BOARD AND CARE FIRE
SAINTE GENEVIEVE, QUEBEC
August 31, 1996
FIRE INVESTIGATION
REPORT

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Prepared by
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ABSTRACT

A fire occurred on Saturday, August 31, 1996 at 12:30 p.m., in a board and care facility, which was occupied by 41 elderly residents. Seven residents died as a result of this fire.

The building was a two story structure that had an occupied basement, with a reinforced masonry exterior. The interior wood framed walls were all covered on each side by either 1/2 inch (13-mm) or 5/8 inch (16 mm) sheetrock. The roof and floor structural systems were lightweight wood trusses. The ceilings were also either 1/2 inch (13 mm) or 5/8 inch (16 mm) sheetrock, which were attached to the bottom chord of the trusses.

The building was not sprinklered. It was equipped with a fire alarm system that was comprised of system heat detectors in each of the rooms, two system smoke detectors in each hallway and two system heat detectors in each hallway. Manual fire alarm boxes also were located in the hallways. The system reportedly transmitted a signal to a central monitoring station.

There were eight staff members on duty at this time. According to investigators from the Montreal Police Department, the staff members had either minimal or no training in fire safety.

The fire was determined to have started in Room 208, which was occupied at the time. A staff member on the third floor heard a noise and went to the second floor to investigate. Upon arrival she saw the fire in the closet in Room 208. She proceeded to remove the occupant from the room and then went to sound the alarm.

According to the fire investigators, there was a delay in transmitting the alarm to the fire department. The first call to the fire department was made from a passerby and not from the alarm monitoring company.

The fire spread from the second floor to the third floor via an open exterior window on the room of origin, traveling up the outside of the building and then re-entered the building through a window directly above the room of origin. Also, at some point, the roof structure was ignited by direct flame impingement on the exterior of the building.

Fire also spread through the interior of the building when it breached the ceiling in the closet in Room 208 and then spread laterally through the floor trusses between the 200 and 300 levels. The wall between the resident’s rooms and the corridor did not extend fully through the combustible void space.

Fire and smoke also spread through the open door to the room of origin, into the corridor on the 200 level. Since the corridor doors and the stairwell doors were propped open, fire was also allowed to spread via these avenues.
All seven fatalities were residents who were on the third floor. According to information provided by the facility, four were considered ambulatory patients and three required the use of wheelchairs. Their ages ranged from 74 years old to 90 years old. Some of the victims were found in their rooms, while others were found in locations that indicated they may have been trying to escape but were overcome before reaching safety.

Based on the NFPA’s investigation and analysis of this fire, the following, significant factors were considered as having contributed to the loss of life and property in this incident:

- Lack of automatic fire sprinklers
- Fire spread through a combustible void space
- Inadequate corridor separation
- Combustible room contents
- Combustible contents in the corridors
- Delayed notification of the fire department
- Staff response
- Open doors on stairwells, on the occupant’s rooms on the 300 level, and on the room of origin.
I. INTRODUCTION

The National Fire Protection Association (NFPA) investigated the Sainte Genevieve Board and Care fire to document and analyze significant factors that resulted in the loss of life and property.

The study was funded by the NFPA as part of its on-going program to investigate technically significant incidents. The NFPA's Fire Investigation Department documents and analyzes incident details so that it can report lessons learned for life safety and property loss prevention purposes.

The NFPA became aware of the fire on the day it occurred, and Edward Comeau, Chief Fire Investigator of the NFPA Fire Investigations Department, visited Sainte Genevieve to perform an on-site study of this incident. That two day study and subsequent analysis of the event were the basis for this report. Entry to the fire scene and data collection activities were made possible through the cooperation of the Montreal Urban Community Police (MUC) and the Sainte Genevieve Fire Department.

This report is another of the NFPA’s studies of fires that have particular important educational or technical interest. All information and details regarding fire safety conditions 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 is not the NFPA’s intention that this report pass judgment on, or fix liability for, the loss of life or property resulting from the Sainte Genevieve Board and Care fire. Rather, the NFPA intends that its report presents the findings of the NFPA data collection and analysis effort and highlight factors that contributed to the loss of life or property.

Current codes and standards were used as criteria for this analysis so that conditions at the facility on the day of the fire could be compared with state-of-the-art fire protection practices. It is recognized, however, that these codes and standards may not have been in effect during the building’s construction or operation. The NFPA has not analyzed this fire regarding its compliance with the codes and standards that were in existence when the structure was built or during its operation.

The cooperation and assistance of Chief Jean-Pierre Bertrand and Assistant Chief Reajan Cauchon of the Sainte Genevieve Fire Department and Sergeant-Detective Michel Bonneville and Sergeant-Detective Yves Ouimet of the Montreal Urban Community Police Department is appreciated.
II. BACKGROUND

Occupancy Classification
Based on NFPA 101®, Life Safety Code®, 1994 edition, Chapter 23, this occupancy would have been classified as an Existing Board and Care Occupancy.

According to information provided by the facility, 24 residents required the use of wheelchairs and one person was confined to bed. Each of the three levels had wheelchair residents living on them.

While there were eight staff members on duty at the time of the fire, staffing levels dropped to two people at night, according to investigators from MUC.

After considering the staffing level and the physical capabilities of the residents, NFPA has determined that the evacuation capability for a facility of this size would be “impractical.” Paragraph 101:23-1.3 defines impractical evacuation as the “Evacuation capability of a group that, even with staff assistance, cannot reliably move to a point of safety in a timely manner.” The appendix to this paragraph in the NFPA 101 further clarifies that any evacuation that cannot be completed within 13 minutes should be considered impractical.

This situation would then invoke paragraph 101:23-3.1.2.2 which discusses evacuation criteria:

101:23-3.1.2.2 Impractical. Large facilities classified as impractical evacuation capability shall meet the requirements for limited care facilities in Chapter 13.

Therefore, the code analysis used in this report will be that of Chapter 13, Existing Health Care Occupancies.

NFPA 1, Fire Prevention Code, 1992 edition, also references NFPA 101 requirements. NFPA 1, Chapter 12, Health Care Occupancies, contains requirements for these occupancies and provides specific references to NFPA 101.

The Building
The building was a two story structure with an occupied basement that measured approximately 110 feet by 41 feet (33.5 m by 12 m). One section was constructed in 1983, and the second (west) section was built in 1985. It was built as an elderly housing facility.

The primary level of exit discharge was what was referred to as the 200 level, or the middle level, of the three level structure. This building will be defined as a two story structure with an occupied basement.
Sainte Genevieve
Board & Care
Level 100

There were a total of 31 rooms that were occupied by 41 residents on all three levels. The lowest level was partially below grade, but did have exterior windows in all of the rooms. All of the rooms on each floor exited onto a common corridor which ran the length of the building.

There were two exits provided, one at each end of the building, that discharged directly to the exterior at the second level. A ramp for use by physically challenged people was provided at the east exit of the building. The west end did not have a ramp. Fire separation doors existed between the stairwells and each floor. However, kickdowns which would hold the doors open were observed on some of the undamaged doors.

A set of double doors was located approximately 48 feet (15 m) from the east end of the building in each corridor. These doors were located where the addition to the building had been made in 1985. The corridor doors on the 200 and 300 levels were totally destroyed. The undamaged doors on the 100 level were equipped with panic hardware and self closing devices. However, there were also kickdowns on
The building's street entrance was located at the middle (200) level. One level existed above grade, and another occupied level existed below grade.

these doors which held them in the open position. There were wired glass window panels, measuring 6 inches by 80 inches (152 mm x 2,000 mm) remaining on the second floor on each side of the doors.

An elevator serving all three levels was located at the west end of the building.

The exterior walls were reinforced masonry and were approximately 1 foot (305 mm) thick. At the roof level, the roof truss system rested directly on the exterior wall. The ends of the trusses were covered with lightweight metal panels.

The exterior of the building was reinforced masonry, except at the roof where the ends of the combustible trusses were covered with lightweight sheet metal panels.
In addition, the exterior wall between the windows was constructed of wood frame and covered with lightweight metal panels.

The interior walls between the individual rooms were wood frame, 2x4's. 16 inches (406 mm) on center, and the construction was covered with a single layer of either 1/2 inch (13 mm) or 5/8 inch (16 mm) fire-rated sheetrock on each side. The wooden studs ran from deck to deck. The sheetrock extended from the floor to the ceiling level in each room.

The wall between the resident's rooms and the corridor was constructed of 2 x 6 wood frame construction, spaced 16 inch (406 mm) on center and covered by either 1/2 inch (13 mm) or 5/8 inch (16 mm) sheetrock on each side, which stopped at the ceiling level. In the void space above the corridor ceiling, sheetrock fire stopping material was placed in between the trusses at the corridor walls. The wall between the resident's rooms and the corridor was not a continuous, fire rated assembly from deck to deck through the combustible void space.
In between the floors at the windows was a combustible exterior wall.

The interior walls of the building were wooden studs covered with sheetrock.

The floor and roof structural system were lightweight wood trusses. The roof truss system measured 24 inches (610 mm) deep and was made of 2x4 wooden members. The trusses were spaced 18-3/4 inch (476 mm) on center.

The floor structural system also was made from lightweight wooden trusses, comprised of 2x4 wooden members. These trusses measured 11 inch (280 mm) deep and were also spaced 18-3/4 inch (476 mm) on center.
Per NFPA 220, Standard on Types of Building Construction, 1995 edition, this building would be classified as a Type III (200).*

The ceilings throughout the facility were either 1/2 inch (13 mm) or 5/8 inch (16 mm) sheetrock attached to metal runners, which in turn were attached to the lower chord of the lightweight wood trusses.

The floor coverings were tile on plywood. There were no combustible wall finishings observed.

According to the fire department, the roof system was a tar and stone layer on plywood.

The individual doors to the rooms were solid core doors. They were equipped with self closing devices. The door hardware was positive latching type with lever type handles. No kickdowns were observed on the undamaged doors to the resident rooms. There was no locking hardware observed on the doors.

The contents of the rooms were comprised of a hospital style bed and chairs. Each room was also provided with a dresser. No labeling was found on the mattresses to indicate their compliance with any type of mattress flammability rating. The chairs were wood frame with padded upholstery. There were a variety of dresser types, some were constructed of either wood or particle board.

Some of the rooms housed only one resident while others housed two.

* A Type III (200) structure will have a two-hour fire rating for the exterior bearing walls (first digit); A 0-hour fire rating for the structural frame or columns and girders supporting loads for more than one story (second digit); and a 0 hour fire rating for the story assembly (third digit).
There were combustible chairs in the corridors for use by the residents.

There were chairs in each of the hallways on all three levels that projected 30 inches (762 mm) into the corridor, reducing its effective width. These chairs had wood frames and padded upholstery. No tags were found indicating any fire rating or testing that had been performed.

**Fire Protection Systems**

**Suppression Systems** The facility was not equipped with an automatic fire sprinkler system.

There were fire extinguishers observed on the first floor and in the debris on the second and third floors. According to investigators, there were a total of three dry chemical extinguishers.

**Fire Alarm and Detection Systems** There was a fire alarm system in this building. Manual fire alarm boxes were in place on each of the floors. Three were observed on the first floor—one in the new section and two in the old section. The remaining two floors were too damaged to determine the exact number of pull stations. However, the remains of at least one manual pull station was observed on each floor. Audible alarms (bells) were used on each of the three floors.

The system was controlled by a fire alarm control unit in the basement of the building. Reportedly, upon alarm, the system would sound an audible alarm inside the building and also transmit an alarm to a central station monitoring company by telephone who, in turn, would notify the fire department.

The system was equipped with heat detectors in the individual rooms. The damage to the second and third floors was too severe to verify the exact configuration of the
system. However, in the rooms which were not totally destroyed, system heat detectors were seen in each room. The hallway on the first floor had two smoke detectors and two heat detectors in it.

A single station, battery-powered smoke alarm was observed in one of the resident’s rooms on the basement floor. No other single station, battery-powered smoke detectors were observed.

**Emergency Lighting** The facility was equipped with battery-powered emergency lighting.

**Means of Egress**

The building was configured with 29 resident rooms over three floors that all discharged into common corridors. The width of the hallways which served the resident rooms was 95 inches (2.4 m).

The building had two exits, one at each end of the structure. The corridors on each floor discharged into the stairwells, which in turn discharged at the 200 level (street level) to the exterior of the building. Doors separated each of the floors from the stair-
way. There were only two undamaged stairwell doors remaining, both on the 100 level. The one located at the west end, 100 level, had a fire rating of 20 minutes.

There was a closet located underneath the stairs on the 100 level at the west end that contained extra mattresses. Wheelchairs and other material was stored under the stairwell at the east end of the building.

An elevator which serviced all three floors was located at the west end of the building. This elevator could be accessed directly from the corridor and did not have a separate, protected lobby or foyer.

**Building Occupants**

The building was occupied by 40 residents and eight staff members at the time of the fire. According to the facility's evacuation plan, dated August 29, 1996, the following is a breakdown of the physical capabilities of the residents and their locations:

<table>
<thead>
<tr>
<th>Level</th>
<th>Ambulatory</th>
<th>Wheelchair</th>
<th>Confined to bed</th>
<th>Total Residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 (below grade)</td>
<td>3</td>
<td>6</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>200 (street level)</td>
<td>5</td>
<td>11</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>300 (above street level)</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>24</td>
<td>1</td>
<td>40</td>
</tr>
</tbody>
</table>

**The Fire Department**

The Sainte Genevieve Fire Department is a volunteer fire department. It provides protection to a community of 3,500 residents over 0.5 square miles (1.3 km²). It is comprised of 26 members and has two pumperss and one rescue truck. Emergency Medical Service is provided by a provincial ambulance service. In 1995, the department responded to 45 calls out of one station.

**Weather**

On the day of the fire it was 82 degrees F (28 degrees C), so many of the exterior windows were open. The wind was reported by the fire department to be out of the northwest.
III. THE FIRE

Discovery and Occupant Activities

The fire occurred at approximately 12:40 p.m.. A nurse on the 300 level reported hearing a noise and walked down to the second floor via the west stairs to investigate. She characterized the noise as a slight buzzing sound, perhaps the type that would be made by a call button. Upon arrival on the 200 level she heard the occupant in Room 208 calling for help. When the nurse entered the room, she observed a fire in the closet. She proceeded to remove the patient from the room. According to local investigators, it is believed that she did not close the door to the room of origin when she left (although the doors were equipped with automatic closures, the fire department indicated that on previous responses to this facility they had noted that the doors to the individual rooms were propped open frequently).

The nurse next went to the intercom and notified the rest of the staff, who was in the 100 level, of the fire. She then attempted to use a dry chemical fire extinguisher, but was unsuccessful because of her unfamiliarity with how it operated. She also stated that she felt the fire had grown too large by this point for the fire extinguisher to have had any affect.

One of the other nurses first went to the 300 level, mistakenly thinking the report had come from that area. She then went down to the 200 level, which was becoming charged with smoke. She asked a fellow employee to call 911 to report the fire.

According to the employee who was asked to make the call to 911, he did so from the 300 level of the facility. When he made the call, he reported that the alarm system was sounding.

At approximately 12:30 p.m. to 12:35 p.m., a passerby reported that he observed smoke coming from the building and heard a loud buzzing sound. At approximately the same time an off duty Montreal fire fighter also was passing by and entered the building to assist with the evacuation operations. He was assisted by an off-duty police officer. They attempted to make entry to the 300 level but were unable to do so due to the extreme heat and smoke conditions.

There were a number of residents who were in the 100 level having lunch when the fire occurred. The staff was able to evacuate these residents successfully.

The first call to 911, according to the investigators, came from outside of the facility. A person was driving by and saw the fire and called 911 from his cellular telephone at 12:43 p.m. He then entered the building to help with the evacuation. He reported that the alarm was sounding at this point in time.

A number of other civilians also made calls to 911 from cellular telephones and assisted with the evacuation.
According to information provided by the Montreal Police, the company that provides 911 service to the Montreal area reported that they received the first call regarding the fire from a person outside of the facility, not from the central monitoring station.

**Fire Department Notification and Response**

A total of eight communities responded to this fire. They included:

- Sainte Genevieve
- Pierrefonds
- Roxboro
- Baie D'urfe
- Pointe Claire
- Pincourt
- Sainte Anne de Bellevue
- Senneville

With the exception of Pierrefonds and Pointe Claire, all of the departments are either paid-call or volunteer fire departments.

Upon being dispatched to the call, two fire fighters from Sainte Genevieve responded directly to the facility and arrived at 12:52 p.m. Upon arrival they began assisting with the evacuation. They evacuated four residents from the second and third levels.

At 12:52 p.m., the Assistant Chief of Operations from Sainte Genevieve arrived at the same time as one of the pumpers from Sainte Genevieve. The two fire fighters who had arrived just prior to the assistant chief reported that there were two residents in windows on the south side who needed to be rescued. They took a ladder off the pumper and went to rescue these victims. One of the victims collapsed inside of the building before being rescued, but they were able to rescue the other victim over the ladder.

The Assistant Chief immediately met with the nursing supervisor on the east side of the site and attempted to ascertain how many patients were still inside. The supervisor reported that she did not have a copy of the list of residents and did not know how many patients had been removed from the facility. According to the fire department, there were residents from the facility in several locations around the site, and a head count had not been taken at this point.

The Assistant Chief reported that the 300 level was fully charged with smoke and that the 200 level was on fire from the west end to approximately two-thirds of the length of the building towards the east end.

The pumper from Pierrefonds was on the scene at 12:54 p.m. The Assistant Chief requested two fire fighters and ordered them to take an 1-1/2 inch (38-mm) line through the front door. He reported that the heat was too intense for entry, and this crew was forced back. They then advanced a 2-1/2 inch (64-mm) line to the front door.
While this line was being advanced, the aerial apparatus from Pierrefonds was now also on the scene (1:01 p.m.), and it was ordered to ventilate the roof. They extended the aerial to the roof, but the fire had self vented at this point. Next, the crew proceeded to forcibly open the exterior window on the east side of the third level and discharged water from the ladder pipe directly into the building for approximately two minutes to knock down the fire.

Once the fire had been knocked down, crews were able to advance the 2-1/2 inch (64 mm) line through the front door to the second level. Another crew advanced the 1-1/2 inch (38 mm) line to the third level.

At 1:06 p.m., equipment and personnel from Roxboro arrived on the scene. The crews advanced a 2-1/2 inch (64-mm) line to the southwest corner of the building, wyed it off and attached two 1-1/2 inch (38-mm) lines to the west entrance of the building. They attempted to enter the building but were unable to due to the intensity of the fire. They advanced a ground monitor to the south side of the structure and began a defensive operation.

At 1:28 p.m., the ladder from Pointe Claire was on the scene along with the ladder from Sainte Anne de Bellevue. The Pointe Claire personnel positioned the ladder on Gouin Street on the northwest corner of the building, raised the aerial, and began discharging water into the building.

At 2:50 p.m., crews inside of the building reported that they had managed to extinguish the fires in the eastern portion of the building and had completed their search. The western interior portion of the building had collapsed and could not be accessed by the crews.

**Casualties**

Seven residents died in this fire, all of whom were located on the third floor. According to information provided by the facility, three of the fatalities were ambulatory while four required the use of wheelchairs. Investigators reported that all seven residents died from smoke inhalation.

<table>
<thead>
<tr>
<th>Victim's Location</th>
<th>Physical Ability</th>
<th>Normal Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room 302</td>
<td>Ambulatory</td>
<td>Room 301</td>
</tr>
<tr>
<td>Room 302</td>
<td>Wheelchair</td>
<td>Room 304</td>
</tr>
<tr>
<td>Room 307</td>
<td>Wheelchair</td>
<td>Room 307</td>
</tr>
<tr>
<td>Room 313</td>
<td>Ambulatory</td>
<td>Room 313</td>
</tr>
<tr>
<td>Room 308</td>
<td>Wheelchair</td>
<td>Room 308</td>
</tr>
<tr>
<td>Salle de Séjour (Sun Room)</td>
<td>Ambulatory</td>
<td>Room 310</td>
</tr>
<tr>
<td>Salle de Séjour (Sun Room)</td>
<td>Wheelchair</td>
<td>Room 311</td>
</tr>
</tbody>
</table>

In reviewing the locations of the fatalities, two of the residents who were confined to a wheelchair (Rooms 307 and 308) died in their rooms. Another occupant, who
was listed as being ambulatory, also died in Room 313. The remaining four residents were found in the rooms immediately adjacent to the exits at each end of the corridor (Room 302 on the east end of the building and the Salle de Séjour on the west end). The occupants in the Salle de Séjour could have been in the room at the time of the fire or trying to escape. A theory is that the fatalities found in room 302 were attempting to escape the fire and were unable to do so.

**Damage**

The west end of the second and third floors were damaged severely by fire. Several rooms on the third floor collapsed into the second and first floors. There was severe smoke damage throughout the second and third floors. The first floor was severely damaged by the collapse of the structure above it on the west end of the building. There was moderate to light smoke damage on the first floor in the eastern portion of the building.
There was widespread structural collapse on the west end of the building in both the corridor and the residents rooms on each side of the corridor.

The corridor of the street level (level 200) was severely damaged by the fire. A number of the rooms on the west end of the building were also damaged by the fire and by the collapse of the 300 level down into the 200 level.
IV. TIME LINE

12:42 p.m. (approx.) Fire first detected
12:43 p.m. First 911 call made by a passerby from a cellular telephone
12:44 p.m. Call received by 911 from staff member inside of the facility
12:45 p.m. Fire department dispatched
12:52 p.m. First two fire fighters on the scene and begin rescue operations
12:52 p.m. Sainte Genevieve command officer on the scene
12:54 p.m. Pierrefonds on the scene
1:01 p.m. Pierrefonds aerial on the scene
1:04 p.m. Chief from Pierrefonds on the scene
1:06 p.m. Roxboro pumper on the scene
1:09 p.m. Command request mutual aid ladder from Pointe Claire.
1:16 p.m. Baie-d’Urfé on the scene
1:18 p.m. Sainte Anne De Bellevue on the scene
1:28 p.m. Pointe Claire ladder on the scene
2:37 p.m. Pincourt on the scene
2:50 p.m. Fire declared under control
2:37 p.m. Senneville on the scene
V. ANALYSIS

Cause and Origin

Investigators from the Montreal Police determined that the fire originated in Room 208. They are attributing the cause to smoking materials or matches.

Fire Growth and Spread

The fire was fueled by the combustible fuel load in Room 208. It then extended out of the exterior window and lapped up the side of the building, igniting the contents in Room 309, which was directly above Room 208, through its window. It also impinged upon the lightweight metal panels on the exterior of the building at the window level and roof level until they failed, allowing the fire to spread into the void space created by the wooden truss system. Next, the fire spread across the roof structure in this void space.

The fire destroyed the wooden trusses between floors and caused areas of the 300 level to collapse downward.
Fire also spread via the combustible truss void space between the 200 and 300 level. The fire breached the ceiling in the closet in Room 208, and then entered the void space, spreading laterally.

Although it was not possible to verify the position of the doors to the individual rooms, personnel from the Sainte Genevieve fire department reported that when they responded to previous alarms at this facility it was very common to find the doors propped open. If this had been the situation at the time of the fire, it would have been possible for the fire to spread into the corridors through the open doors of rooms 208 and 309 and, subsequently into other rooms on the floors.

In addition, the hallways had combustible chairs lining one of the walls, which created a fuel load that would have been ignited.

The fact that most of the windows on the facility were reported to be open due because it was a hot day is also felt to be a contributing factor to the fire spread. The wind was reported to be out of the northeast, which would have “pushed” the fire out of the exterior window of Room 208.

**Code Analysis**

**Construction Type**

This combination of construction material and height would not have been permitted by Table 13-1.6.2 of the NFPA 101®, *Life Safety Code*. The lack of sprinkler protection, the height of the building, the combustible void spaces which contributed to the fire spread and caused the widespread collapse, and the lack of corridor separations all reinforce the need to limit the potential structural fuel load and provide adequate fire suppression systems as covered in the *Life Safety Code*.

**Sprinklers**

This facility was classified as a Type III (200) by NFPA 220, *Standard on Types of Building Construction*, 1995 edition. It would be required to be equipped with an automatic fire sprinkler system by Table 13-1.6.2 of the NFPA 101®, *Life Safety Code*. There were no sprinkler systems in the facility.

Properly designed, installed, and maintained sprinkler systems have a proven track record in reducing the loss of life and property in many classes of properties. If a functional system had existed within this occupancy, the fire might have been controlled and limited to within the unit of origin instead of extending into the corridor.

NFPA has no record of a fire killing more than two people in a completely sprinklered public assembly, educational, institutional, or residential building where the system was properly designed, maintained, and operating.

Sprinklers also reduce property damage by 63% in care of the aged facilities, according to data compiled by NFPA.
The lack of a suppression system is considered to be a major contributing factor to the outcome of this fire.

**Building Height**

Per table 13-1.6.2 in NFPA 101, a structure with this type of construction would only be permitted to have one level. This structure had two levels, plus a basement, which is not in compliance with NFPA 101.

The height of the building, coupled with the lack of a suppression system and other factors, presented a challenging situation in this fire. Since the fire was capable of spreading unchecked to the upper level, and the primary means of exiting the building were on the floor fire, evacuation was difficult in light of the fact that 24 residents were in wheelchairs.

The combustible construction used throughout the building also was a significant contributing factor that caused the widespread fire damage. Such construction, combined with the building height, would not have been permitted by NFPA 101, because of the danger that it presents.

**Residents’ Capabilities**

Over half of the residents were confined to either bed or wheelchairs. Six of the non-ambulatory residents resided on the 100 level, which was below the level of exit discharge, while seven residents resided on the 300 level, one floor up from the level of exit discharge.

Based on this profile of the residents and the design of the building and the staffing, NFPA defines the evacuation capabilities to be impractical, considering that there could be, in a worst case scenario, two people on duty at night. (See the previous discussion on the evacuation criteria in the section “Occupancy Classification.”) When considering the physical impairments that some of the residents had, completely evacuating the building in a timely manner would have been difficult.

**Corridor Separations**

The corridors are required to be separated from the adjacent rooms by a wall providing a fire resistance rating of 20 minutes per 101:13-3.6.2.1. The corridor walls and the ceiling were constructed of either 1/2 inch (13 mm) or 5/8 inch (16 mm) sheetrock, attached to metal runners, which in turn were attached to either 2 inch x4 inch studs or to the bottom chord of the lightweight wood truss. Depending upon the specific product, the fire rating of this assembly could have ranged from 15 minutes to 22 minutes. The exact fire rating of this specific installation was not determined, so whether or not the corridor wall met the requirements of a 20 minute separation is unknown.

The corridor walls did not extend fully from floor to floor, as required by 101:13-3.6.2.1. The corridors walls stopped at the underside of the floor truss. Although
the void space above the ceiling between the occupants rooms and the corridor was fire stopped, there were still exposed wooden structural members.

One of the significant mechanisms of fire spread was via the combustible void space, according to police investigators. The existence of a continuous fire rated assembly between the resident rooms and the corridors would have helped to limit the fire spread in the void space. This would have possibly reduced the widespread structural collapse that ensued due to the fire damage in the floor trusses.

**Storage in the Stairwells**

A closet which stored extra mattresses was located at the bottom of the west stairwell. This condition is not permitted by paragraph 101:5-2.2.6.5. The objective of this paragraph is to prohibit storage of any type within the exit enclosures because the fuels may be ignited and compromise this exit.

Wheelchairs and other furniture also were stored in the east stairwell underneath the stairs. This storage is also not permitted.

It is important that the stairwells not be compromised in any manner which will render them impassable. Storage of combustible fuels, which may be ignited, could easily render the stairs unusable. In addition to the storage, the doors at the bottom level also were held open by kickdowns. These two factors could easily allow fire or smoke to spread from the floor and into the stairwells, igniting the combustible fuels stored within them and seriously compromising egress.

Wheelchairs, furniture and other material were stored at the bottom of the east stairwell.
The combustible chairs in the corridors contributed to the spread of the fire within the corridors on both the 200 and 300 levels.

Combustible Furniture in Hallways

Combustible chairs for residents to use were in the hallways on each of the three levels. This is prohibited by paragraph 101:13-3.6.1 of the Life Safety Code which states that “corridors shall be separated from all other areas by partitions...” This wording, especially in light of the eight exceptions, is intended to mean that no use area can be open to or be within the corridor without specific protection requirement, such as a sprinkler system, fire alarm system, or direct staff supervision. This occupancy met none of these requirements. To place chairs in the corridors created a “use space.”

The problem in this incident was that once the fire extended beyond the hallway door and into the corridor, the fire was fueled by the combustible furniture. While there were a number of other factors in this fire, such as lack of a sprinkler system or failure to close the door to the room of origin, which also contributed to the fire spread, the chairs were another part of the equation. The presence of the chairs not only created potential barriers to movement, but when they were ignited by the fire, they also further compromised the means of egress.

Staff and Resident Fire Safety Training

Paragraph 101:31-4.1.2 of the Life Safety Code requires that drills be conducted at least quarterly on each work shift to train the staff in the correct actions to be taken if a fire occurs. Having trained personnel that are prepared to take the correct actions is critical to reducing the potential for the loss of life in an building where a number of the occupants are not capable of self preservation and are relying upon the staff for a level of protection.
NFPA was not able to determine what level of training the staff was provided. However, the fire department reported that when they arrived, patients were not being accounted for and the staff was unable to report how many people were still inside of the building. Part of an evacuation plan should include a system to account for the number of residents that have been removed from the building.

As stated in paragraph 101:31-4.1.2, fire drills are required to be conducted quarterly on each shift to familiarize the staff with the correct actions to be taken in the event of a fire. The investigators could not ascertain the frequency with which fire drills were conducted in this facility.

NFPA has determined that fire drills have a provable, positive effect on the outcome of a fire. In a facility such as this where the residents are dependent upon the staff to provide them with a degree of fire safety, it is important that the staff be very familiar with the correct actions required to protect the residents or to evacuate them safely from the structure.

**Door Self-Closing Devices**

The doors to the stairwells are required to have self-closing devices on them to ensure that the doors remain closed and that the stairwells do not serve as a means of vertical fire spread. The only type of devices allowed to hold open doors by 101:13-2.2.2.6 are those that will release the door automatically upon activation of the fire alarm. Some of the doors in this facility had kickdowns on them which did not meet the requirements of this paragraph.

Kickdowns were used on a number of the stairwell and corridor doors throughout the facility.
The stairwells in any building are critical components of the exiting design. It is imperative that they be protected and isolated from smoke and fire so that they do not become impassable. If there are devices that hold them open, then they can be rendered unusable very quickly, as well as serving as a conduit for fire spread to upper levels.

The Life Safety Code does not require that the individual room off of the corridor be equipped with self closures as they were in this facility. The purpose of these door closers are to help ensure that the doors are in a closed position in the event of a fire. If a fire occurs within the room, a closed door will help to limit the fire spread to within a single room. If a fire occurs outside of the room, closed doors will help to limit the spread of the smoke and fire into the room, providing the occupant with an increased level of protection and enhancing their chances for survival while waiting to be rescued by the staff. In this case, the rooms were equipped with such closers. However, according to fire department personnel who had responded to previous alarms at this facility, it was very common to find these doors propped open, which defeated the purpose of the door-closing devices and the additional level of fire safety that they provided.

The lack of a requirement for self closures is based on the premise that the staff will respond and close all of the doors, either confining the fire within the room of origin or limiting its spread into adjacent rooms. This action did not occur in this case, which has been documented also in other fires.

Another fire investigated by NFPA occurred in a hospital where the door to the room of origin was left open by the staff person who responded to the fire. This open door was a critical factor in allowing the fire to spread into the corridor, resulting in the death of seven patients. Another fire, which occurred in a Board and Care facility in Mississauga, Ontario, and killed eight elderly residents, also spread via the open door to the corridor of the single story structure. In several other fires that NFPA has investigated an open door was a contributing factor to the loss in health care occupancies.

**Smoke Detection**

The Life Safety Code requires system smoke detection in the corridors of limited care facilities (101:13-3.4.5.1). This occupancy was equipped with such a system on the first floor, which was undamaged. The upper floors were too damaged to determine if any detectors existed.

**Alarm Notification**

When the fire alarm system is activated, it is required to sound an alarm within the facility (101:13-3.4.3.1). A method of notifying the fire department is also required (101:13-3.4.3.2 and 101:7-6.4). This notification can be accomplished by either an auxiliary alarm system, a central station connection, a proprietary system, or a remote station connection. In this case, the alarm system was connected to an out-

‘NFPA Fire Investigation Report, Petersburg Hospital Fire, January 1995. See Appendix A for a copy of the Abstract from this report."
side monitoring company that would retransmit the alarms to the fire department. The exact type of monitoring system is unknown.

From information obtained by the Sainte Genevieve Fire Department and the investigators from MUC, there may have been a delay of approximately two or three minutes before the fire department was notified by a call from within the facility. This delay allowed the fire to grow unchecked until the arrival of fire department personnel on the scene, and is a significant contributing factor to the difficulty faced by the first-arriving fire fighters who attempted to make entry.

Notifying the building’s occupants and the fire department of a fire as soon as possible is critically important so that they can initiate a response. Any delay in this notification can compromise their ability to control the fire and to rescue trapped victims.

**Ramps at both exits**

The *Life Safety Code* does not address specifically the need for ramps for use by physically challenged persons in a existing facility such as this one where a number of the residents are confined to wheelchairs.

This facility was equipped with one such ramp at the main entrance, but the second means of egress only had stairs. In this case, having an effective evacuation to the exterior of the building would have been difficult once the front exit was rendered impassable.
VI. DISCUSSION

The Life Safety Code supports a “total concept” approach that should be used in developing a fire defense plan for health care occupancies. The provisions of Chapter 13 are all based on a “defend in place” philosophy.

101:13-1.1.3 Total Concept. All health care facilities shall be designed, constructed, maintained, and operated to minimize the possibility of a fire emergency requiring the evacuation of the occupants. Because the safety of health care occupants cannot be ensured adequately by dependence on evacuation of the building, their protection from fire shall be provided by appropriate arrangement of facilities, adequate staffing, and development of operating and maintenance procedures composed of the following:

(a) Design, construction and compartmentation; and
(b) Provision for detection, alarm, and extinguishment; and
(c) Fire prevention and the planning, training, and drilling in programs for the isolation of fire, transfer of occupants to areas of refuge, or evacuation of the building.

The following discussion addresses each of the three areas mentioned above.

Compartmentation

Open door to the room of origin. The fire spread into the corridor through the open door to the room of origin. This door, which was equipped with an automatic door closer, was left open by the staff member who had responded to the alarm, according to the investigators. If the staff member had closed the door, the fire spread on the second floor could have been reduced. Since all of the windows to the building were reported to be open when the fire occurred, the open door may have contributed to the spread of smoke and fire through the exterior window because the wind direction would have been through the door.

Open doors have been a common significant factor (among others) in a number of fires which NFPA has investigated.

- Board and Care Fire, Mississauga, Ontario, 3/21/95, eight fatalities
- Board and Care Fire, Broward County, Florida, 12/1/94, five fatalities
- Hospital Fire, Petersburg, Virginia, 12/31/94, five fatalities
- Hospital Fire, Brooklyn, New York, 9/1/93, three fatalities
- Nursing Home Fire, Dardanelle, Arkansas, 3/13/90, four fatalities
- Nursing Home Fire, Norfolk, Virginia, 10/5/89, twelve fatalities
- Hospital Fire, St. Jerome, Quebec, 1/29/89, two fatalities
- Hospital Fire, Kansas City, Missouri, 12/30/86, two fatalities
- Hospice Fire, Southfield, Michigan, 12/15/85, eight fatalities
- Nursing Home Fire, Mississauga, Ontario, 7/14/80, twenty-five fatalities

In all of these fires, the occupants were not fully capable of self-preservation and were dependent to some degree upon the structure providing them with a higher lev-
el of protection. A closed door on the room of origin will help to confine the fire to the room and provide additional time for the other occupants to either escape or for fire suppression efforts to begin.

In addition to the open door, police investigators reported that the fire also breached the ceiling in the closet in room 208 and entered the truss space between the 200 and 300 levels. This allowed the fire to spread unimpeded within this combustible void space and ultimately led to the collapse of the upper floor into the 200 level.

**Open doors on stairwells.** There were several doors that had “kickdowns” or devices on the bottom of the doors that would hold them open. This device effectively bypassed any fire protection that the doors, which are a key component of fire-safety design for any building, provided for the stairwells. The doors in the corridor in the middle of each floor also were equipped with these devices. The reason that these doors were held open is so that the residents, many of whom are in wheelchairs, can move about the floors easily. However, by not allowing the doors to close automatically in the event of a fire, the residents are exposed to a significantly higher level of risk from fires which occur remote from the residents room. There are devices currently available that interconnect into a building’s fire alarm system that will allow the doors to be held in an open position during normal operations, but will close automatically upon activation of the fire alarm system.

**Extinguishment**

**Lack of automatic suppression system.** A sprinkler system probably would have controlled the fire and stopped it from spreading beyond the room of origin.

A properly designed, installed, maintained, and operating automatic sprinkler system has a proven track record of saving lives and property. According to NFPA records, no fire in a completely sprinklered public assembly, educational, institutional, or residential building has killed more than two people.

A sprinkler system in a multistory nursing home fire in Woburn, Massachusetts, in 1992 was successful in controlling a fire. All 101 residents of the facility were evacuated successfully. There are a number of documented incidents with fatalities where the lack of a sprinkler system was a factor in the loss.

A bibliography on articles and reports relating to these fires is included in an appendix to this report.

**Fire safety training**

**Fire Prevention and Fire Drills.** NFPA has been able to verify that fire prevention and fire drills have a demonstrable positive impact when a fire does occur. It would appear that in this facility a strong emphasis was not placed upon preparing the staff for a fire situation. The simple act of closing the door to the room of origin would have had a critical impact upon the spread of smoke and fire beyond the room on the fire floor.
In a health care occupancy where the occupants are not always capable of self-preservation, a higher level of reliance is placed upon the staff to take the proper actions during a fire. Providing the staff with guidelines and the preparation to deal with such a fire emergency is an important step towards the “total concept” mentioned in NFPA 101, *Life Safety Code*.

**Staffing.** The staffing levels are an important aspect that must be considered. A balance must be struck between the level of passive and active fire protection systems and the need to either defend in place or evacuate a facility. If there are inadequate fire protection design features, then the staff may have to evacuate the endangered occupants. If the staff is unable to evacuate the residents who are at risk in a safe and timely manner, then other measures must be taken to protect these people.
VII. SUMMARY

This fire is the second fire which has occurred in a Canadian board and care facility that NFPA has investigated within 18 months. The other fire, which occurred in Mississauga, Ontario, claimed the lives of eight residents, while this fire killed seven people. The one common factor between the two fires was that neither facility was equipped with a sprinkler system although such systems would be required by NFPA 101 based on the construction type and use of the building. While sprinklers are by no means a complete answer to all fire protection needs, they have a demonstrated track record in protecting people and property from fire. The use of sprinklers, along with proper building design and a well trained staff, can make a significant difference in future fires and hopefully avoid these tragedies.
VIII. ABSTRACTS OF RELATED NFPA INVESTIGATIONS

Shelby County, Tennessee

February 8, 1996

At approximately 11:45 p.m. on February 8, 1996, a fire occurred in a Shelby County board and care facility that was housing elderly residents. The fire was caused most likely by improperly disposed smoking materials. Smoke from the apartment of fire origin spread to other apartments through open doors. Four residents died as a result of this fire.

The 20-year-old facility had six wings and a central core. All areas were of wood-frame construction, and wall and ceilings assemblies were covered with gypsum wall board. Four of the wings contained apartments for elderly residents and two wings contained apartments for elderly residents with special needs. These two wings will be classified as board and care occupancies. The fire occurred in one of the board and care wings. All areas in the building had various fire protection provisions including smoke detectors, fire alarms, fire doors, and door self-closing devices. In addition, the staff was reportedly trained with regard to fire safety.

The building construction and most fire protection equipment that was provided performed well. In many areas, gypsum wall board walls and ceilings restricted the spread of combustion products. Smoke detection and fire alarm systems operated and cross-corridor doors equipped with self-closing devices remained closed, again, restricting the spread of combustion products to the wing of fire origin.

However, self-closing devices for many apartments, including the apartment of fire origin, had been removed or deactivated allowing doors to remain open. The open doors permitted smoke to spread from the fire apartment, fill the corridor with smoke and spread into several other apartments. Thus, the open doors compromised much of the benefit afforded by the gypsum wall board wall and ceiling assemblies.

Staff rescued the resident in the apartment of fire origin, but he died several days later from burn injuries. Two other residents suffered smoke-related injuries and died in their respective apartments. Twenty-seven days after the fire, a fourth resident also died of a smoke-related injury.

Based on the NFPA's investigation and analysis of this fire, the following factors were considered as having contributed to the loss of life in this incident:

- Improperly disposed smoking materials
- Lack of automatic sprinkler protection
- Ineffective response of some staff members
- Failure of occupants to respond effectively to operating fire alarms
- Room doors that remained open due to the deactivation of door self-closing devices and chocks
Laurinburg, North Carolina

March 17, 1996

Approximately 10:00 p.m. on Sunday, March 17, 1996, a fire occurred in a Laurinburg, North Carolina board and care facility and eight residents died. Sparks from a faulty electrical receptacle ignited bedding materials in one of the resident rooms.

Both residents in that room escaped from the room, but only one safely evacuated the building. The other was overcome by smoke and died in the corridor. Approximately 18 other residents were on the wing of fire origin. Seven of these residents died in their respective rooms, and the other 11 residents self-evacuated. The doors to rooms in which residents died were in the open position. Staff, reportedly, were unable to enter the wing of fire origin due to severe conditions.

The following factors contributed to the loss of life in this facility:

- Lack of automatic sprinkler protection
- Ineffective responses of staff members
- Failure of occupants to respond effectively to operating fire alarms
- Room doors that remained open due to the lack of door self-closing devices.

Mississauga, Ontario

March 21, 1995

On Tuesday, March 21, 1995, at approximately 7:40 p.m., a fire occurred in a one story board and care facility in Mississauga, Ontario. The fire resulted in eight fatalities and 12 injuries. Three people died at the time of the fire and one died five days later. The remaining four fatalities, determined to be related to the fire, occurred over a span of eight months.

The 70 occupants ranged in age from 60 to 101 years old. Many of the occupants had some degree of mental or physical impairment that could have impeded their ability for self rescue. Of the 70 occupants, 20 people used wheelchairs, 17 used canes or walkers, and 15 suffered from varying degrees of mental impairment.

The building was a one story structure that was partially sprinklered in the basement area only. The residents’ rooms were equipped with heat detectors, as were the hallways, which were connected to an alarm system. The alarm system was connected to an alarm-monitoring company.

The fire was determined by the Ontario Fire Marshal’s office to have been caused by smoking materials which ignited clothing in a closet in one of the rooms. The room was occupied by two people at the time of the fire, which occurred at 7:39 p.m. One of the occupants of the room called the fire department via 911 and reported
the fire. She then was able to escape from the room via an exterior window. The other occupant, who was confined to a wheelchair, was not able to escape.

Six of the other fatalities were found in their rooms. One other victim, who was confined to a wheelchair, was found in the hallway, having become overcome by smoke while attempting to escape.

Smoke was able to spread to the other rooms through the void space above the rooms. The corridor walls and the walls between the individual units did extend above the ceiling to the underside of the roof diaphragm. However, smoke was able to penetrate into this void space via unprotected openings in the ceiling in the room of origin and then into the other areas through unsealed penetrations in the various walls.

In addition to the void space, smoke also penetrated into the rooms through the corridor doors to the individual units. In several of the rooms, the occupants died from smoke inhalation even though the door to their rooms were closed.

The following are considered significant factors that contributed to the outcome of this incident:

- The lack of sprinkler protection (except for the basement)
- The failure to close the door to the room of fire origin following detection of the fire
- The combustible room contents
- The lack of staff training and fire drills.

This fire is the second to have occurred in a Mississauga facility housing elderly people and with a serious loss of life. In 1980, another fire in a nursing home killed 25 occupants. There are a number of common factors between the two fires, which include lack of an automatic sprinkler system and failure to close the door to the room of origin.

**Broward County, Florida**

**December 1, 1994**

At approximately 3:45 a.m. on Thursday, December 1, 1994, an accidental fire occurred in a board and care facility in Broward County, Florida, which resulted in the deaths of six residents.

The building was a one story, single-family dwelling that had been modified for use as a board and care facility. The modifications included the construction of several bedrooms, the installation of a building-wide fire alarm system and single-station smoke detectors, and the installation of at least one exit door in every bedroom. These doors provided direct access to the building’s exterior. Local fire
officials were unable to secure detailed information regarding the capabilities of occupants; as a result, fire officials considered the occupants to have “slow” evacuation capabilities.

The fire, which started in a resident’s bedroom, caused heavy damage in the room of origin and in an adjacent dining area. Smoke filled all the rooms throughout the building. A staff person and eight residents were able to self-evacuate, six residents had to be rescued, and four residents died in the building. Two of the rescued residents later died, one before being transported to the hospital and the other in the hospital.

The 1994 Life Safety Code anticipates various levels of resident performance and requires more stringent fire protection equipment as the abilities of the residents decrease. The facility involved in this fire had many code-required fire protection provisions for residents with moderate abilities. Therefore, the ability (or inability) of residents to perform during the actual fire emergency was a major contributing factor affecting the survival of residents.

The fact that staff and resident capabilities had on the outcome of this incident is an important lesson for fire department officials, representatives of local and state agencies, and property owners who have responsibility for life safety in board and care facilities. They must understand that adequate life safety does not depend solely on building features and fire protection equipment. The abilities of both staff and residents are integral factors that must be considered while striving for even a minimal level of life safety in a board and care facility.

**Detroit, Michigan**

**June 2, 1992**

At approximately 2:15 a.m., on Tuesday, June 2, 1992, a fire occurred at an adult foster care facility in Detroit, Michigan, and it resulted in the deaths of ten occupants. The building involved in this fire was originally a three-story, two-family dwelling. However, in the early 1970s it was renovated for use as an adult foster care facility. At the time of the fire, sixteen predominantly elderly individuals lived in the facility, and some of these residents were mentally or physically handicapped. In addition to the residents, one night supervisor was in the facility.

Local investigators believe that the probable cause of the fire was smoking materials discarded in a wastebasket in a first floor kitchen. Once ignited, the fire spread to the combustible interior finish materials in that room, and then the growing fire ignited combustible finish materials in other first floor rooms. Open stairways and other unprotected vertical openings allowed the combustion products to spread rapidly throughout the building. Untenable conditions developed in the building before most of the residents could evacuate safely.
The factors that significantly contributed to the loss of life were:

- The lack of an automatic fire sprinkler system
- The presence of combustible interior finish throughout the structure
- The lack of fire safety and evacuation training for staff and residents
- The presence of open stairways and other unprotected vertical openings
- The lack of a second exit for the second floor.
IX. ADDITIONAL INFORMATION

Since 1972, NFPA has prepared 24 reports or journal articles as a result of NFPA investigations of other board and care facility fires. The following is a list of those reports and articles:

**NFPA Fire Investigation Reports**

- Cincinnati, Ohio, December 12, 1983.
- Pleasant Beach, New Jersey, February 3, 1981.

**NFPA Journal and Fire Journal Articles**


* An NFPA Fire Investigation Report is also available.


X. NFPA CODE REFERENCES


101:5-2.2.6.5 There shall be no enclosed, usable space within an exit enclosure, including under stairs, nor shall any open space within the enclosure, including stairs and landings, be used for any purpose such as storage or similar use that could interfere with egress. Where there is enclosed usable space under stairs, the walls and soffits of the enclosed space shall be protected the same as the stair enclosure. Entrance to such enclosed usable space under stairs shall not be from within the stair enclosure. (See also 5-1.3.4.)

101:7-6.4 Emergency Forces Notification.
Where required by another section of this Code, emergency forces notification shall be provided to alert the municipal fire department and fire brigade (if provided) of fire or other emergency.

Where fire department notification is required by another section of this Code, the fire alarm system shall be arranged to transmit the alarm automatically via any of the following means acceptable to the authority having jurisdiction and in accordance with NFPA 72, National Fire Alarm Code:

(a) An auxiliary alarm system, or
(b) A central station connection, or
(c) A proprietary system, or
(d) A remote station connection.

Exception: Where none of the above means of notification is available, a plan for notification of the municipal fire department, acceptable to the authority having jurisdiction, shall be provided.

101:13-1.1.3 Total Concept. All health care facilities shall be designed, constructed, maintained, and operated to minimize the possibility of a fire emergency requiring the evacuation of occupants. Because the safety of health care occupants cannot be ensured adequately by dependence on evacuation of the building, their protection from fire shall be provided by appropriate arrangement of facilities, adequate staffing, and development of operating and maintenance procedures composed of the following:

(a) Design, construction, and compartmentation; and
(b) Provision for detection, alarm, and extinguishment; and
(c) Fire prevention and the planning, training, and drilling in programs for the isolation of fire, transfer of occupants to areas of refuge, or evacuation of the building.

101:13-1.1.4.5 Renovations, Alterations, and Modernizations. Renovations, alterations, and modernizations shall comply, to the extent practical, with requirements for new construction in accordance with 1-4.6. Where such renovations, alterations, or modernizations are done in a nonsprinklered facility, the automatic sprinkler requirements of Chapter 12 shall apply to the smoke compartment undergoing the renovation, alteration, or modernization. However, in cases where the building is not
protected throughout by an approved, automatic sprinkler system, the requirements of 13-1.6 and 13-2.3.2 shall also apply. Exception No. 2 to 12-3.7.3 shall be permitted only where adjacent smoke compartments are protected throughout by an approved, supervised automatic sprinkler system in accordance with 12-3.5.2. Where minor renovations, alterations, modernizations, or repairs are done in a nonsprinklered facility, the requirements of 12-3.5.1 shall not apply, but, in such cases, the renovations, alterations, modernizations, or repairs shall not reduce life safety below that which existed before, nor below the requirements of Chapter 13 for nonsprinklered buildings.

101:13-1.6.2 Health care occupancies shall be limited to the types of building construction permitted by Table 13-1.6.2 (see 6-2.1).

Table 13-1.6.2 Construction Type Limitations

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X: Permitted type of construction
X*: Building requires automatic sprinkler protection (see 13-3.5.1)
N.P.: Not Permitted

*Exception*: Any building of Type I, Type II(222), or Type II(111) construction shall be permitted to include roofing systems involving combustible supports, decking, or roofing, provided:
(a) The roof covering meets Class C requirements in accordance with NFPA 256, Standard Methods of Fire Tests of Roof Coverings, and
(b) The roof is separated from all occupied portions of the building by a non-combustible floor assembly that includes at least 2 1/2 in. (6.4 cm) of con-
crete or gypsum fill. To qualify for this exception, the attic or other space so
developed shall either be unoccupied or protected throughout by an approved,
avtomic sprinkler system.

101:13-2.2.2.6 Any door in an exit passageway, stairway enclosure, horizontal exit,
smoke barrier, or hazardous area enclosure shall be permitted to be held open only
by an automatic release device that complies with 5-2.1.8. The automatic sprinkler
system, if provided, the required fire alarm system, and the systems required by 5-
2.1.8(c) shall be arranged to initiate the closing action of all such doors by zone or
throughout the entire facility.

101:13-3.4.3.1 Occupant Notification. Occupant notification shall be accomplished
automatically in accordance with 7-6.3. Presignal systems shall be prohibited.
Exception No. 1*: In lieu of audible alarm signals, visible alarm-indicating
appliances shall be permitted to be used in critical care areas.
Exception No. 2: Where visual devices have been installed in patient sleeping areas in place of the audible alarm, they shall be permitted to be accepted
by the authority having jurisdiction.

101:13-3.4.3.2 Emergency Forces Notification. Fire department notification shall
be accomplished in accordance with 7-6.4.
Exception: Smoke detection devices or smoke detection systems equipped with re-
confinement features need not automatically notify the fire department unless the
alarm condition is reconfirmed after a maximum 120-second time period.

101:13-3.4.5.1 Corridors. An approved, automatic smoke detection system shall
be installed in all corridors of limited care facilities. Such system shall be installed
in accordance with Section 7-6.
Exception No. 1: Where each patient sleeping room is protected by an approved
smoke detection system, and a smoke detector is provided at smoke barriers
and horizontal exits, such corridor systems shall not be required on the patient
sleeping room floors.
Exception No. 2: Smoke compartments protected throughout by an approved,
supervised automatic sprinkler system installed in accordance with 13-3.5.2.

101:13-3.6.1 Corridors shall be separated from all other areas by partitions com-
plying with 13-3.6.2 through 13-3.6.5. (See also 13-2.5.8.)
Exception No. 1: Smoke compartments protected throughout by an approved,
supervised automatic sprinkler system in accordance with 13-3.5.3 shall be per-
mitted to have spaces that are unlimited in size open to the corridor, provided:
(a) The spaces shall not be used for patient sleeping rooms, treatment rooms,
or hazardous areas, and
(b) The corridors onto which the spaces open in the same smoke compartment
are protected by an electrically supervised, automatic smoke detection sys-
tem installed in accordance with 13-3.4, or the smoke compartment in which
the space is located is protected throughout by quick response sprinklers,
and
(c) The open space is protected by an electrically supervised automatic smoke detection system installed in accordance with 13-3.4, or the entire space is arranged and located to permit direct supervision by the facility staff from a nurses' station or similar space, and

(d) The space does not obstruct access to required exits.

Exception No. 2: In smoke compartments protected throughout by an approved, supervised automatic sprinkler system in accordance with 13-3.5.3, waiting areas shall be permitted to be open to the corridor, provided:

(a) The aggregate waiting area in each smoke compartment does not exceed 600 sq ft (55.7 sq m), and

(b) Each area is protected by an electrically supervised automatic smoke detection system installed in accordance with 13-3.4, or each area is arranged and located to permit direct supervision by the facility staff from a nursing station or similar space, and

(c) The area does not obstruct access to required exits.

Exception No. 3*: Spaces for nurses' stations.

Exception No. 4: Gift shops open to the corridor where protected in accordance with 13-3.2.5.

Exception No. 5: Limited care facilities in smoke compartments protected throughout by an approved, supervised automatic sprinkler system in accordance with 13-3.5.3 shall be permitted to have group meeting or multipurpose therapeutic spaces open to the corridor, provided:

(a) The space is not a hazardous area, and

(b) The space is protected by an electrically supervised automatic smoke detection system installed in accordance with 13-3.4, or the space is arranged and located to permit direct supervision by the facility staff from the nurses' station or similar location, and

(c) The area does not obstruct access to required exits.

Exception No. 6: Spaces other than patient sleeping rooms, treatment rooms, and hazardous areas shall be permitted to be open to the corridor and unlimited in area, provided:

(a) The space and corridors that the space opens onto in the same smoke compartment are protected by an electrically supervised automatic smoke detection system installed in accordance with 13-3.4, and

(b) Each space is located to permit direct supervision by the facility staff, and

(c)* Each space is protected by automatic sprinklers, or the furnishings and furniture in combination with all other combustibles within the area are of such a minimum quantity and are arranged so that a fully developed fire is unlikely to occur, and

(d) The space does not obstruct access to required exits.

Exception No. 7*: Waiting areas shall be permitted to be open to the corridor, provided:

(a) Each area does not exceed 600 sq ft (55.7 sq m), and

(b) The area is located to permit direct supervision by the facility staff, and

(c) The area is equipped with an electrically supervised automatic smoke detection system installed in accordance with 13-3.4, and

(d) The area does not obstruct any access to required exits.
Exception No. 8: In a limited care facility, group meeting or multipurpose therapeutic spaces, other than hazardous areas, under continuous supervision by facility staff shall be permitted to be open to the corridor, provided:
(a) Each area does not exceed 1,500 sq ft (140 sq m), and
(b) Not more than one such space is permitted per smoke compartment, and
(c) The area is located to permit direct supervision by the facility staff, and
(d) The area is equipped with an electrically supervised, automatic smoke detection system installed in accordance with 13-3.4, and
(e) The area does not obstruct access to required exits.

101:13-3.6.2.1 Corridor walls shall be continuous from the floor to the underside of the floor or roof deck above, through any concealed spaces, such as those above the suspended ceilings, and through interstitial structural and mechanical spaces, and shall have a fire resistance rating of at least 20 minutes.

Exception No. 1: In smoke compartments protected throughout by an approved, supervised automatic sprinkler system in accordance with 13-3.5.2, a corridor shall be permitted to be separated from all other areas by non-fire-rated partitions and shall be permitted to terminate at the ceiling where the ceiling is constructed to limit the transfer of smoke.

Exception No. 2: Existing corridor partitions shall be permitted to terminate at ceilings that are not an integral part of a floor construction if 5 ft (1.5 m) or more of space exists between the top of the ceiling subsystem and the bottom of the floor or roof above, provided:
(a) The ceiling shall be part of a fire-rated assembly tested to have a minimum fire resistance rating of 1 hour in compliance with the provisions of 6-2.3.1, and
(b) Corridor partitions form smoketight joints with the ceilings (joint filler, if used, shall be noncombustible), and
(c) Each compartment of interstitial space that constitutes a separate smoke area is vented, in case of smoke emergency, to the outside by mechanical means having sufficient capacity to provide at least two air changes per hour, but in no case having a capacity less than 5,000 cfm (2.36 cu m/s), and
(d) The interstitial space shall not be used for storage, and
(e) The space shall not be used as a plenum for supply, exhaust, or return air except as noted in (c).

Exception No. 3*: Existing corridor partitions shall be permitted to terminate at monolithic ceilings that resist the passage of smoke where there is a smoketight joint between the top of the partition and the bottom of the ceiling.

101:23-3.1.2.2 Impractical. Large facilities classified as impractical evacuation capability shall meet the requirements for limited care facilities in Chapter 13.

Exception*: Facilities where the authority having jurisdiction has determined equivalent safety is provided in accordance with Section 1-5.

101:31-4.1.2 Fire exit drills in health care occupancies shall include the transmission of a fire alarm signal and simulation of emergency fire conditions. Drills shall be conducted quarterly on each shift to familiarize facility personnel (nurses, in-
terns, maintenance engineers, and administrative staff) with signals and emergency action required under varied conditions. When drills are conducted between 9:00 p.m. (2100 hours) and 6:00 a.m. (0600 hours), a coded announcement shall be permitted to be used instead of audible alarms.

*Exception: The movement of infirm or bedridden patients to safe areas or to the exterior of the building shall not be required.*