## **United States Fire Administration**



## Twelve-Fatality Nursing Home Fire Norfolk, Virginia



**Federal Emergency Management Agency** 



United States Fire Administration
National Fire Data Center

# Twelve-Fatality Nursing Home Fire Norfolk, Virginia (October 5, 1989)

Investigated by: Randolph E. Kirby Hollis Stambaugh

This is Report 034 of the Major Fires Investigation Project conducted by TriData Corporation under contract EMW-88-C-2649 to the United States Fire Administration, Federal Emergency Management Agency.



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#### U.S. Fire Administration Fire Investigations Program

The U.S. Fire Administration develops reports on selected major fires throughout the country. The fires usually invovle multiple deaths or a large loss of property. But the primary criterion for deciding to do a report is whether it will result in significant "lessons learned." In some cases these lessons bring to light new knowledge about fire -- the effect of building construction or contents, human behavior in fire, etc. In other cases, the lessons are not new but are serious enough to highlight once again, with yet another fire tragedy report.

The reports are sent to fire magazines and are distributed at national and regional fire meetings. The International Association of Fire Chiefs assists USFA in disseminating the findings throughout the fire service. On a continuing basis the reports are available on request from USFA.

This body of work provides detailed information on the nature of the fire problem for policymakers who must decide on allocations of resources between fire and other pressing problems, and within the fire service to improve codes and code enforcement, training, public fire education, building technology, and other related areas.

The Fire Administration, which has no regulatory authority, sends an experienced fire investigator into a community after a major incident only after having conferred with the local fire authorities to insure that USFA's assistance and presence would be supportive and in no way interfere with any review of the incident they are themselves conducting. The intent is not to arrive during the event or even immediately after, but rather after the dust settles, so that a complete and objective review of all the important aspects of the incident can be made. Local authorities review USFA's report while it is in draft. The USFA investigator or team is available to local authorities should they wish to request technical assistance for their own investigation.

This report and its recommendations were developed by USFA staff and by TriData Corporation, Arlington, Virginia, its staff and consultants, who are under contract to assist the Fire Administration in carrying out the Fire Reports Program.

The U.S. Fire Administration appreciates the cooperation received from the Norfolk Fire Department and the Hillhaven Rehabilitation and Convalescent Center. Particular thanks go to Chief Thomas Gardner and Investigator Forest Parham of Norfolk Fire Department and to Assistant Administrator Willie Alston of Hillhaven.

### Twelve-Fatality Nursing Home Fire Norfolk, Virginia

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#### **OVERVIEW**

On October 5, 1989 at 2218 hours, a fire in Norfolk, Virginia was reported from the Hillhaven Rehabilitation and Convalescent Home, 1005 Hampton Boulevard. This was a 4-story masonry building, housing 161 elderly patients, most of whom were bedridden.

First arriving firefighting units discovered fire coming out of the window of a second floor patient room located on the front of the building. The fire was lapping up to the third floor window. The second floor was completely filled with heavy smoke, and some flame at the ceiling level was observed. No alarms were heard and there was no apparent commotion.

Second and third alarms were sounded immediately to assist in rescue efforts. Some patients were removed from their rooms by the use of ground ladders set up on the outside. Bedridden patients, trapped in their

#### SUMMARY OF KEY ISSUES

Issues Comments

Cause	Believed accidental discarding of lighted match on bed, igniting bed linen and foam rubber pad in second floor patient room.
Detection & Reporting	Fire detected by floor nurse who assisted two occupants from room of origin, leaving door open to hallway, allowing flame and smoke to penetrate hall. Other patients on same floor were made aware of fire by the staff yelling and smoke penetrating their rooms.
Firefighting	Heavy black smoke throughout second floor made search and rescue difficult. Three alarms were needed to provide sufficient manpower.
Building Structure	Sound construction and quick extinguishment prevented structural failure and fire extension to other areas.
Fire Protection Equipment	No smoke detectors in patient rooms. Interior fire alarm system (including detectors) failed to operate, resulting in delayed detection and fire department notification.  Building equipped with 6" standpipe system connected to city water only. No automatic fire pumps. No sprinkler system.
Smoke Barrier Doors	Smoke barrier doors, installed in hallway and equipped with automatic smoke-activated door closures, failed to operate due to blown fuse in fire alarm panel. This allowed rapid spread of heat and smoke throughout second floor.
Code Compliance	Building not subject to current code requirements for fire sprinklers and smoke systems, since it was constructed prior to requirement.

#### SUMMARY OF KEY ISSUES (Cont'd)

Issues Comments

Patient Life Support & Restraint	Many patients restrained to beds with cotton cravats and/or connected to life support systems, making removal by firefighters extremely difficult.
Evacuation	Because of heavy, thick, black smoke and considerable heat, coupled with the fact most occupants were bedridden, rescue and evacuation were difficult and time consuming.
Local Hospital Disaster Plan	Plan was effectively put into operation, thereby providing adequate medical support and transport for the large number of injured.

rooms, had to be carried by firefighters through heavy smoke and heat conditions. Rescue efforts on the second floor required approximately 35 minutes.

Approximately 55 patients were removed from the second floor, and eventually, the entire building was evacuated. Heavy smoke conditions claimed the lives of 12 residents and injured 98. In addition, four firefighters were injured.

One hundred thirty-eight fire and rescue services personnel were required to bring the scene under control, officially declared at 0100 hours.

#### **BUILDING STRUCTURE**

The building is located in a predominately residential community in the downtown section of Norfolk, Virginia. It is constructed with brick and cinderblock walls; floors are concrete slabs, supported by steel bar joists. It is a 4-story L-shaped design, 250' X 60' (see Appendix A for photographs and Appendix B for floor plan).

The building is equipped with service and passenger elevators. The first floor contains the administrative offices, cafeteria, physical therapy treatment rooms, and the building heating and electrical services. The second, third, and fourth floors are devoted to patient rooms, housing 172 beds.

There are three stairwells located on the north, east, and west sides of the building. Each stairwell begins at ground level and terminates at the fourth floor.

Interior decor is largely vinyl-covered and painted wall surfaces, vinyl floor tile, and a l-hour rated suspension ceiling.

#### **CODES**

The building was constructed in 1969 under the Southern Standard Building Code, which at that time did not require sprinkler systems or smoke detection systems. The building is considered to be in compliance

with existing building codes and is not subject to fire-protection upgrading though a fire alarm/smoke detection system was in place. The last inspection by the Norfolk Fire Department was November 1988 at which time reportedly only a few, minor violations were found. The building has enjoyed a very good fire record.

Should this structure be constructed today, complete fire detection and fire sprinkler systems would be required, including smoke detectors in each patient room.

#### FIRE PROTECTION

The building is equipped with a 6-inch standpipe system located in each exit stairwell. A 2 l/2-inch hose valve is located on each floor level; a 1 l/Z-inch valve is located on hallways outside each stairwell.

The building is equipped with an automatic fire alarm system, which is monitored by a private agency. The building has three sets of smoke barrier doors, one set each on floors two, three, and four. These doors are equipped with magnetic hold open devices activated by smoke detectors located in the corridors and interconnected to the fire alarm system.

Exit doors from each floor are equipped with an alarm for the purpose of alerting the nursing staff about wandering patients.

The building does not contain a sprinkler system or individual room smoke detectors. The city water main system in this area is considered to be satisfactory.

#### ORIGIN AND SPREAD OF FIRE AND SMOKE

The fire originated in Room 226, believed to be as a result of a patient accidentally discarding a lighted match onto his bed (after missing the waste can) and igniting the bed linen and the polyurethane mattress pad, which is a highly combustible and smoke-generating material when subjected to open flame. The fire intensified very rapidly, generating

tremendous heat and smoke buildup. It was known that the patient was a smoker. The night before the fire he had been caught with cigarettes in his room, which was against the facility's rules.

The room was not equipped with smoke detectors or an automatic fire suppression system, and it appears that the fire burned unabated for a few minutes before it was discovered. A nurse's assistant had checked the patients in Room 226, the room of origin, and then proceded down the hall to look in on other patients. Originally she stated she was only two rooms away when she smelled smoke and began checking for the source of fire. Later, however, she recalled she was several rooms away from Room 226 and that she checked back into each of these rooms for the fire before finally discovering the blaze in 226.

Once the floor nurse detected the fire she assisted the two occupants from the room. The door remained open, allowing the fire and smoke to penetrate the second floor hall.

Smoke barrier doors, located in the hall and within 20 feet of the room of origin, failed to close, allowing smoke to completely penetrate the second floor. The interior fire alarm system was pulled. Due to a blown fuse in the main fire alarm control panel, that system also failed to operate and no alarm was sounded.

The nurse yelled to other second floor staff that there was a fire. The nurses began to open and close stairwell doors as they attempted to evacuate patients. This allowed smoke to penetrated the upper floors.

It is believed that the fire burned approximately 12-15 minutes before the Fire Department arrived.

#### THE FIRE

On October 5, at 2218, a fire call was received by the Norfolk Fire Alarm Dispatch Center from a staff member who worked at the Hillhaven Home. First responding units arrived at the scene in four minutes at 2222. Engine 6's four firefighters went to the front entrance and observed heavy flames from a second story patient room. Engine 6 proceeded with an

interior attack from the east side stairwell, advising Engine 7 to make an exterior attack to the room of fire origin.

An immediate call for additional alarms was requested. Engine 7, with four men, arriving moments behind Engine 6, began laying a 5-inch supply line to Engine 6 from a fire hydrant located on Hampton Boulevard at the north end of the building. The fire hydrant was broken and not usable. Engine 1 arrived moments after Engine 7 and proceeded with a 5-inch line to Engine 6. Engine 7 positioned itself at the intersection of Hampton Boulevard and Westover Avenue.

Personnel from Engine 6 carried a high-rise pack to the second floor by way of the east stairwell. Hose was connected to the standpipe system and firefighters, who began to make their way to the second floor through the exit stairwell, found the floor completely charged with heavy, black smoke. They observed fire at ceiling level in the area of the smoke barrier doors located midway down the hall. After opening their handline, water was lost for a few moments, probably due to an air pocket within the standpipe system.

By this time, the crew from Engine 7 had entered the building through a window on the second floor and had knocked down the majority of fire. It then became apparent to the members of Engine 6 that the floor had not been evacuated, and that many patients were still in their rooms. Though fire was no longer a threat, dense toxic smoke pervaded the second floor corridor in the location of the room of origin, highly threatening to the frail, elderly residents.

At this time, a nurse was attempting to roll a patient in a bed to the exit stairwell. Firefighters quickly removed the patient from the bed and helped the nurse and patient to the outside. Firefighters began carrying patients, most of whom were bedridden, from smoke-filled rooms. This proved to be a tremendously difficult and time-consuming task, given the smoke conditions and the number of people who needed to be evacuated.

As additional Fire Department personnel arrived, a command post was established in front of the building on Westover Avenue. Three ground

ladders were placed against the front wall of the building, where several patients were removed through second floor windows.

A relay system was utilized to remove people from the second floor. Firefighters wearing breathing apparatus took patients from their rooms to the stairwell, where they were transferred to other personnel who carried them to the outside.

By this time, the medical director for the Paramedic Rescue Squad and a Norfolk General Hospital physician arrived and established a triage site on the lawn near the east end of the building.

Rescue was continuing. Firefighters were experiencing difficulty releasing restrained patients from beds, as the restraining devices had to be cut or untied, requiring additional time. Difficulty was also experienced when removing life support systems and body fluid tubes, which were connected to bed and patient. Because it took so long to remove the bed straps and to disconnect patients from medical equipment, and because rescuers had to move cautiously down the stairwell carrying elderly, infirm patients, a traffic jam developed in the hall outside the stairwell. This further complicated rescue operations.

As the fire suppression and evacuation effort on the second floor was proceeding, fire personnel were stationed on the third and fourth floors, where moderate smoke had permeated. They, along with nursing staff, began reassuring patients and closing doors to rooms. The Fire Department then hooked up their new high-volume smoke removal unit (Air-I) to the front entrance, and used the unit to blast smoke out of the building.

By approximately 2240, the fire on the second floor was extinguished and most patients there had been removed. The medical director ordered evacuation of the third and fourth floors as a precaution since some patients were showing signs of distress.

Thirty-four ambulances, from Norfolk, Chesapeake, Portsmouth, and local Navy bases were used to transport the injured to area hospitals. Two Navy ambulance buses and local transit mini vans also were made available to transport wheelchair patients. The hospital emergency procedure that

was put into operation apparently worked quite effectively, as medical treatment for so many was given without delay. Nevertheless some patients were pronounced dead at the triage site; others at hospitals later.

The building was occupied by 161 patients and 28 staff members on the evening of the fire. This emergency required the services of approximately 138 fire and rescue service personnel. The scene was officially declared under control at 0100 hours.

#### **FATALITIES**

Twelve elderly patients, most of whom were bedridden, died as a result of smoke inhalation or other complications directly related to exposure from heat and smoke. The nine women, ranging in age from 71 to 97 years, and three men (including the patient who started the fire) ranging in age from 65 to 92 years, died either at the scene or in the hospital sometime later. All the victims resided on the second floor in the immediate vicinity of the fire origin. Of the original seven fatalities at the scene, all were reported to have carboxyhemoglobin rates of 54-59 percent, according to doctors at the hospital.

#### **INJURIES**

Building Occupants -- Ninety-eight patients were injured and required hospital treatment. Three died later within days of the incident. Most injuries were due to smoke inhalation problems. Four were considered critical. The majority of those injured resided on the second floor. Others lived on the third and fourth floors, where there was some penetration of smoke.

Firefighter Injuries -- There were four firefighters injured, all as a result of rescue efforts. Three were treated for smoke inhalation, and one was treated for a strained back. All were treated at the hospital and have since returned to duty.

#### DAMAGE ASSESSMENT

Dollar loss is estimated at \$100,000. Fire completely gutted the room of origin and caused moderate fire damage to ceiling and walls on portions of the second floor. There was heavy smoke damage throughout the second floor, with moderate smoke damage to the third and fourth floors. There was no apparent structural damage.

Additional damage was prevented by rapid extinguishment by the fire department, coupled with the practice of closing patient room doors by the nursing staff and sound construction of the building.

#### **LESSONS LEARNED**

## 1. <u>Institutional buildings, regardless of when they were built, need</u> full, built-in protection.

Regardless of when they were constructed, multiple occupancy institutional buildings should be subjected to current fire codes regarding installation of fire protection equipment. This fire is further testimony to the urgent need for such action. The installation of a fire sprinkler system, coupled with a well-designed smoke detection system, would have reduced, if not eliminated, this tragic loss of life.

When dealing with large numbers of frail and bedridden people in an institutional setting, evacuation often is not a viable alternative. As such, there is an essential need for facilities such as Hillhaven to have complete automatic fire suppression and detection capabilities.

#### 2. Frequent testing of fire protection and alarm systems is critical.

The fact that the smoke barrier doors and alarm system failed to operate illustrates the importance of frequent and thorough inspections and testing of fire protection systems.

Nursing home operators should be made aware of the importance of making sure the safety systems are operating, and of their self-interest in preventing damage and liability suits.

#### 3. Flammable furnishings contribute to rapid fire growth and flashover.

While the polyurethane mattress pads apparently were treated for fire retardancy, they were a major factor in heat and smoke buildup. Equipment and decorations, such as drapes, wall coverings, bed linen, etc., should be of the type that affords the lowest flame spread possible.

## 4. <u>Commonly used patient restraints seriously hamper evacuation efforts during emergencies.</u>

Restraining patients to beds should be accomplished by using a type of restraint that can be released with relative ease and speed in the event of emergencies. The use of cotton cravats in this fire hampered firefighters in their rescue efforts, as straps had to be cut or untied before patients could be evacuated.

Consideration also must be given to the method used in attaching life support systems to patients and beds.

#### 5. It is important to remember to rotate personnel at the scene.

Personnel from the first arriving engine company were also among the last to leave and were quite exhausted. This is a reminder of the need to rotate personnel as feasible, so as to avoid overexertion and potential injury.

## 6. <u>Employee training and practice drills pay off when an emergency does happen.</u>

The Hillhaven fire once again demonstrates the importance of developing and implementing a well-designed emergency procedures program. The program at this facility was excellent. It was well-designed, clearly documented, and was practiced on a monthly basis. This training was evident the night of the fire when staff immediately began closing doors to impede the spread of fire and smoke and attended to patients removed to the lawn. Their efforts went a long way toward effecting a prompt and efficient response to the fire and in limiting confusion at the scene.

#### **APPENDICES**

- A. List of Slides, Selected Photographs
- B. Floor Plan of Second Floor (Layout of third and fourth floors is similar.)
- C. Fire Scene Diagram Showing Fire Units' Positions at Fire
- D. Unit Reponse Times
- E. "Egg Crate" Pad Label
- F. Units Used at the Fire
- G. Fire Department Incident Report
- H. Fire Department Pre-fire Plan Floor Diagram for Hillhaven
- I. Sample of Hillhaven's Safety Committee Meeting Minutes, Monthly Training Schedule, and Staff Attendance Record

#### APPENDIX A

#### List of Slides, Selected Photographs

Slides and photographs are included with the master report at the U.S. Fire Administration. Below the slides with an asterick have been made into photos and are presented following this list.

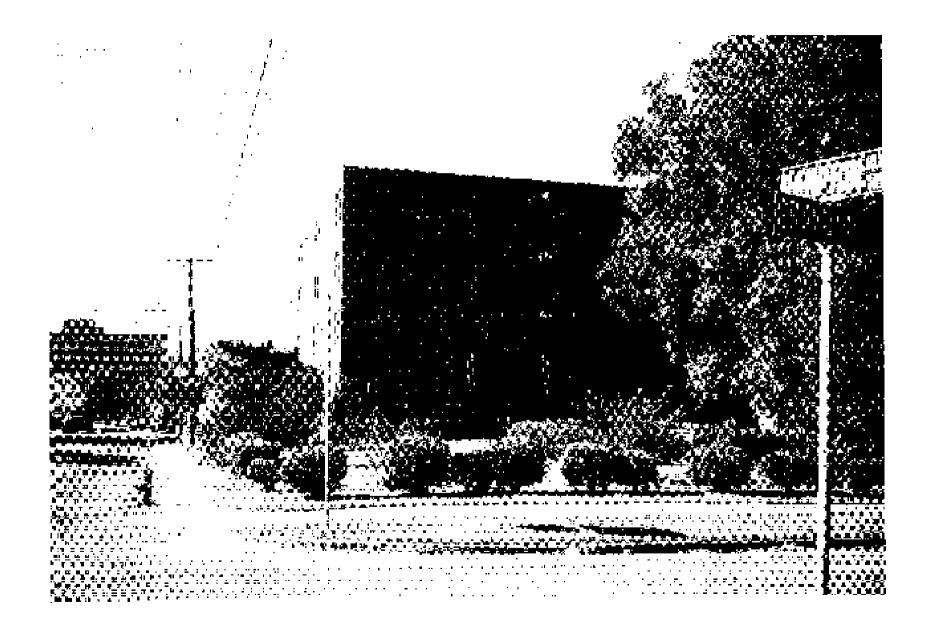
- \*1. Main entrance to Hillhaven Home
- 2. South portion of building, facing Westover Avenue
- \*3. South end of building, indicating second floor window where fire originated
- 4. East end of building facing Hampton Avenue
- \*5. Northeast end of building looking southwest (Note defective fire hydrant)
- 6. West end of building and parking lot
- 7. Typical standpipe riser for building
- \*8. Typical 1 I/2-inch hose outlet, located at each stairwell entrance on each floor
- \*9. Main control panel for fire alarm and smoke detector systems
- 10. Emergency generator set
- 11. Siamese connection to standpipe system on east side of building (Note obstructions)
- \*12. Typical door alarm on each stairwell door
  - 13. Typical bed used throughout Home
- \*14. "Egg crate" polyurethane mattress used throughout Home
- 15. Hallway looking north from front of building on third floor
- 16. Hallway looking north from front of building on third floor
- \*17. Smoke detector and smoke barrier located on second, third, and fourth floors
- \*18. Fire damage to smoke barrier doors and to ceiling from room of origin on right

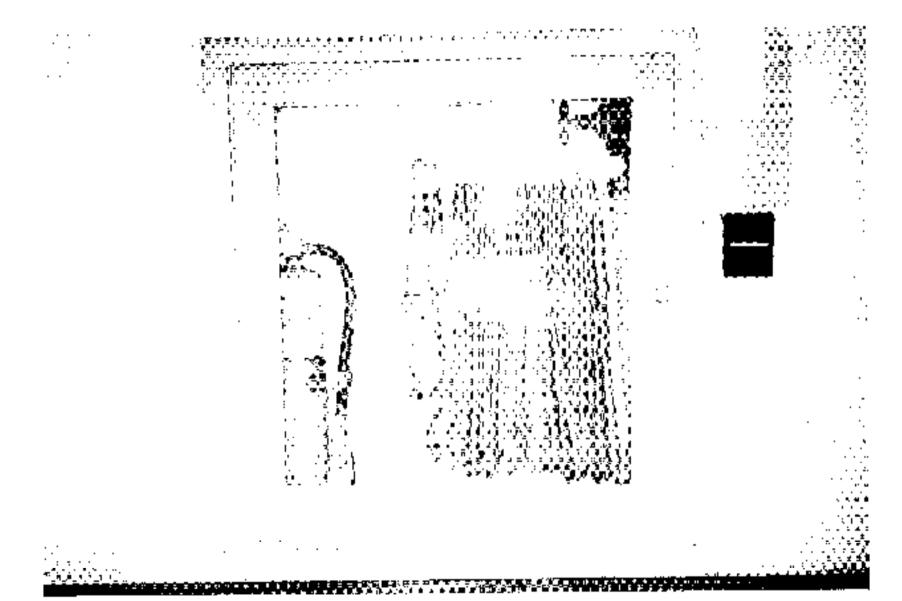
#### List of Slides, Selected Photographs (cont'd)

- \*19. Fire and heat damage to ceiling and walls on opposite side of smoke barrier doors
- 20. Magnetic hold open device for second floor smoke barrier doors.
- 21. Fire damage to hallway from room of origin
- 22. Point of origin in Room 226
- 23. Fire damage to front wall of Room 226
- 24. Fire damage to wall in Room 226
- 25. Fire damage to ceiling system in Room 226 (Note relatively good condition of steel bar joists)
- 26. Fire damage in Room 226 facing hallway

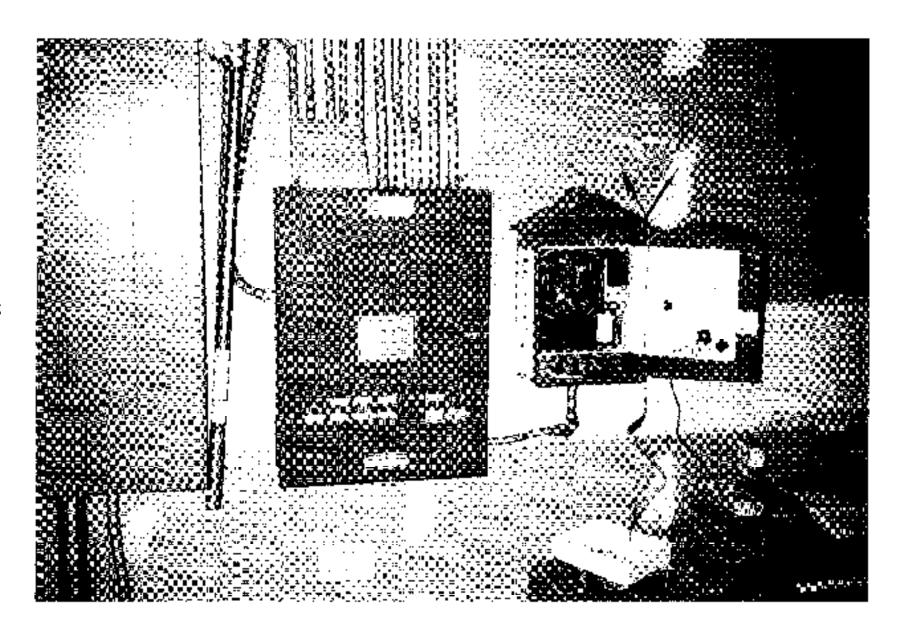


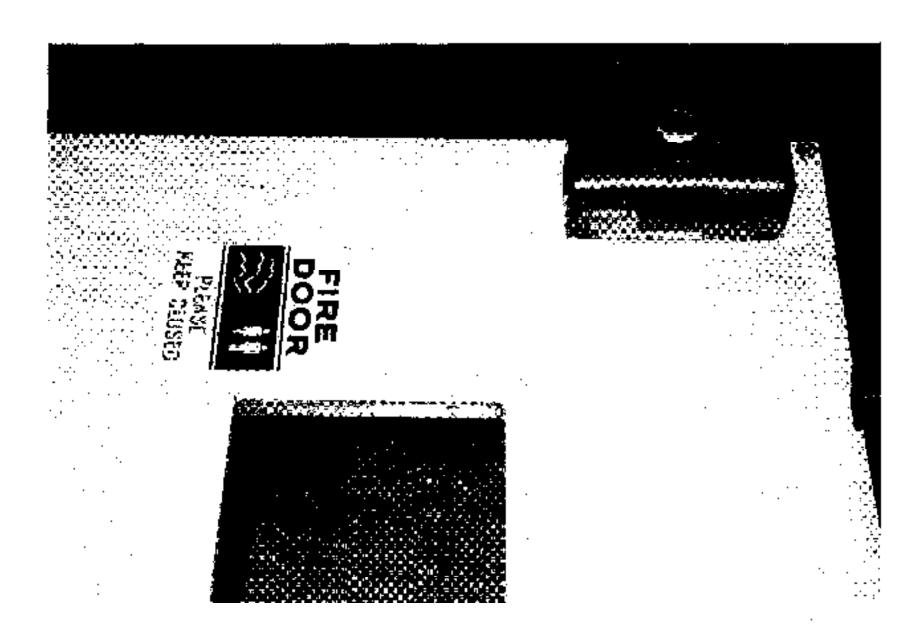


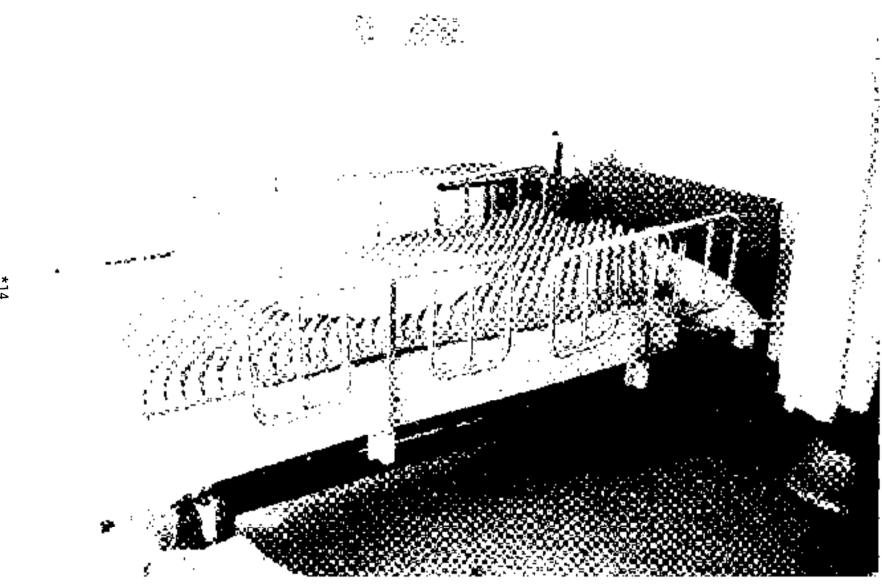


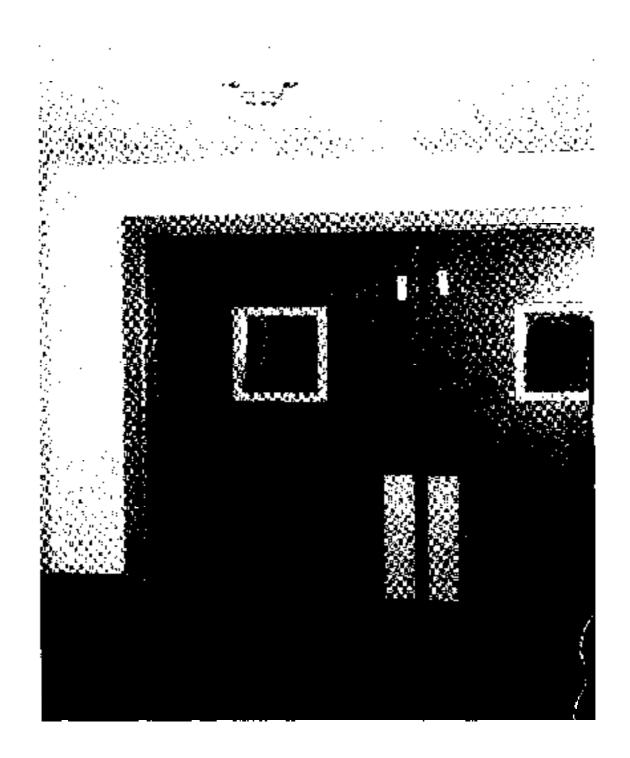


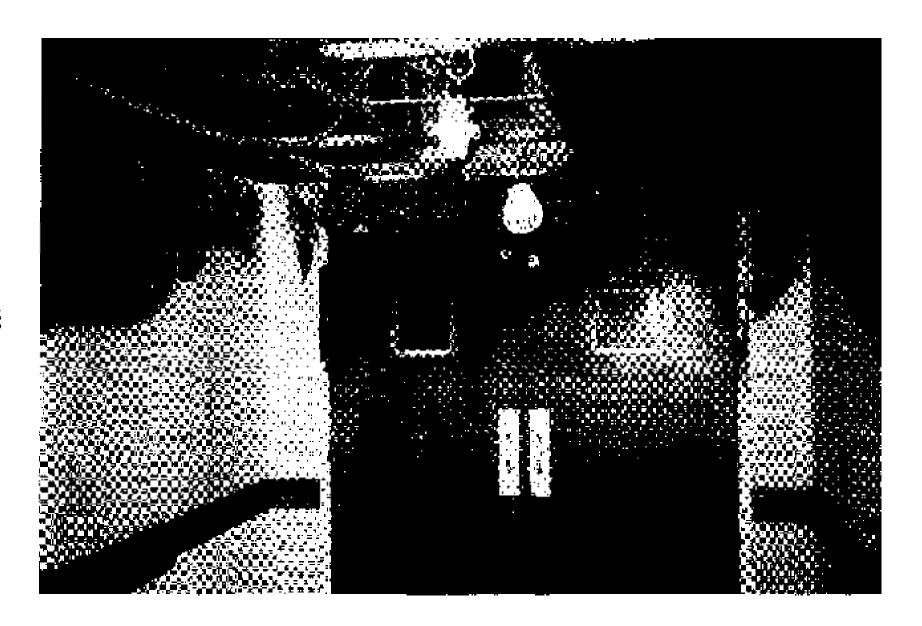


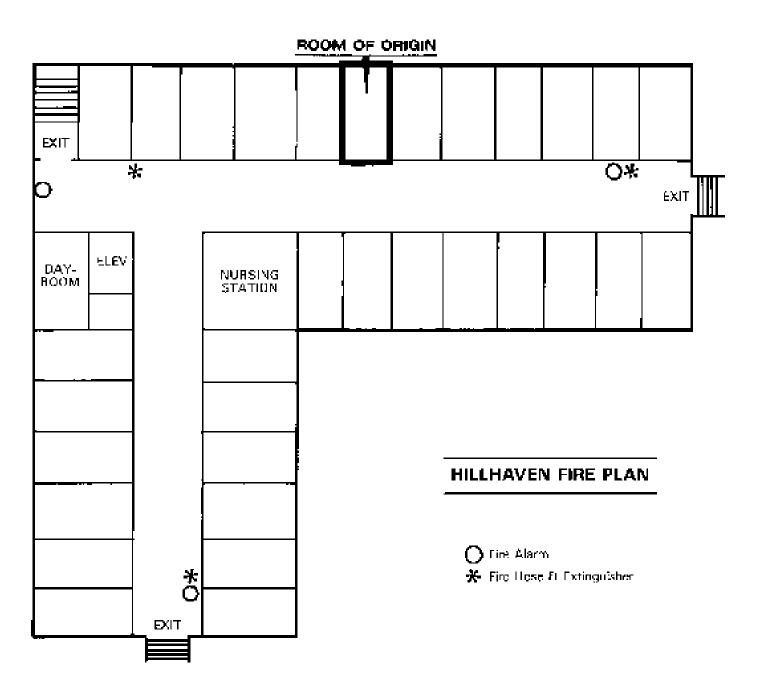


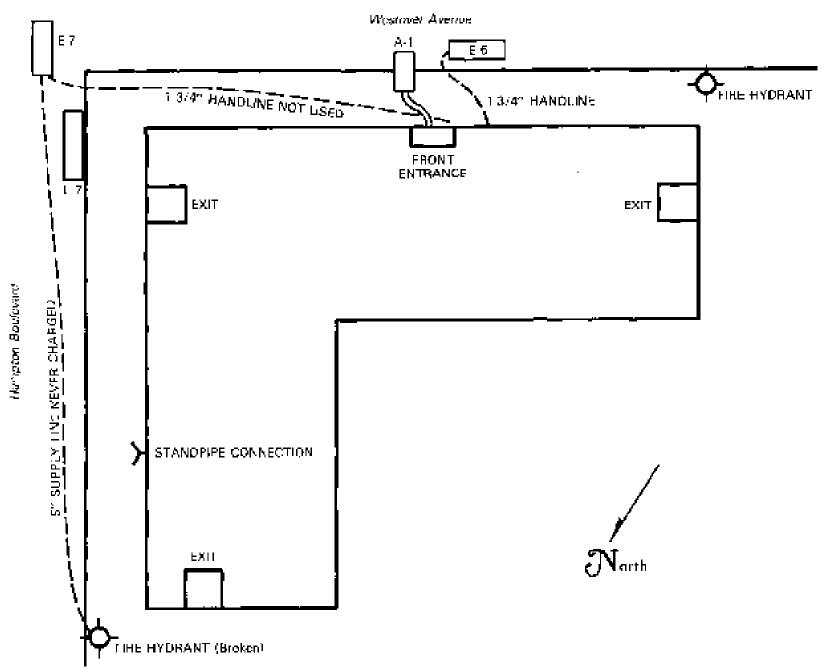












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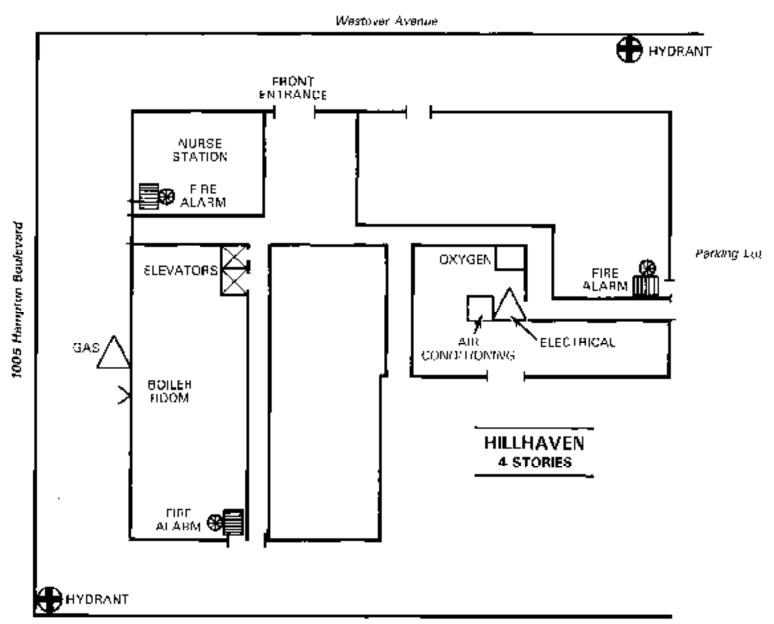
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#### Appendix F

#### Units Used at the Fire

- 11 Engines
  - 3 Ladder Trucks
- 2 Squad Rescue Units
- 39 Ambulances
- 2 Navy Ambulance Buses
- 1 Safety Officer
- 6 Minivans with Chair Lifts
- 1 High Volume Ventilation Unit
- 138 Personnel (approximate)

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Graydon Avenue

## Appendix I SAFETY COMMITTEE MEETING MINUTES

CHAIRPERSON	DATE 4/1/89
1. Members:  Uthern Syman & Grat and Proceed Attack of The State of Th	Dien & Custon D. Fundo Harras Fos Remaio Anc Dref Occhio Orcher

- Read minutes of last meeting and correct it necessary.
- 4. Unfinished business (status of previous recommendations, programs, etc.).
- 5. Review of incidents (Patient and Employee) with recommendations.
- Inspections and subsequent recommendations.
- New Business.
- 8. Salety Education and Motivation.

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#### STAFF DEVELOPMENT ATTENDANCE RECORD

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Signature, Title, Staff Attending:	
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