Require by July 1, 2005, that all “special amusement buildings” as defined in Rhode Island State Code with an occupancy of less than 150 use fire retardant paints or other coverings, to a standard acceptable to the Fire Safety Code Board of Appeal and Review, unless the building has sprinklers.
- Prohibit use of pyrotechnics in all Class B and Class C places of assembly effective upon passage, and allow pyrotechnics only in Class A places of assembly that are fully fire alarmed and sprinklered.
- Require NFPA standards for the use of pyrotechnics, and require all licenses issued or renewed after February 20, 2004, to have holder demonstrate satisfactory knowledge of NFPA standards for the use of pyrotechnics.
- Raise the financial responsibility, which is currently \$50,000, to \$1,000,000 for permits to possess or use commercial fireworks or pyrotechnics, effective February 20, 2004.
- Make it a felony for violation of requirements for commercial and public use or display of commercial pyrotechnics, effective upon passage.
- Require “hard-wired” smoke and carbon monoxide detectors, with combined detectors specifically allowed, in three-family dwellings, by July 1, 2008.
- Give power of entry for purposes of inspections to fire marshals similar to those of other state and local inspectors, effective upon passage.

- Give power to fire marshals to order the immediate abatement of conditions (such as blocked fire exits or improper storage of flammable materials) that pose an imminent threat to public safety or property, and give power to the fire marshal, or a designee, to order premises to be vacated, effective upon passage.
- Require inspections of places of special amusement and places of assembly that have a Class B or Class C liquor license at least once annually during actual hours of operation when fire risks are highest, and require proof of compliance with the fire code for renewal of Class B and Class C licenses, effective February 20, 2004.
- Give power to fire marshals to issue citations for violations constituting imminent hazards that are identified in inspections for enforcement purposes, effective upon passage.
- For failure to correct routine violations, which are identified in inspections for enforcement purposes, provide for issuance of notice of violation (NOV), and make the failure to respond to the NOV subject to fine and made part of land evidence record; make failure to correct following a second NOV a misdemeanor that includes a greater fine and/or jail time, effective upon passage.
- Specify that a nightclub is considered a “special amusement building” and that use of a restaurant as a nightclub with concentrated occupancy, reduced lighting, or food service, constitutes a change in use for the purposes of fire and building codes, effective February 20, 2004.
- Require two fire extinguishers, which shall be at least 20 lbs or such other size as may be established as appropriate by the Fire Safety Code Board of Appeal and Review, in all stage areas, effective February 20, 2004.
- Require that alarm systems sound, that all lighting return to normal levels, and that any conflicting sounds or visuals stop on the actuation of any smoke detector or fire alarm, effective February 20, 2004.
- Require floor proximity exit signs for all occupancies greater than 150, by February 20, 2006.
- Require audible announcement of the location of emergency exits prior to each act or set, effective on passage.
- Require that there be an emergency plan for the premises, approved by a fire marshal and consistent with rules established by the Fire Safety Code Board of Appeal and Review, by July 1, 2004.
- Require that for every occupancy of 300 or greater there shall be a crowd manager present during special amusement events, who has been trained by the Fire Marshal with regard to the emergency plan and basic crowd management techniques, effective October 1, 2004. This requirement shall be in addition to the current requirement for a detail fire fighter.
- Prohibit use of decorative or acoustical materials that are not certified, consistent with NFPA requirements or such other requirements as may be established by the Fire Safety Code Board of Appeal and Review, with a penalty of up to \$5,000, effective upon passage.
- Augment the duties of the Fire Marshal to include planning, implementing, and overseeing a comprehensive system for fire safety education, fire prevention, fire safety code enforcement, and fire investigations, effective upon passage. (Note: Current law treats the Fire Marshal as a law enforcement officer, not a system manager.)
- Require the Fire Marshal to make public the repeat and/or uncorrected fire safety code violations of all places of assembly that are special amusement buildings and to provide this information on a web site, effective February 20, 2004.
- Require the Fire Safety Code Board of Appeal and Review to approve all local amendments, changes, additions, or deletions to fire safety codes, effective February 20, 2004.
- Require the preparation of five-year plans for the improvement of fire safety in Rhode Island, with the first plan due by February 20, 2004. The plans shall include recommendations regarding fire safety education.
- Require annual reports submitted by the Fire Marshal, on or before February 1, to the

Governor, the Speaker of the House, the President of the Senate on fire safety in Rhode Island, progress toward meeting goals set forth in the plan, and recommendations for improving fire safety. A copy of the report shall be provided to the Secretary of State, and the report shall be posted on the web site of the Fire Marshal.

- Provide sales tax exemption for sprinklers, fire alarms, and hard-wired smoke detectors in existing buildings, which are mandated by passage of the act, effective upon passage.
- Support funding for the Fire Marshal's office and the Fire Safety Code Board of Appeal and Review in order to implement the requirements of the changes in law.
- Request the Attorney General to monitor for price irregularities vendors and markets that may be affected by passage of new fire safety regulations.

The Governor signed a bill making these recommendations law on July 7, 2003. As a result, NFPA 1, *Uniform Fire Code*, and NFPA 101, *Life Safety Code* (2003 editions) became the basis for the Rhode Island Fire Code. The law also eliminated the use of "grandfathering" in the fire code where buildings were expected to meet the fire code in effect at the time of the building's construction or major renovation. Now all buildings, new and existing, have to meet the provisions of the current state fire code.

The state also adopted NFPA 1126, *Use of Pyrotechnics Before a Proximate Audience* (2003 edition), which restricts the use of pyrotechnics indoors to only properly protected facilities.

The Massachusetts Response

A third of the victims of The Station fire were citizens of the Commonwealth of Massachusetts. The Commonwealth established the Task Force on Fire and Building Safety on April 3, 2003. The 32-member group was composed of the Secretary of Public Safety, the State Fire Marshal, several state commissioners, fire chiefs from throughout the commonwealth, fire protection engineers and building

officials, representatives of the insurance, hospitality and entertainment industries, as well as family members of fire victims.

The task force held meetings throughout the state over the next several months, gathering information and feedback from citizens, fire protection experts, and entertainment and hospitality industry representatives. In September 2003, the task force presented the Governor's Office with a report containing recommendations on how to improve public safety as it relates to places of assembly. These recommendations included:

- All nightclubs, discotheques, dance halls, and bars with more than a 50 person occupancy should have automatic sprinklers installed within 3 years. Although the State Building Code requires automatic sprinkler systems in all new nightclubs, discotheques, dance halls, and bars, the threshold should be decreased and made to be consistent with the retrofit requirements for public safety purposes.
- The Board of Building Regulations and Standards should review sprinkler requirements for buildings used for other public assembly purposes, and should consider revising the State Building Code to require automatic sprinkler systems in these buildings. The task force recommends sprinklers be required at the following thresholds: "A-1" = 0 square feet, "A-3" = more than 5,000 square feet, "A-4" = more than 7,500 square feet.
- The State Building Code should require that all buildings used for public assembly purposes be equipped with a minimum 72 inch (nominal) width main exit door in addition to other required exit doors at other locations. The building official may allow an alternative means of compliance, where construction, regulatory, or other conditions exist that would preclude the installation of a 72-inch door.
- All owners of buildings used for public assembly purposes should satisfactorily complete a "Fire & Building Safety Checklist" as a condition of receiving a Certificate of Inspection and liquor license. The Board of Fire Prevention and Board of Building

- Regulation & Standards should implement this recommendation with the coordination of the Alcoholic Beverages Control Commission. The “Fire & Building Safety Checklist” should include questions on emergency planning, egress layout, overcrowding, fire protection systems, and employee training.
- The Alcoholic Beverages Control Commission should make the issuance or renewal of a liquor license contingent upon a valid Certificate of Inspection, issued by the local building official, and upon an inspection by the head of the fire department.
 - The Board of Building Regulations & Standards should study methods to enhance exit identification in all buildings used for public assembly purposes and incorporate these improvements in the upcoming seventh edition of the State Building Code. Topics for study should include low-level lighting that leads to each exit, outlining exit doors with luminescent marking, distinctive exit sign lighting, and scheduled testing and maintenance for the operation of exit signs and lights.
 - The Board of Fire Prevention Regulations should evaluate the requirements for audible announcements describing the location of emergency exits in all buildings used for public assembly purposes prior to and during performances.
 - The Board of Fire Prevention Regulations and the Board of Building Regulations & Standards should study a requirement that all nightclubs, discotheques, dance halls, and bars install an automatic shutdown mechanism that disconnects the music sound system and raises house lighting in the case of fire.
 - The Board of Fire Prevention Regulations should immediately prohibit the use of pyrotechnics in all nightclubs, discotheques, dance halls, and bars.
 - The Board of Fire Prevention Regulations should continue to allow the use of pyrotechnics in large entertainment venues and theatres that are provided with automatic sprinkler systems to the extent required by law.
 - The Board of Fire Prevention Regulations should require the owner, operator, and/or manager of large entertainment venues and theatres to sign a written statement on establishment letterhead acknowledging use of pyrotechnics in the building.
 - The Board of Fire Prevention Regulations should study, and possibly require the signatures of both the local Fire Chief and Fire Inspector on, all permits for indoor pyrotechnics.
 - The Board of Fire Prevention Regulations should study ways to improve record keeping, use, and storage of pyrotechnics.
 - The task force recommends that federal law be modified to require anyone who sells pyrotechnics in interstate commerce to notify in writing the State Fire Marshal and head of the local fire department of the intent to deliver pyrotechnic materials. Such notification will include the type of pyrotechnics and the date and location of the delivery.
 - The Board of Fire Prevention Regulations should extend the apprenticeship experience necessary for a pyrotechnics license from the current 2 years to 4 years, and require a greater degree of education and training.
 - The Board of Fire Prevention Regulations should regulate the use of fog/haze machines in buildings used for public assembly purposes.
 - The Board of Building Regulations & Standards and the Board of Fire Prevention Regulations should immediately prohibit the use of all foam plastics on interior finishes in all unsprinklered nightclubs, discotheques, dance halls, and bars.
 - The Board of Building Regulations & Standards should review the use of foam plastics on interior finishes in buildings used for public assembly purposes, and monitor the technological development of foam plastic materials in regard to meeting flame resistance requirements. Code officials should be educated to ensure that the installation of such materials is in accordance with approved testing criteria.

- The Executive Office of Public Safety should investigate the feasibility of reinstating the Toxicity Commission (a previous state-appointed body charged with studying the effects of smoke and gas developed during a fire by materials that ultimately affect the ability of a person to properly escape from a fire), and study federal oversight of interior finishes in public assembly buildings.
- The Department of Public Safety and the Department of Fire Services should undertake a program to educate the regulated community (i.e., nightclub owners, restaurant managers, etc.) and enforcement agencies on the meaning of labels found on interior finish materials.
- The Department of Fire Services and the Department of Public Safety should develop and administer a joint training program on fire and building safety standards for both fire and building inspectors. This training program should include training for police officers in conjunction with the Municipal Police Training Council.
- Certification of local building inspectors is currently required on a statewide basis. With respect to fire inspectors, the General Court should enact legislation requiring each municipal fire department to have a minimum of one or more trained and certified fire inspectors. An implementation system will be devised that will allow communities a reasonable period to comply based upon population (i.e., smaller communities will have a longer period of time to implement). A contingency policy will be developed by the Massachusetts Fire Service Commission that will address how communities deal with the absence of an inspector due to retirement, vacancy, injury, illness, etc.
- The Department of Fire Services and the Department of Public Safety should develop a comprehensive training program required for operators of buildings used for public assembly that would institute the employee position of Crowd Manager in all such buildings with occupancy loads of 50 or more. These programs should be designed in such a manner that operators can easily implement ongoing fire and building training at their establishments for every employee. Participation in these training programs should be part of an establishment's "Fire & Building Safety Checklist," which is a condition of a Certificate of Inspection and maintenance of a liquor license. Similar training should also be offered to police personnel who are assigned to entertainment venue details.
- The Executive Office of Public Safety should institute a public awareness campaign designed to raise public consciousness of personal fire and building safety when patronizing buildings used for public assembly purposes.
- The General Court should enact legislation creating specific criminal penalties for the owner or supervisor of buildings used for public assembly purposes who creates a dangerous condition with regard to:
 1. Any blocked or significantly impeded ingress or egress
 2. The failure to maintain or the shutting off of any fire protection or fire warning system required by law
 3. The storage of any flammable or explosive without properly issued permits or in quantities in excess of allowable limits of any permit to store
 4. The use of any fireworks or pyrotechnic device without a properly issued permit
 5. Exceeding the occupancy limit established by the local building inspector

The first infraction should result in a fine of not more than \$5,000 and/or imprisonment of not more than 2½ years. Subsequent infractions should result in a fine of not more than \$25,000 and/or by imprisonment of up to 5 years.

The General Court should enact legislation creating enhanced criminal penalties for an individual who violates a state building code or fire code provision that results in significant injury or death. Punishment should be a fine of not more than \$25,000 and/or imprisonment of up to 5 years.

- The General Court should enact legislation creating enhanced criminal penalties for individuals who violate an order to comply with fire code regulations. Punishment should be a fine of up to \$1,000 and/or imprisonment of up to 1 year. The Housing Court, District Court, or Superior Court should have jurisdiction.
- The General Court should enact legislation creating statewide uniform building and fire code enforcement procedures by which building and fire inspectors can issue standardized “code citation tickets” to building owners/operators for code violations.

The recommendations in this report became the basis for a bill that was signed into law as the Massachusetts Fire Safety Act (Chapter 304) in August 2004. The law went into effect on November 17, 2004. The main points of the law are as follows:

- Mandates sprinklers in places of assembly, such as nightclubs, with an occupancy of 100 persons or more within 3 years (by Nov. 15, 2007).
- Creates a two-strike rule for places of assembly with occupancies of less than 100 that exceed capacity. If a club is cited for an occupancy violation twice in a year, automatic sprinklers must be installed within 90 days or the business will be shut down.
- Eases the financial burden on businesses complying with the new law by putting in place an accelerated tax depreciation deduction for the purchase of automatic sprinkler systems required to be installed as a retrofit in existing nightclubs, discotheques, dance halls, and bars from the current 39 years to 5 years.
- Creates criminal penalties for dangerous conditions in public assembly buildings, including blocking ingress or egress, shutting off or failing to maintain fire protection systems, storing flammables or explosives, using fireworks or pyrotechnics without a permit and exceeding occupancy limits. The first infraction will result in a fine of not more than \$5,000 and/or imprisonment of up to 2½ years. Subsequent infractions will result in a fine of up to \$25,000 and/or imprisonment of up to 5 years.
- Establishes criminal penalties for individuals who violate provisions of the state building or fire codes when a violation results in significant injury or death. Violations may result in a fine of up to \$25,000 and/or imprisonment of up to 5 years.
- Restores the Student Awareness of Fire Education (SAFE) program, which helps educate children about fire safety awareness, and provides grants to municipalities to assist in the purchase of fire fighter safety equipment

Report of the Technical Investigation of The Station Nightclub Fire National Construction Safety Team - NIST

On June 29, 2005, the National Institute of Standards and Technology (NIST) released a report based on the findings of the National Construction Safety Team’s investigation of The Station nightclub fire.

Under the authority of the National Construction Safety Team Act, an investigation team was deployed by the NIST Director on Feb. 27, 2003, to investigate the incident seven days earlier at The Station Nightclub in West Warwick, Rhode Island.

The objectives of the investigation were as follows:

- Establish the likely technical cause or causes of the building failure
- Evaluate the technical aspects of evacuation and emergency response procedures
- Recommend, as necessary, specific improvements to building standards, codes, and practices based on the findings made pursuant to the duties listed above
- Recommend any research and other appropriate actions needed to improve the structural safety of buildings, and improve evacuation and emergency response procedures, based upon the findings of the investigation¹⁰

In addition to investigating the building construction, occupancy, the fire event, as well as the emergency response, NIST conducted both

laboratory simulations and computer modeling of the fire, based on available information.

The report indicates that the direct contributors to the large loss of life were found to be (1) the hazardous mix of building contents, (2) the inadequate capability to suppress the fire during its early stage of growth, and (3) the inability of the exits to handle all of the occupants in the short time available for such a fast-growing fire.¹¹

Based on observations and results of the research conducted by NIST, the report contained 10 recommendations.¹²

Recommendation 1

Model Code Adoption and Enforcement

NIST recommends that all state and local jurisdictions:

- a) Adopt a building and fire code covering nightclubs based on one of the national model codes (as a minimum requirement) and update local codes as the model codes are revised
- b) Implement aggressive and effective fire inspection and enforcement programs that address (i) all aspects of those codes; (ii) documentation of building permits and alterations; (iii) means of egress inspection and record keeping; (iv) frequency and rigor of fire inspections, including follow-up and auditing procedures; and (v) guidelines on recourse available to the inspector for identified deviations from code provisions
- c) Ensure that enough fire inspectors and building plan examiners are on staff to do the job and that they are professionally qualified to a national standard such as NFPA 1031, *Standard Professional Qualifications for Fire Inspector and Plan Examiner*

Recommendation 2

Sprinklers

NIST recommends that model codes require sprinkler systems according to NFPA 13, *Standard for the Installation of Sprinkler Systems*, and that state and local authorities adopt and aggressively enforce this provision:

- a) For all new nightclubs regardless of size
- b) For existing nightclubs with an occupancy limit greater than 100 people.

Recommendation 3

Finish Materials and Building Contents

NIST recommends that:

- a) State and local authorities adopt and aggressively enforce the existing provisions of the model codes
- b) Non–fire-retarded flexible polyurethane foam, and other materials that ignite as easily and propagate flames as rapidly as non–fire-retarded flexible polyurethane foam (i) be clearly identifiable to building owners, operators, contractors and authorities having jurisdiction (regulatory agencies); and (ii) be specifically forbidden, with no exceptions, as finish materials from all new and existing nightclubs
- c) NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, be modified to provide more explicit guidance for when large-scale tests are required to demonstrate that materials (other than those already forbidden in b above) do not pose an undue hazard for the use intended
- d) ASTM E 84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*, and NFPA 286 be modified to ensure that product classification and the pass/fail criteria for flame spread tests and large-scale tests are established using the best measurement and prediction practices available.

Recommendation 4

Indoor Use of Pyrotechnics

NIST recommends that NFPA 1126, *Use of Pyrotechnics Before a Proximate Audience*, be strengthened as described below, and that state and local authorities adopt and aggressively enforce the revised standard.

- a) Pyrotechnic devices should be banned from indoor use in new and existing nightclubs not equipped with an NFPA 13-compliant automatic sprinkler system.
- b) NFPA 1126 should be modified to include a minimum occupancy and/or area for a nightclub below which pyrotechnic devices should be banned from indoor use, irrespective of the installation of an automatic sprinkler system.
- c) Plans for the use of indoor pyrotechnics in new and existing nightclubs should be posted on site, and, in addition to the items listed in paragraph 4.3.2 of NFPA 1126, should describe the measures that have been established to provide crowd management, security, fire protection, and other emergency services.
- d) Subsection 6.6.2 of NFPA 1126 should be modified to require the minimum clearance between (i) the nearest fixed or moveable contents, and (ii) any part or product (igniter, spark, projectile, or debris) of a pyrotechnic device permitted for indoor use in new and existing places of assembly, to be twice the designed projection of the device, until such time that studies show that a smaller minimum clearance can guarantee safe operation in spite of the possibility that building decorations or temporary features that greatly exceed flame spread or fire load provisions of the fire code may occur.

Recommendation 5

Occupancy Limits and Emergency Egress

NIST recommends that the factor of safety for determining occupancy limits of all new and existing nightclubs be increased in the model codes in the following manner, and that state and local authorities adopt and aggressively enforce the following provisions:

- a) Within the model codes, establish the threshold building area and occupant limits for egress provisions using best practices for estimating tenability and evacuation time, and, unless further studies indicate another value is more appropriate, use 1½ minutes as the maximum permitted evacuation time for nightclubs similar to or smaller than The Station.
- b) Compute the number of required exits and the permitted occupant loads assuming at least one exit (including the main entrance) will be inaccessible in an emergency evacuation.
- c) For nightclubs with one clearly identifiable main entrance, increase the minimum capacity of the main entrance to accommodate two-thirds of the maximum permitted occupant level (based upon standing space or festival seating, if applicable) during an emergency.
- d) Eliminate trade-offs between sprinkler installation and factors that affect the time to evacuate buildings.
- e) Require staff training and evacuation plans for nightclubs that cannot be evacuated in less than 1½ minute.
- f) Provide improved means for occupants to locate emergency routes — such as explicit evacuation directions prior to the start of any public event, exit signs near the floor, and floor lighting — for when standard exit signs become obscured by smoke.

Recommendation 6

Portable Fire Extinguishers

NIST recommends that a study be performed to determine the minimum number and appropriate placement (based upon the time required for access and application in a fully occupied building) of portable fire extinguishers for use in new and existing nightclubs, and the level of staff training required to ensure their proper use.

Recommendation 7

Emergency Response

To ensure an effective response to a rapidly developing mass casualty event, NIST recommends that state and local authorities adopt and adhere to existing model standards on communications, mutual aid, command structure, and staffing, such as:

- a) NFPA 1221, *Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems*
- b) NFPA 1561, *Standard on Emergency Services Incident Management System*
- c) NFPA 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments*
- d) NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*

Recommendation 8

Research on Human Behavior

NIST recommends that research be conducted to better understand human behavior in emergency situations, and to predict the impact of building design on safe egress in fires and other emergencies (real or perceived), including the following:

- a) Impact of fire products (gases, heat, and obscuration) on occupant decisions and egress speeds

- b) Exit number, placement, size, and signage
- c) Conditions leading to and mitigating crowd crush
- d) Role of crowd managers and group interactions
- e) Theoretical models of group behavior suitable for coupling to fire and smoke movement simulations
- f) level of safety that model codes afford occupants of buildings.

Recommendation 9

Research on Fire Spread and Suppression

NIST recommends that research be conducted to understand fire spread and suppression better in order to provide the tools needed by the design profession to address Recommendations 2, 3, and 5. The following specific capabilities require research:

- a) Prediction of flame spread over actual wall, ceiling, and floor lining materials, and room furnishings
- b) Quantification of smoke and toxic gas production in realistic room fires
- c) Development of generalized models for fire suppression with fixed sprinklers and for fire fighter hose streams

Recommendation 10

Research on Computer-Aided Decision Tools

NIST recommends that research be conducted to:

- a) Refine computer-aided decision tools for determining the costs and benefits of alternative code changes and fire safety technologies
- b) Develop computer models to assist communities in allocating resources (money and staff) to ensure that their response to an emergency with a large number of casualties is effective

Notes

The entire NIST report can be found at:

http://www.nist.gov/public_affairs/ncst.htm#Rhode_Island_Nightclub

¹ “Natchez Dance Hall Holocaust.” 1940. *NFPA Quarterly* 34(1):70–75.

² *Cocoanut Grove Nightclub Fire Report*, NFPA, Boston - January, 1943.

³ Grant, Casey. 1991. “The Last Dance at the Cocoanut Grove,” *NFPA Journal*, May–June.

⁴ Ibid.

⁵ Teague, Paul E., M.A. *NFPA 101 Handbook*, Supplement 1,– “Case Histories: Fires Influencing the *Life Safety Code*.” Updated by Chief Ronald R. Farr and Kirsten Paoletti.

⁶ Best, R. 1978. “Reconstruction of a Tragedy — Beverly Hills Supper Club,” *NFPA Report*.

⁷ *NCST/NIST Report of the Technical Investigation of the Station Nightclub Fire*, pp. 1–9.

⁸ A cylindrical preloaded pyrotechnic device, intended to produce a controlled spray of sparks with a reproducible and predicted duration, height, and diameter. — NFPA 1126, *Standard for the Use of Pyrotechnics Before a Proximate Audience*, 2006 edition

⁹ Rhode Island Fire Code Classification of Places of Assembly (2000-2001 edition of State Fire Code):

Class A - Place of Assembly – Capacity of 1001 persons or more

Class B - Place of Assembly – Capacity of 301 to 1000 persons

Class C - Place of Assembly (New) – Capacity of 50 to 300 persons

Class C - Places of Assembly (Existing) – Capacity of 76 to 300 persons

References to Class A, B and C occupancies have been removed from current State Fire Code. Assembly Occupancies are now identified according to occupant capacity.

¹⁰ *NNCST/NIST Report of the Technical Investigation of the Station Nightclub Fire*, p. xvii.

¹¹ *NCST/NIST Report of the Technical Investigation of the Station Nightclub Fire*, p. xviii.

¹² Ibid., pp. xxii-xxv.



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