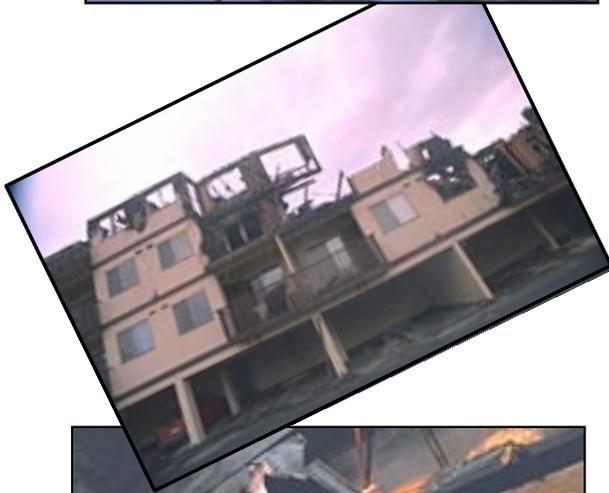


Fire Investigation Summary

Apartment Building Fire

**Bremerton, Washington
November 13, 1997**



A fire in an apartment complex killed four elderly residents. The four-story structure was unsprinklered and only had smoke detectors that sounded within the individual units. The delay in the fire being detected, as well as the door to the apartment of origin being left open, allowed the fire to grow and spread rapidly.



National Fire Protection Association
Fire Investigations Department

On November 13, 1997, at approximately 6:00 a.m., a fire occurred in an occupied, four-story apartment complex in Bremerton, Washington. Four residents died in this fire, and twelve were injured.

The complex was comprised of 142 units, of which approximately 130 units were occupied at the time of the fire. The main portion of the complex was a U-shaped building. The ground floor, which contained storage areas, laundries, parking areas, and utility rooms, was made of noncombustible construction. The upper three

floors contained the apartment units and were constructed of wood studs covered with fire-rated gypsum wallboard on each side. However, the exterior face of the walls was covered with 5/8-in. thick plywood that was not fire-rated. A two-story building occupied the open portion of the U and was built in a similar style as the main portion of the complex.

The roof structure was comprised of wood trusses that were made up of 2-in. x 4-in. and 2-in. x 6-in. members. It was covered with plywood sheathing, which in turn was covered with asphalt shingles. Within the void space in the U-shaped portion of the building were four fire separations. However, on the sole remaining fire separation, it was noted that there were openings in the wall that had not been closed up when the separations were built.

The facility was not equipped with an automatic fire sprinkler system. Six occupant-use hose stations were located on each of the three upper stories.

The complex lacked a facility wide fire alarm system. There were single-station smoke detectors within the individual units. These smoke detectors sounded only within the unit.

According to investigators for the Bremerton Fire Department and the Bureau of Alcohol, Tobacco and Firearms, a fire occurred in an occupied apartment on the third level of the building in the southwest corner at

approximately 6:00 a.m. The occupant of the apartment unit was not present at the time of the fire, which allowed the fire to grow undetected until the single-station smoke detector activated.

The apartment complex manager was delivering newspapers to various units when he heard the sound of the smoke detector. He entered the unit to investigate and reported that smoke had filled the unit to within a foot of the floor. He could see a body of fire in the unit's front bedroom.



The manager then exited the unit, leaving the door open, and began banging on doors in the vicinity of the fire apartment to notify other occupants of the fire.

The first unit to arrive traveled from a fire station that was located approximately 1/4 mile (0.4 km) to the north. The unit had just returned from a call, and at the time of

the alarm both members of the engine company were outside the station refueling the apparatus and were wearing their protective clothing. They responded immediately and reported that they could see a column of smoke coming from the apartment complex as they left the station. (This company had just returned from a call and had passed by the fire building moments earlier without observing any problems.)

Upon arrival, the officer reported that no fire was showing from the "outboard" side of the building. However, when he entered the courtyard, he observed smoke and fire emanating from the open door of the fire apartment and extending both laterally and vertically. The fire was being fueled by the combustible wood finish on the walls, as well as by the wood structural supports for the walkways. He immediately attempted to limit the spread of the fire by using an 1-3/4" (45-mm) handline from the ground level, but by this time the fire had spread to the fourth level and was into the roof structure as well.

A television traffic helicopter flew overhead very shortly after the report of the fire and provided video

footage that documented the rapid spread of the fire throughout the main portion of the apartment complex. The fire appeared to have penetrated the combustible void space of the roof structure and to have spread very rapidly.

According to accounts provided by some of the residents, they were unaware of the fire until they were trapped within their units. The woman directly above the fire apartment was awake and lying in bed at the time of the fire. She reported that her window exploded inward upon her and that fire entered her apartment through this window.



As additional fire fighting units arrived, many residents were on their balconies on the outboard side of the building. The immediate focus was on rescuing these residents. One person was in such danger that he lowered a rope from his fourth floor unit and slid down it, severely burning the skin on his hands in the process.

A large defensive fire-fighting operation was mounted, and the fire was declared under control at 7:45 a.m. An effort was made to determine if there were any fatalities, and, based on preliminary accounts, sixteen residents were unaccounted for.

The National Response Team from the Bureau of Alcohol, Tobacco and Firearms was requested to respond to assist in the investigation. During the three-day investigation, it was finally determined that there were four fatalities from the fire, twelve residents were injured, and over 150 residents were displaced. Approximately 117 units were damaged by the fire in varying degrees. The entire complex was declared a loss by the owners and was demolished in January of 1998.

Based on 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
- Combustible exterior wall construction
- The door to the apartment of fire origin being left open after the fire was discovered
- Inadequately protected means of egress
- Lack of proper fire separations in the combustible void space
- Lack of a complex wide fire alarm system incorporating automatic detection

The four people who died in this fire ranged in age from 75 to 91 years. These four people fall into a very high-risk category, according to data collected by the NFPA.

- *People age 65 and over had a fire death rate of 27.6 fire deaths per million population, or roughly **twice** the national average.*
- *People age 75 and over had a fire death rate of 37.9 fire deaths per million population, or **nearly three times** the national average.*
- *People age 85 and over had a rate of 59.4 fire deaths per million, or **more than four times** the national average.*

This incident very tragically demonstrates the speed with which a fire can spread. Despite the fact that the fire department was only one quarter of a mile away and was able to respond very quickly, the fire was able to spread extremely quickly, trapping and killing four elderly residents. Even though this was not a designated "elderly housing" facility, this fire is indicative of the high-risk bracket that this age group occupies. Other recent fires in residential apartments in New York City and St. Louis involving elderly residents further reinforce the need to ensure that the buildings where our elderly live are provided with adequate fire safety and protection to avoid a repetition of the circumstances of this tragic fire.

Written by Chief Fire Investigator Ed Comeau, NFPA Fire Investigations Department.

Fire Investigation Summary

Apartment Building Fire

**Bremerton,
Washington
November 13, 1997**

The National Fire Protection Association's Fire Investigations Department documents some of the most significant fires and incidents throughout the world. The objective of these investigations is to determine what lessons can be learned from these incidents. This information is then made available to the fire safety community to be used in developing future codes and standards. A complete listing of reports is available, either upon request or can be viewed on our web page.

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**APARTMENT BUILDING
BREMERTON, WA
NOVEMBER 13, 1997**



**FIRE
INVESTIGATIONS**

NATIONAL FIRE PROTECTION ASSOCIATION

Apartment Building

Bremerton, WA
November 13, 1997

4 Fatalities

Prepared by

Ed Comeau
Chief Fire Investigator

Robert Duval
Fire Investigator
National Fire Protection Association

ABSTRACT

On November 13, 1997, at approximately 6:00 a.m., a fire occurred in an occupied, four-story apartment complex in Bremerton, Washington. Four residents died in this fire, and twelve were injured.

The complex was comprised of 142 units, of which approximately 130 were occupied at the time of the fire. The main portion of the complex was a U-shaped building. The ground floor, which contained storage areas, laundries, parking areas, and utility rooms, was made of noncombustible construction. The upper three floors contained the apartment units and were constructed of wood studs covered with fire-rated gypsum wallboard on each side. However, the exterior face of the walls was covered with 5/8-in. thick plywood that was not fire-rated. A two-story building occupied the open portion of the U and was built in a similar style as the main portion of the complex.

The roof structure was comprised of wood trusses that were made up of 2-in. x 4-in. and 2-in. x 6-in. members. It was covered with plywood sheathing, which in turn was covered with asphalt shingles. Within the void space in the U-shaped portion of the building were four fire separations. However, on the sole remaining fire separation, it was noted that there were openings in the wall that had not been closed up when the separations were built.

The facility was not equipped with an automatic fire sprinkler system. Six occupant-use hose stations were located on each of the three upper stories.

The complex lacked a facility wide fire alarm system. There were single-station smoke detectors within the individual units. These smoke detectors sounded only within the unit.

According to investigators for the Bremerton Fire Department and the Bureau of Alcohol, Tobacco and Firearms, a fire occurred in an occupied apartment on the third level of the building in the southwest corner at approximately 6:00 a.m. The occupant of the apartment unit was not present at the time of the fire, which allowed the fire to grow undetected until the single-station smoke detector activated.

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The apartment complex manager was delivering newspapers to various units when he heard the sound of the smoke detector. He entered the unit to investigate and reported that smoke had filled the unit to within a foot of the floor. He could see a body of fire in the unit's front bedroom.

The manager then exited the unit, leaving the door open, and began banging on doors in the vicinity of the fire apartment to notify other occupants of the fire.

The first unit to arrive traveled from a fire station that was located approximately 1/4 mile (0.4 km) to the north. The unit had just returned from a call, and at the time of the alarm both members of the engine company were outside the station refueling the apparatus and were wearing their protective clothing. They responded immediately and reported that they could see a column of smoke coming from the apartment complex as they left the station. (This company had just returned from a call and had passed by the fire building moments earlier without observing any problems.)

Upon arrival, the officer reported that no fire was showing from the "outboard" side of the building. However, when he entered the courtyard, he observed smoke and fire emanating from the open door of the fire apartment and extending both laterally and vertically. The fire was being fueled by the combustible wood finish on the walls, as well as by the wood structural supports for the walkways. He immediately attempted to limit the spread of the fire by using an 1-3/4" (45-mm) handline from the ground level, but by this time the fire had spread to the fourth level and was into the roof structure as well.

A television traffic helicopter flew overhead very shortly after the report of the fire and provided video footage that documented the rapid spread of the fire throughout the main portion of the apartment complex. The fire appeared to have penetrated the combustible void space of the roof structure and to have spread very rapidly.

According to accounts provided by some of the residents, they were unaware of the fire until they were trapped within their units. The woman directly above the fire apartment was awake and lying in bed at the time of the fire. She reported that her window exploded inward upon her and that fire entered her apartment through this window.

As additional fire fighting units arrived, many residents were on their balconies on the outboard side of the building. The immediate focus was on rescuing these residents. One person was in such danger that he lowered a rope from his fourth floor unit and slid down it, severely burning the skin on his hands in the process. (This occupant had purchased the rope after a previous fire several years earlier.)

A large defensive fire-fighting operation was mounted, and the fire was declared under control at 7:45 a.m. An effort was made to determine if there were any fatalities, and, based on preliminary accounts, sixteen residents were unaccounted for.

The National Response Team from the Bureau of Alcohol, Tobacco and Firearms was requested to respond to assist in the investigation. During the three-day investigation, it was finally determined that there were four fatalities from the fire, twelve residents were injured, and over 150 residents were displaced. Approximately 117 units were damaged by the fire in varying degrees. The entire complex was declared a loss by the owners and was demolished in January of 1998.

Based on 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
- Combustible exterior wall construction
- The door to the apartment of fire origin being left open after the fire was discovered
- Inadequately protected means of egress
- Lack of proper fire separations in the combustible void space
- Lack of a complex wide fire alarm system incorporating automatic detection

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I. INTRODUCTION

The National Fire Protection Association (NFPA) investigated the Bremerton, Washington, apartment fire in order to document and analyze significant factors that resulted in the loss of life and property.

The investigation was conducted by NFPA as part of its ongoing program to investigate technically significant incidents. NFPA's Fire Investigations Department documents and analyzes incident details so that it can report lessons learned for life safety and property loss prevention purposes.

NFPA became aware of the fire on the day it occurred, and Ed Comeau, chief fire investigator of NFPA's Fire Investigations Department, visited Bremerton to perform an on-site study of this incident. That three-day, on-site study, documentation, and subsequent analysis of the event are the basis for this report. Entry to the fire scene and data collection activities were made possible through the cooperation of the Bremerton Fire Department and the Bureau of Alcohol, Tobacco and Firearms.

This report is another of NFPA's studies of fires having 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 Bremerton fire. Rather, NFPA intends that its report present the findings of its 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 Bremerton apartment building 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 construction or operation of the building. NFPA has not analyzed this building regarding its compliance with the codes and standards that were in existence when it was built or during its operation.

The cooperation and assistance of Chief Al Duke of the Bremerton Fire Department and Harry Eberhardt of the Bureau of Alcohol, Tobacco and Firearms is greatly appreciated.

II. BACKGROUND

OCCUPANCY CLASSIFICATION

Per NFPA 101[®], *Life Safety Code*[®], 1997 edition, this building would have been classified as an Existing Apartment Building.

THE BUILDING

The main portion of the complex was a U-shaped structure with a separate building located in the open part of the U. (See Figure 1.) The complex had been built in two phases, the west half in 1971 and the east half in 1972.

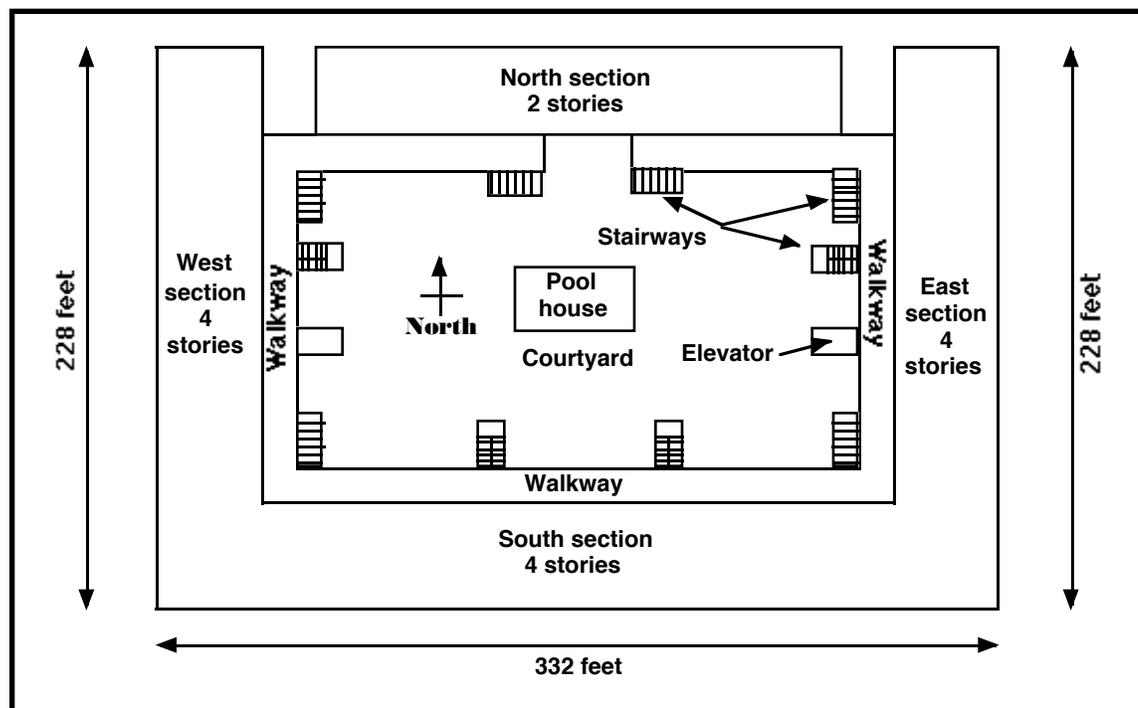


Figure 1. Site plan.

Three legs made up the U. The east and west sections measured 228 ft (69 m) long, and the south section measured 332 ft (101 m) long. These three sections were four stories high (unoccupied ground level plus three occupied levels).

There were 142 living units within the complex. 114 units were located in the U-shaped structure, and 28 units were located in the north, two-story structure.

The ground floor of the U-shaped portion was composed of masonry block walls. Contained within this area was a combination of laundry rooms, mechanical rooms, storage rooms, and parking areas.

The wall between the exterior walkways and the occupancies was composed of an outer layer of 5/8-in. (16-mm) plywood, 1/2-in. (13-mm) thick gypsum board (unknown fire rating), 2-in. x 4-in. wooden studs with fiberglass batt insulation in the cavities, and 1/2-in. (13-mm) fire-rated gypsum board on the apartment side.

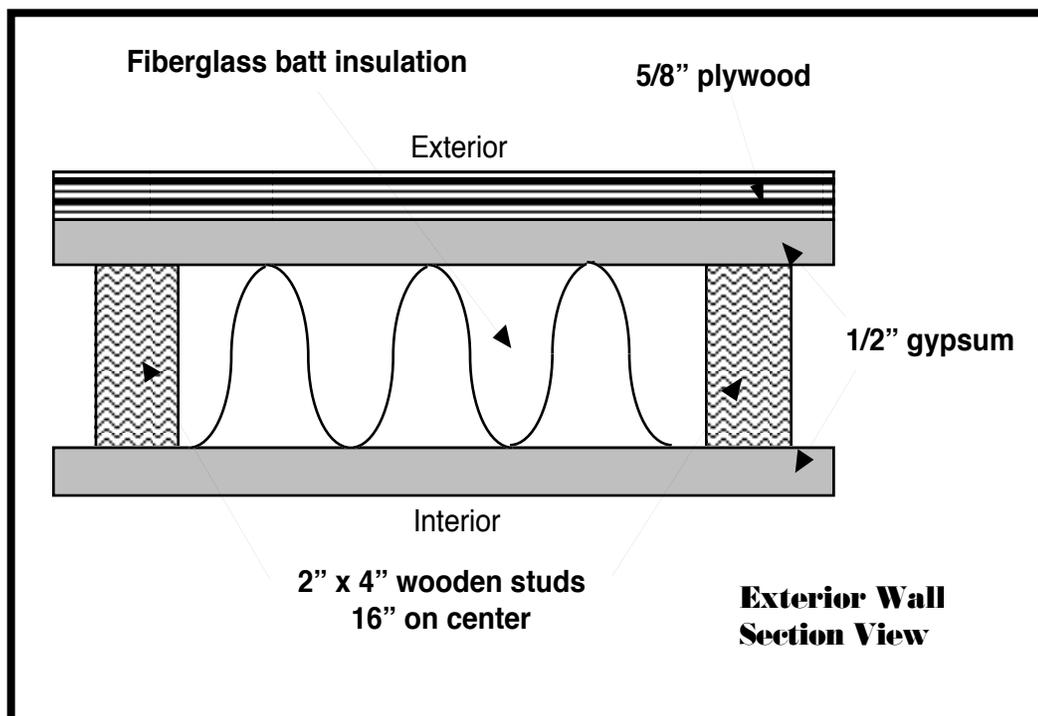


Figure 2. The configuration of the exterior walls.

The interior walls within the apartment were comprised of a single layer of 1/2-in. fire-rated gypsum board attached to wooden 2-in. x 4-in. studs, which were placed 16-in. (406-mm) apart, on center. The ceiling was also comprised of a single layer of 1/2-in. (13-mm) fire-rated gypsum board attached to metal runners which, in turn,

were attached to the underside of wood floor joists, placed 16-in. (406-mm) on center. (See Figure 3.)



Photo 1. A view of the ceiling/floor assembly inside a damaged apartment.

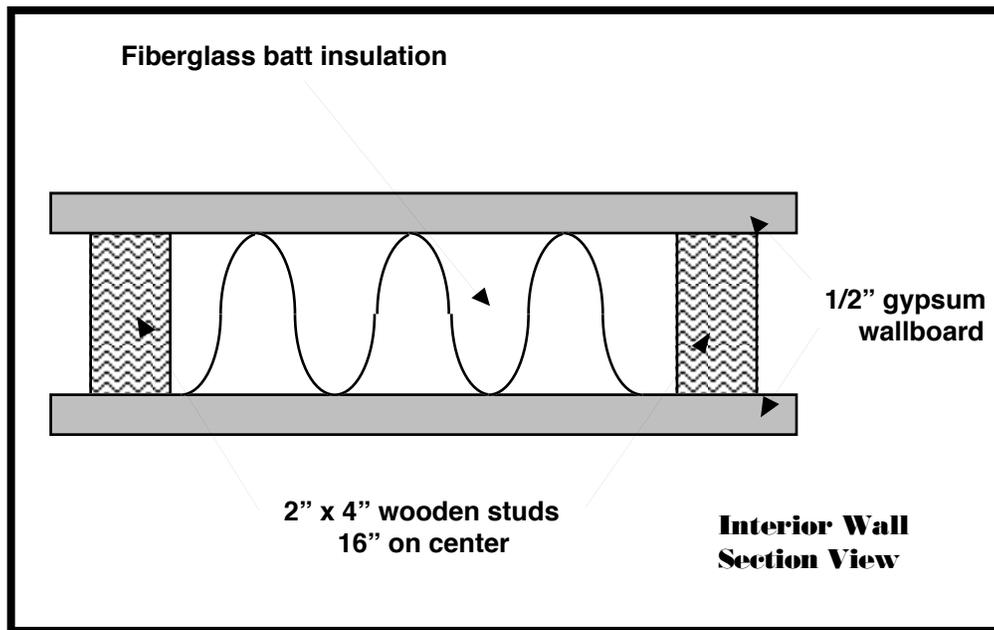


Figure 3. The configuration of the interior walls.

Between the individual apartments the wall was comprised of the following:

- A 1/2-in. (13-mm) layer of fire-rated gypsum board
- 2-in. x 4-in. wood studs placed 16-in. on center with fiberglass batt insulation in the cavity
- A 1/2-in. (13-mm) layer of gypsum board (unknown fire rating)
- 2-in. x 4-in. wood studs placed 16-in. (406-mm), on center, with fiberglass batt insulation in the cavity
- A 1/2-in. (13-mm) layer of fire-rated gypsum board

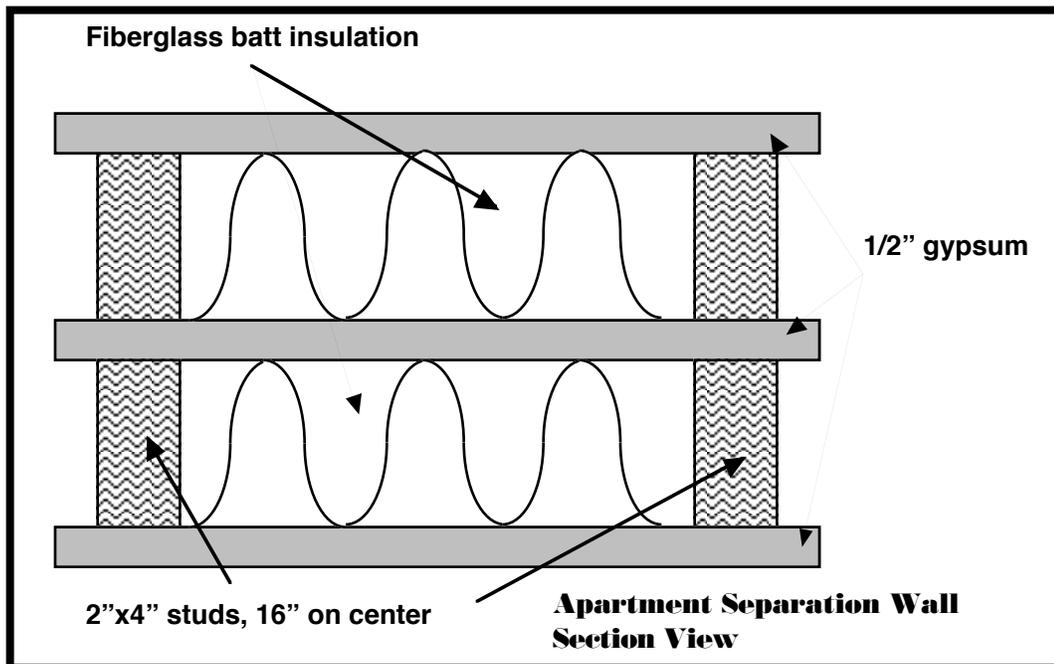


Figure 4. Configuration of separation walls.

A variety of wall finishes were noted in the undamaged apartments. These included painted wallboard, 1/4-in. (6.4-mm) wood paneling placed over the wallboard, or wallpaper.

All of the undamaged units were carpeted. It appeared that a variety of carpeting material was used in the various units. The fire or smoke spread rating of the carpeting was not determined.

The ceiling/floor assembly in the apartments was comprised of the following components, from the top down (see Photo 1):

- Carpeting
- Carpet pad
- 1-1/2-in. (38-mm) layer of concrete-type material
- 1/2-in. (13-mm) layer of plywood
- 2-in. x 10-in. wooden joists with fiberglass batt insulation in the cavity
- 1/2-in. (13-mm) fire-rated gypsum board attached to metal runners that, in turn, were attached to the underside of the joists

The roof structural system was comprised of wood triangular trusses placed 24-in. (610-mm) on center. The top and bottom chords were made up of 2-in. x 6-in. wooden members, and the web members were 2-in. x 4-in. wood.

The roof covering was an asphalt shingle system over a layer of plywood. The thickness of the plywood is unknown.

The insulation in the roof void space was blown-in cellulosic insulation that was lying loose within the cavities created by the bottom chords of the trusses.

Each apartment unit had a balcony on the outboard side of the building. This balcony was constructed of a variety of wooden structural and finish materials.

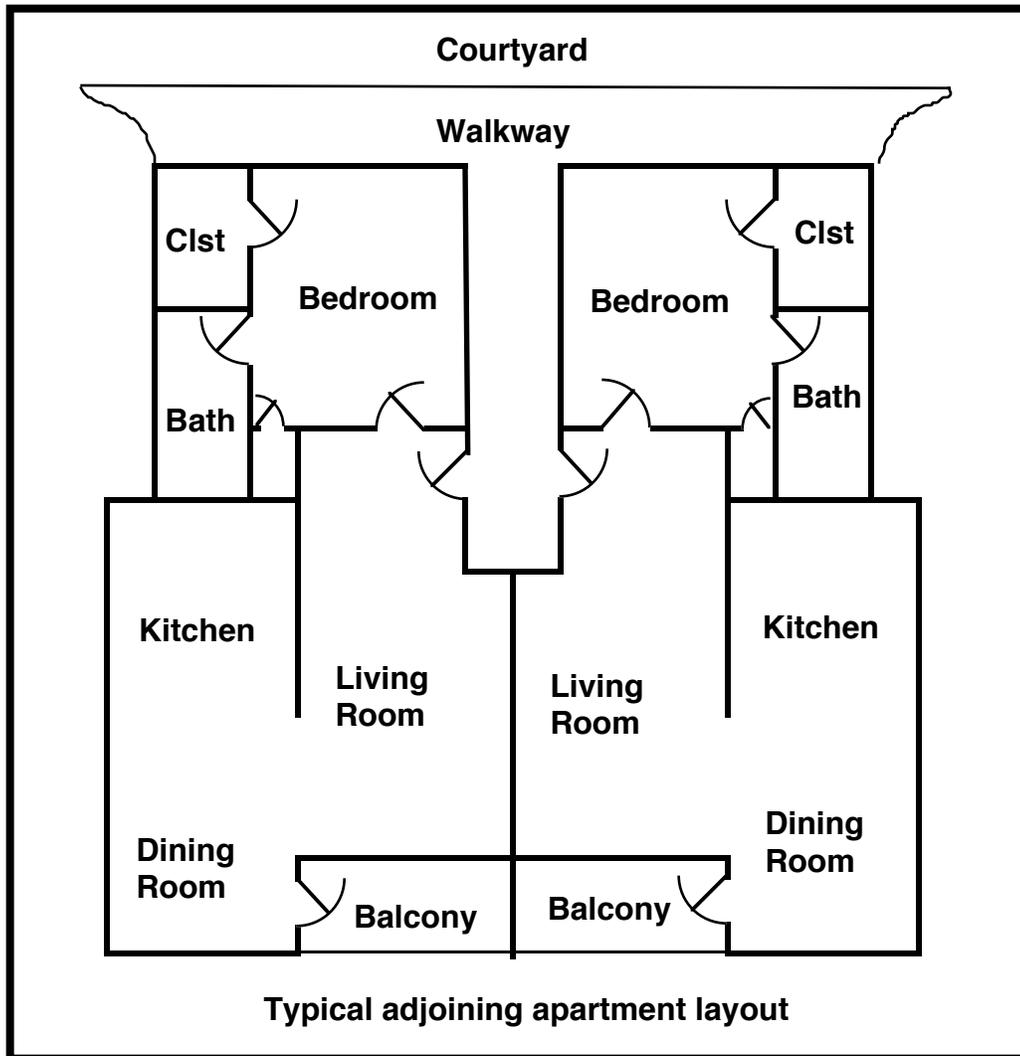


Figure 5. A typical layout of two adjacent apartment units.

Each unit had windows on both the inboard and outboard sides. The windows that faced onto the walkways measured 60-in. (1.5 m) long and were single-glazed. These windows were operated by sliding the glass laterally. (See Figure 4.)

The entrance doors to the individual units were solid core and measured 1 5/8-in. (41.3-mm) thick. They were equipped with latching and locking hardware but were not equipped with self-closures.

The exterior walkways measured 66-in. (1.7 m) wide. The wall finish on the exterior of the building was 1/2-in. (13-mm) plywood placed over a 1/2-in. (13-mm) layer of fire-rated gypsum wallboard. The ceiling on the walkways was also comprised of

1/2-in. (13-mm) plywood attached to a 1/2-in. (13-mm) layer of fire-rated gypsum wallboard. The railings of the walkways were constructed of wooden uprights and handrails, to which was attached 1/2-in. (13-mm) plywood. The floor of the walkways was also made up of wood material that was covered with indoor-outdoor carpeting.

The egress stairs, which were all located on the courtyard side of the building, were built of wood treads, joists and handrails. Each stair measured 42-in. (1 m) wide, with 12-in. (305-mm) treads and 6-in. (152-mm) risers. To exit from the courtyard area, it was necessary to proceed through breezeways at the ground level that passed underneath the building and discharged occupants into the carport areas. Each breezeway measured 48-in. (1.2 m) wide.

On the outboard side of the complex were carports underneath the apartment units that measured 22 ft (6.7 m) long and 10 ft (3 m) high. The walls facing onto these carports were made up of masonry block and the ceilings were made up of what appeared to be 1/2-in. (13-mm) gypsum wallboard. The fire resistance of this material was unknown. There were no suppression or detection systems in the carport areas. (See Figure 6.)

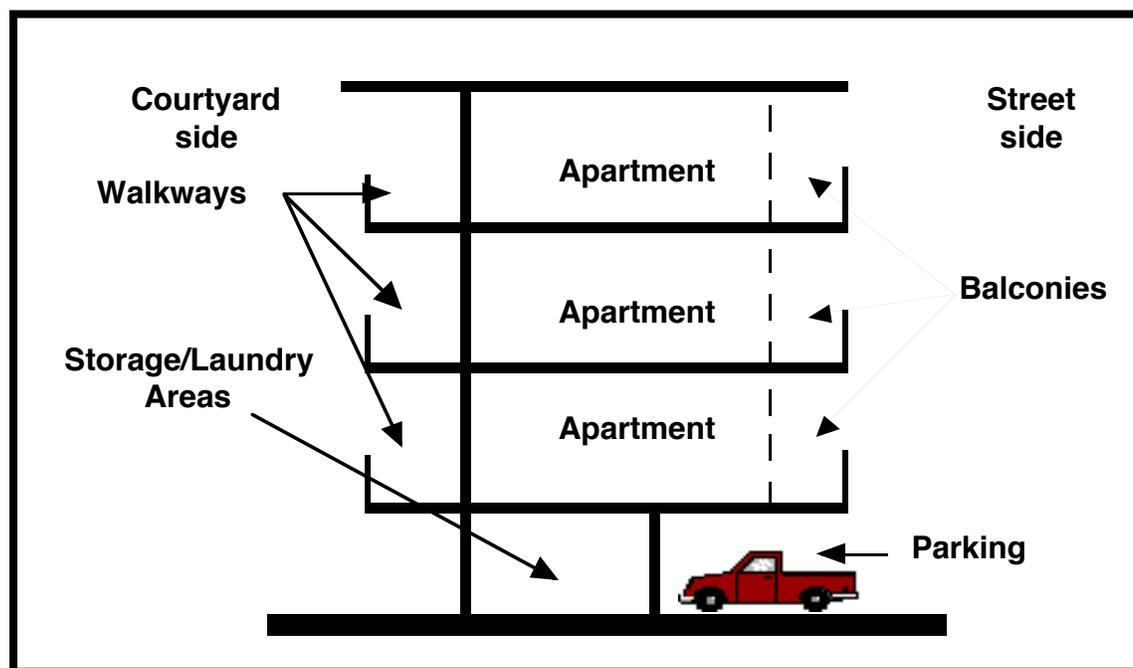


Figure 6. Elevation diagram showing the ground floor storage area, carport and three levels of apartments.



Photo 2. The exterior, or outboard, side of the apartment complex.

The building most closely resembled Type V (000) construction according to the criterion in NFPA 220, *Standard on Types of Building Construction*, 1995 edition. (See Photo 2.)

FIRE PROTECTION SYSTEMS

The facility was not equipped with an automatic fire sprinkler system. There was no manual fire alarm system within the complex. There was no complex-wide automatic smoke or fire detection system. Each living unit was equipped with a single-station, battery-powered smoke detector that would sound an alarm within just that unit. (See Photo 3.)

A Type V (000) structure has a 0-hour fire rating for the exterior bearing walls (first digit), a 0-hour fire rating for structural frame or columns and girders supporting loads for more than one story (second digit), and a 0-hour fire rating for the upper story assembly (third digit).



Photo 3. The only fire alarm devices were single-station, battery-powered smoke detectors in each living unit. There was one device per unit.

There were twelve occupant-use hose cabinets throughout the three upper levels of the complex. Each cabinet was equipped with 100 ft (30.5 m) of 1 1/2-in. (38-mm) occupant-use hose. A 5-pound (2.3-kg), 3A-40BC, dry chemical fire extinguisher was also located inside each cabinet. An inspection label on the hose showed that the last listed inspection date was October, 1989. According to officials, the latest inspection they had on record was April, 1997.

According to a pre-plan provided by the Bremerton Fire Department, there were fire barriers within the void space below the roof and above the fourth floor unit. These barriers were reportedly located every fourth unit. Following the fire, only one remained available for inspection. It was comprised of the following:

- Two layers of 1/2-in. (13-mm) gypsum wallboard of unknown fire rating
- 2-in. thick wooden truss members
- Another layer of wallboard

When the remaining fire barrier was inspected, it was noted that it was not continuous to the eaves. A large opening existed on the courtyard side of the structure. It was not possible to inspect the outboard side to determine if there was a similar opening.

MEANS OF EGRESS

The exterior walkways on the courtyard, or inboard, side of the building measured 66-in. (1.7 m) wide and ran the length of the east, south, and west wings.



Photo 4. A view of one of the balconies on the fourth level looking from east to west toward the damaged corridor. One of the stairways is seen in the middle of the picture.

There were 10 exterior stairways located on the courtyard side of the buildings. They measured 37-in. (0.9 m) to 42-in. (1.1 m) wide with a 12-in. (305-mm) tread and a 6 in. (152-mm) riser. All of the stair component were constructed of wood. The stairways discharged into the courtyard area. To gain access to a public way, it was then necessary to pass through one of 12 breezeways. (See Photo 4.)

All of the walkways and stairways were covered with indoor/outdoor-type carpeting. The fire rating of this carpeting is unknown.

Two elevators were located on the courtyard side on the east and west wings. These elevators serviced all four levels of the building.

From within the courtyard were twelve breezeways that led from the courtyard to the exterior side of the building, through the carports. (See Figure 7.)

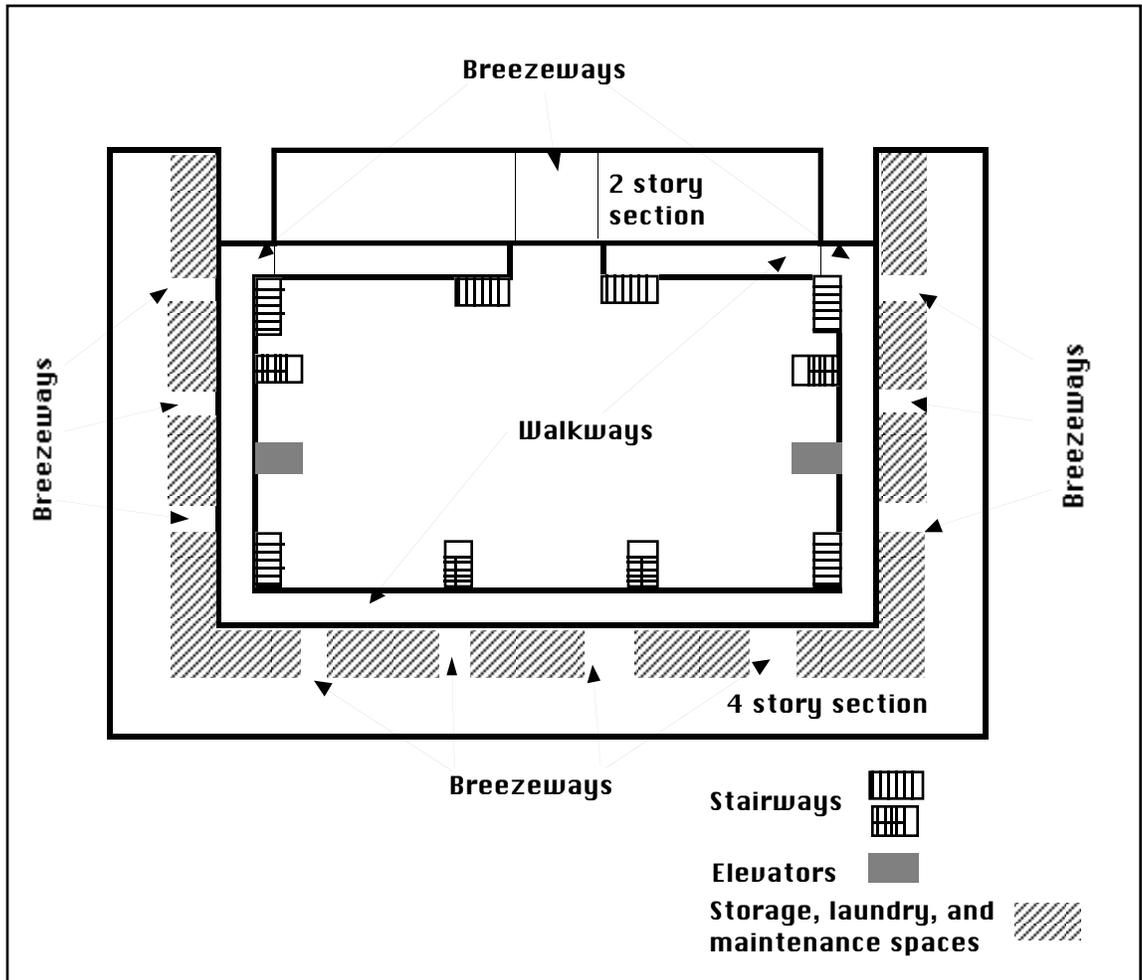


Figure 7. Site plan showing the location of the breezeways that provided access to the interior court from the outboard side of the complex.

The travel distance from the most remote unit on each level to the stairway was determined to be 75 ft (23 m). At no point during this travel would the travel path take a person through a protected enclosure.

The units were not equipped with any air conditioning. They were heated by electric baseboard heaters that were individually controlled within each unit. There were two separate zones, each with its own thermostat, within the units.

Electric water heaters were located underneath the sinks in each unit.

BUILDING OCCUPANTS

The building was normally occupied by approximately 150 residents. It is unknown how many people were in the building at the time of the fire. The unit where the fire occurred was normally occupied. However, the occupant was not home at the time of the fire.

FIRE DEPARTMENT

The Bremerton Fire Department is made up of 55 members with an on duty staffing of 11 people. There are three stations providing protection to 18 square miles (47 sq km). BFD provides paramedic level EMS service as well as transports patients. BFD also provides waterfront protection to buildings and boats on Puget Sound. In 1996 the department responded to 6,711 alarms and EMS calls.

WEATHER

The wind was reported to be calm, at approximately 5 miles per hour (8 km/hr) out of the north. The temperature was 32° - 35°F degrees (0° - 2°C). There was no precipitation.

III. THE FIRE

DISCOVERY AND OCCUPANT ACTIVITIES

At approximately 6:00 a.m., the manager of the apartment complex was delivering newspapers to various apartments. He reported that he heard a smoke detector going off in apartment 316. He returned to his apartment, called 911 to report the fire, picked up his master key and a flashlight and went to apartment 316 to investigate. When he opened the door, he reported that the apartment was filled with black, heavy smoke, almost down to the floor level. He got down on his stomach and crawled into the apartment about four or five feet to see if there were any people inside. When he entered, he looked to his right and could see flames in the area of the bed, against the courtyard side wall. He reported that the fire was not very large at this point in time. (See Figure 8.)

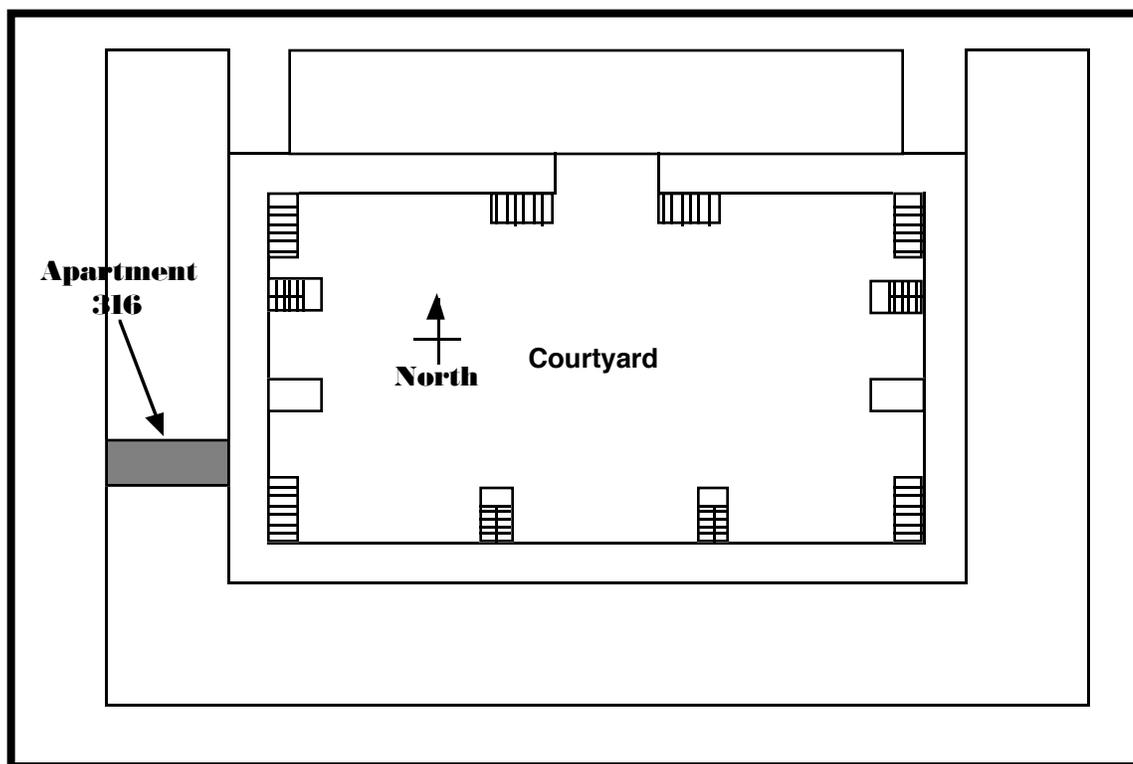


Figure 8. Site plan showing the apartment of fire origin on the third floor.

The manager then backed out of the apartment. Physical evidence indicates that the door was probably left in the open position, which allowed the heat and smoke to escape from the apartment. He then proceeded to bang on doors to wake people up.



Photo 5. Photo from the west showing the remaining two floors below the area of origin. The apartment of origin was the third-floor apartment located above the ladder.

The resident in apartment 416, directly above the fire occupancy, reported that she woke up at 6:00 a.m. and looked outside her window. She stated that she saw what she thought was fog, and went back to bed. Within minutes, her window exploded inward upon her, and fire and smoke started coming into her apartment.

She then went to the door to her apartment and opened it, where she met her male neighbor. The heat and fire was too intense to attempt to escape through that route, so they both closed their doors and went back into their apartments. They then went to their balconies to await rescue by the fire department. A ground ladder was extended up to them, and they were taken down this route. Reportedly, the fire was so severe that the male neighbor jumped from the ladder and broke his ankle.

The occupant in apartment 420 had been living in the apartment complex when there had been a previous fire in 1986. As a safety precaution, he had a rope to use in the

event that he had to escape. When he became aware of the fire, he used the rope to lower his briefcase off his balcony, then lowered his camera bag. He then tied off the rope inside of his apartment and slid down the rope. He severely injured his hands from sliding down the rope in his effort to escape.



Photo 6. View of the diminishing fire damage as one moved further north from the area of origin on the west wing.

Another occupant in the two-story building awoke at about 6:00 a.m. He reported hearing some yelling, looked out his window toward the courtyard and saw fire and smoke. He dressed quickly and ran down the walkway on the east wing of the second level. He advanced an occupant-use hose towards the fire and attempted to stop its spread.

FIRE DEPARTMENT NOTIFICATION AND RESPONSE

The Kitsap County public safety answering point, Central Communications (Cen-Com), received the call from the apartment manager at 6:06 a.m.. An initial dispatch of four units was toned out.

Fire Station 3 is located 1/4 mile (0.4 km) to the north of the occupancy. The companies had responded to a motor vehicle accident earlier in the morning and had just returned to the station. Two people, a fire fighter and a lieutenant on the engine, returned to the station (the other two crew members were enroute to the hospital with the victim from the car accident). Their route had taken them past the fire occupancy, and they reported that they had not observed anything unusual when they passed by.

When the dispatch came in, they were refueling their engine at the pump behind the station and were wearing their turnout gear. For this reason, their turnout time was very brief. The lieutenant reported that, as they were responding, he could see the smoke coming from the complex, and requested a second alarm.

Upon arrival, this engine (E3) entered the area by the gate at the northeast corner of the complex. They proceeded west along the front of the complex and met the manager at the northwest corner. He directed them toward the southwest corner of the building. They proceeded south until they stopped near the southwest corner. The lieutenant reported that he did not see any smoke or fire on the outboard side of the building.

He then entered the courtyard through one of the breezeways and looked up toward apartment 316. He reported that he saw heavy, black smoke coming out of the corridor leading to apartment 316. Initially, there were no flames, but within 15 seconds he began seeing what he called “fingers of flame” dancing in the smoke. Within a few more seconds, the smoke (gases) were ignited, which in turn ignited the exterior finish of the building. He reported that the fire was extending laterally on the third level walkways and upward and involving the fourth floor wooden walkway handrails, ceiling, and exterior finish.

The lieutenant from Engine 3 extended a 1-3/4-in. (45-mm) handline from the engine through the breezeway and into the courtyard. He proceeded to discharge water onto the fire in an effort to limit its spread.

Additional units were arriving on the scene and began concentrating their efforts on rescuing the many victims from their balconies. Twenty-two people were rescued over ground ladders from the west and south wings. By one estimate there were 12 people on balconies on the west side that needed immediate rescue.

Engine 1 arrived on the scene and positioned their apparatus on Sheridan Boulevard, outside the chain link fence surrounding the complex. They connected a supply line to the hydrant in front of the complex and began discharging water through their deck gun on the north side of the west wing.

During these operations, at 6:18 a.m., Engine 3 ran out of water and the lieutenant stopped using his handline. The corner where the engine was located was becoming untenable, so the engine was moved to the southeast corner of the building. It was later moved again to the northeast corner of the building.

The lieutenant then ran through the opening between the two-story and four-story building to the north. He helped advance an 1 3/4-in. line from Engine 1 into the complex. It was necessary to cut a hole through the chain link fence to advance this line.

The lieutenant and a fire fighter from Medic 3 then began to put water on the northern portion of the west wing. The fire fighter then proceeded to conduct a search and rescue operation of the apartments on the second floor while the lieutenant provided him with protection using the handline.

Ladder 81 was positioned on the east side of the occupancy on Schley Street. Water was discharged through a ladder pipe onto the building. (See Figure 9.)

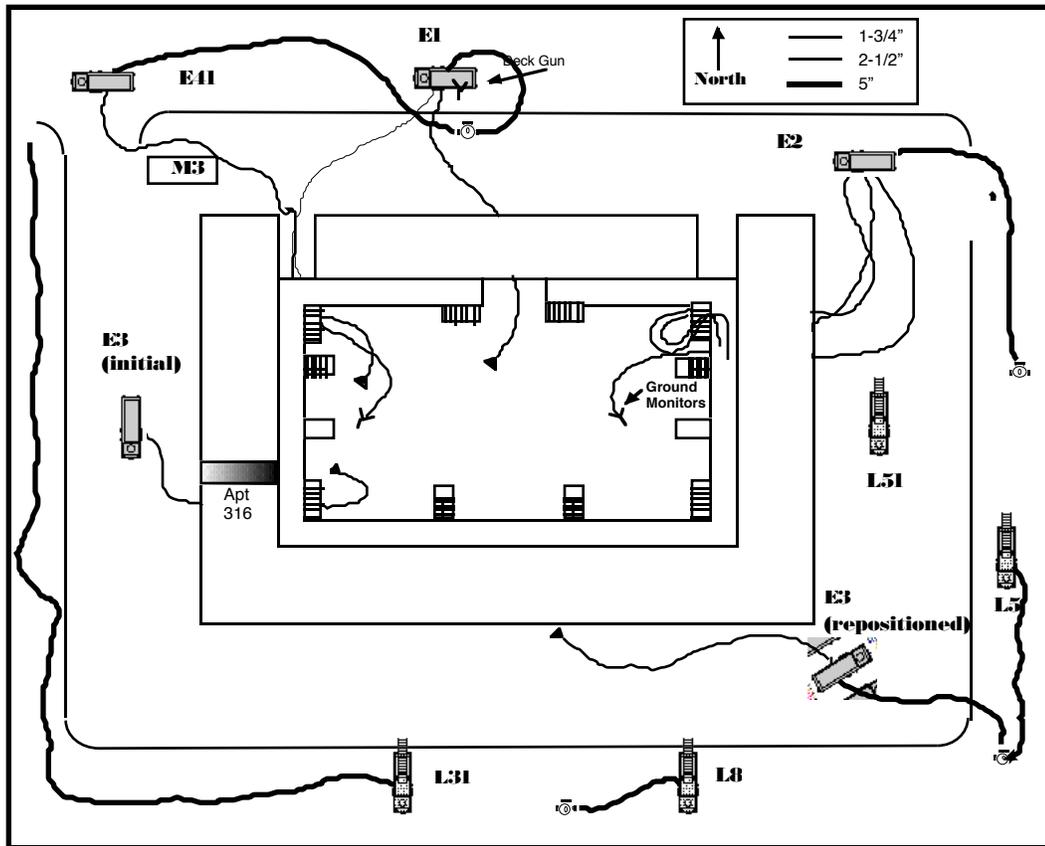


Figure 9. Fireground operations.

Engine 2 laid a large-diameter supply line from a hydrant on Schley Boulevard directly to the east of the complex, through the gate at the northeast corner of the building. Engine 2 then positioned itself at the northeast corner of the building. A 2 1/2-in. (65 mm) handline was advanced through the breezeway into the courtyard and was used to attempt to limit the fire spread in the southeast corner of the building. A ground monitor was then moved into the courtyard, and this handline was shut down and the line was connected into the monitor, along with another 2-1/2 (65 mm) line. Water was then put on the same area of the building in an effort to halt the fire spread.

A third 2 1/2-in. (65 mm) handline was then extended from Engine 2 through the breezeway and into the courtyard.

An apartment bundle (comprised of 100 ft of 2 1/2 (65 mm) hose which is wyeed off to an 1 3/4 (45 mm) line with an automatic nozzle on it) was then extended through the breezeway. An additional 1 3/4-in. (45 mm) line was attached to the wye, and

two search and rescue crews proceeded to perform search and rescue operations on the east wing on the third and fourth floors, advancing the lines for protection. They also checked for extension during this operation by pulling ceilings.

It was reported that there was insufficient pressure and volume available for all of the fire department units. Additional lines had to be laid from hydrants located on another main. Part of the problem was attributed to the fact that the complex was located on the top of a hill.

Ultimately, 40 units from 12 municipalities responded. Fire suppression continued until 11:00 a.m. when the fire was declared out. Crews continued working at the site until the following day. (See Photo 7.)

Rescues were made from the following apartment units by fire department personnel: 208, 212, 308, 312, 313, 314, 317, 408, 410, 412, 414, 416, and 434.

To assist in the cause and origin determination, the National Response Team of the Bureau of Alcohol, Tobacco and Firearms was activated at the request of the Bremerton Fire Department. Fifty agents were deployed and were on the scene by Friday, November 14.

CASUALTIES

Four people died as a result of this fire. (Table 1.) These people were located in apartments 417, 419 (two residents), and 423. Due to the extensive fire damage, it was not possible to locate and identify all of the victims until Sunday, November 16. To ascertain how many people were missing and their possible location, interviews were conducted with the residents and family members. Several of the fatalities had been so severely burned that there were only fragments of bone remaining from which they were identified.



Photo 7. View of the southwest corner of the complex. The apartment of origin was on the third floor, above where the ladder is seen on the left.

At one point the female occupant of apartment 423 was seen shouting on the balcony. This was where she was last seen.

Apartment	Sex	Age
417	Male	78
419	Female	75
419	Male	76
423	Female	91

Table 1. Fatality Profile

INJURY PROFILE¹

Twelve people were injured. (See Table 2.)

Apartment	Fire Service/ Civilian	Age	How Sustained	Type of Injury
N/A	Fire	40	During Rescue	Smoke inhalation
410	Civilian	81	During Escape	Smoke inhalation
313	Civilian	32	During escape	Fractured foot
409	Civilian	45	During escape	Leg laceration
410	Civilian	83	During escape	Smoke inhalation
412	Civilian	51	During escape	Leg pain
314	Civilian	40	During escape	Foot pain
408	Civilian	61	Unknown	Unknown
420	Civilian	70	During escape	Burned hands
215	Civilian	58	Off site	Anxiety
242	Civilian	74	During escape	Leg pain
309	Civilian	28	During escape	Burned hands/smoke inhalation

Table 2. Injury Profile

DAMAGE

Property damage was assessed at \$7.5 million. All three occupied floors of the southwest corner were destroyed. From the southwest corner along the south and west wings, the extent of damage to the occupied apartments gradually decreased the further away from the area of origin.

The roof structure of the south and west wings were totally destroyed as was a portion of the roof structure on the east wing. Ultimately, the entire building was demolished because of the extensive damage. (See Photo 8.)

¹Information provided by Bremerton Fire Department.



Photo 8. View towards the southwest corner of the complex that included the apartment of origin. The upper two stories were completely burned off.

As a result of the fire, 150 residents were displaced. A local church provided shelter and coordinated the relocation efforts for these people.

INVESTIGATION

The fire investigation was under the direction of the Bremerton Fire Department. Due to the size of the building involved, the complexity of the investigation, and the potential number of victims, BFD requested assistance from the local ATF office. The Western Regional Team of the ATF National Response Team (NRT) was activated. Fifty ATF agents and specialists from across the country were deployed and were on the scene for three days. The investigation was conducted jointly by BFD and ATF.

The ATF National Response Team is made up of members that are cross-trained in a variety of disciplines relating to fire investigations including fire protection engineering, forensic chemistry, scene photography, and evidence collection. One member of the team is a certified fire investigator (CFI) who is responsible for the

determination of the origin and cause of the fire. Four NRT's are distributed geographically across the United States.

Due to the extensive damage, several canine teams were used both to identify the location of the victims in the debris and to determine if there any accelerants were present.

Other members of the team conducted interviews of witnesses and residents to assist in re-creating the events during the fire, as well as attempting to identify missing residents. These interview teams were made up of personnel from the Bremerton area fire departments, law enforcement agencies, and ATF. At least 150 interviews were conducted by these teams.

The investigation was conducted using protocols developed by ATF. Many of these protocols follow those outlined in NFPA 921, *Guide for Fire and Explosion Investigations*.

The scene was secured from unauthorized entry during the investigations phase by local law enforcement personnel. All personnel entering and exiting the scene were required to pass through a control point that not only restricted entry, but also established a strict personnel accountability system in the event that an emergency evacuation should be required.

To avoid cross-contamination of the fire scene during the debris removal and evidence collection, the hand tools used were washed as needed. No gasoline-powered tools were used in the area of origin to avoid any potential contamination. As personnel entered and exited the scene they were required to pass through a wash line and to wash their footwear to avoid any potential contamination.

All evidence collected was documented and then turned over to the Bremerton Fire Department for disposition. The scene was documented by sketch and photographs.

IV. TIME LINE

Time	Elapsed Time	Event
6:06 a.m.	00:00	Time of call
6:06 a.m.	00:00	Following companies dispatched: C1, E3, M2, E1
6:07 a.m.	00:01	E3 enroute
6:08 a.m.	00:02	E3 on the scene
6:08 a.m.	00:02	E2 dispatched
6:08 a.m.	00:02	Following companies dispatched: M41, E2, C1, R28, E28
6:09 a.m.	00:03	M45, E51, L51, E41, R41, RH41, C1A dispatched
6:14 a.m.	00:08	E1, E2 on the scene
6:15 a.m.	00:09	DV51, ST51, C41 dispatched
6:18 a.m.	00:12	E27 dispatched
6:18 a.m.	00:12	M2, E41, E27 on the scene
6:21 a.m.	00:15	R41, E51 on the scene
6:23 a.m.	00:17	Requested call-back of all personnel
6:25 a.m.	00:19	M14 dispatched
6:28 a.m.	00:22	L51 on the scene
6:28 a.m.	00:22	M3 dispatched
6:29 a.m.	00:23	M3 on the scene
6:39 a.m.	00:33	E29 on the scene
6:46 a.m.	00:40	C8, CH8, L8, L31 dispatched
6:47 a.m.	00:41	DC8 dispatched
6:49 a.m.	00:43	Mason County 3-engine strike team enroute, E21, E51, E32
7:45 a.m.	01:39	Declared under control

V. ANALYSIS

CAUSE AND ORIGIN

A joint investigation was conducted by the Bremerton Fire Department and the Bureau of Alcohol, Tobacco and Firearms. The cause of the fire was determined to be either an electrical baseboard heater or an electrical outlet on the courtyard side bedroom wall of apartment 316. The apartment was normally occupied, but at the time of the fire the occupant was not in the apartment. (See Figure 10.)

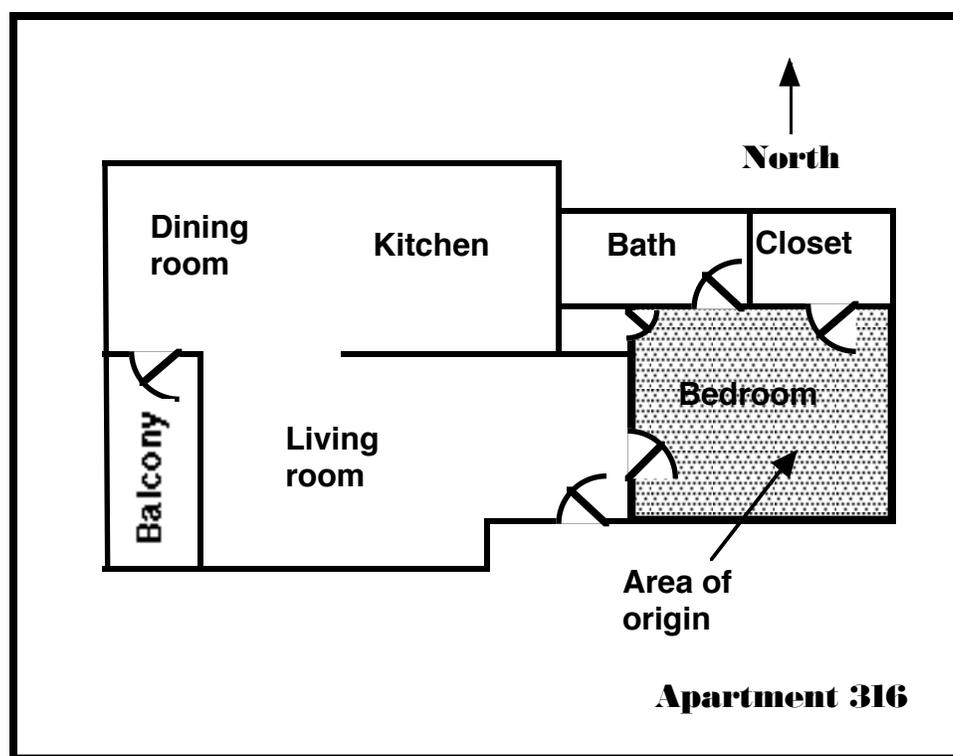


Figure 10. The layout of the apartment of origin showing the area where investigators determined the fire started.

FIRE GROWTH AND SPREAD

Based on the physical evidence and the testimony of eyewitnesses, investigators believe that the door to the apartment of origin was left open after the fire was discovered. The fire then was able to move from the apartment unit to the outside, igniting the combustible exterior finish on the building as it progressed. From this

point, it spread very rapidly, both laterally and vertically on the west wing, fueled by both the combustible exterior finish and the combustible structural components of the balconies and exterior exit stairways. The fire also spread into the combustible void space of the roof structure and spread laterally throughout the void space. Reportedly, there were four fire barriers within the void space. When the sole remaining barrier was inspected, openings were observed at the eaves. If this was the case on the other three barriers, then these openings would have served as an avenue for fire spread within the void space. (See Photo 9.)



Photo 9. Within the attic area, the fire separations were not continuous to the eaves. To the right, one can see the opening that existed where the fire separation was not continued.

When the fire encountered the southwest corner, it turned and began spreading to the east on the third and fourth floors. Based on video taken by a traffic helicopter at 6:15 a.m., the fire had involved most of the third and fourth floors on the west wing and half of the south wing on the third and fourth floors.



Photo 10. View from the southeast corner looking towards the area of origin showing the progression of damage that occurred.

By 6:45 a.m., the fire had spread into the east wing involving the roof, the fourth floor, and portions of the third floor.

During the investigation, it was observed that in three apartments in the east wing the fire spread downward through the common wall between the bathrooms to the laundry on the ground floor. These damaged units were separated from the main body of fire damage by undamaged units.

The rapid fire spread can be attributed to the combustible exterior finish on the walls, floors, and ceilings of the exterior portions of the structure. Once the fire entered the combustible void space between the ceiling of the roof structure, it was able to spread rapidly horizontally. The one remaining fire barrier in the void space was not complete and had openings through which it would be possible for fire to spread beyond the barrier.

VI. DISCUSSION

This fire demonstrated the value of a number of fire safety features that were not incorporated into the design of the building.

Lack of an automatic sprinkler system was a key factor in the fire development and spread. Unquestionably, a properly designed, installed, and maintained sprinkler system would have helped to limit the significant fire spread that occurred and probably would have changed the tragic outcome. The effectiveness of a sprinkler system in controlling a fire and reducing the potential for loss of life is well documented. Sprinklers can provide a level of life safety that can contend with some of these factors. Their effectiveness is undeniable. A report published by NFPA's Fire Analysis and Research Division on the U.S. experience with fire sprinklers states; "When sprinklers are present, the chances of dying in a fire and the average property loss per fire are both cut by one half to two thirds, compared to fires where sprinklers are not present."²

Existence of a complex-wide automatic fire detection system would have been instrumental in helping to detect the fire in the early stages and provide warning to the occupants of a fire. Some of the residents were not even aware of the fire until it broke in their windows and they were in severe danger. The sooner that the occupants of a building can be alerted to danger, the sooner they can react and take action.

Although there had been widespread use of fire-rated gypsum wallboard throughout the facility, much of the effectiveness of this type of construction was negated when it was covered with a layer of combustible plywood finish. This finish fueled the fire spread once the fire emerged from the apartment of origin.

Furthermore, the sole means of egress from the apartments (the courtyard walkways) were also constructed of combustible wooden material. They did not provide a protected means of egress from an apartment to an exit stairwell. Many of the residents had to be rescued by ladder from their balconies on the outboard side of the

²*U.S. Experience with Sprinklers: Who Has Them? How Well Do They Work?*, Kimberly D. Rohr, NFPA Fire Analysis and Research Division, October 1998.

building. These rescues tied up many fire fighting resources that could have been used for fire control.

The four people who died in this fire ranged in age from 75 to 91 years. These four people fall into a very high-risk category, according to data collected by the NFPA. (See Chart 1.)

- People age 65 and over had a fire death rate of 27.6 fire deaths per million population, or roughly **twice** the national average.
- People age 75 and over had a fire death rate of 37.9 fire deaths per million population, or **nearly three times** the national average.
- People age 85 and over had a rate of 59.4 fire deaths per million, or **more than four times** the national average.³

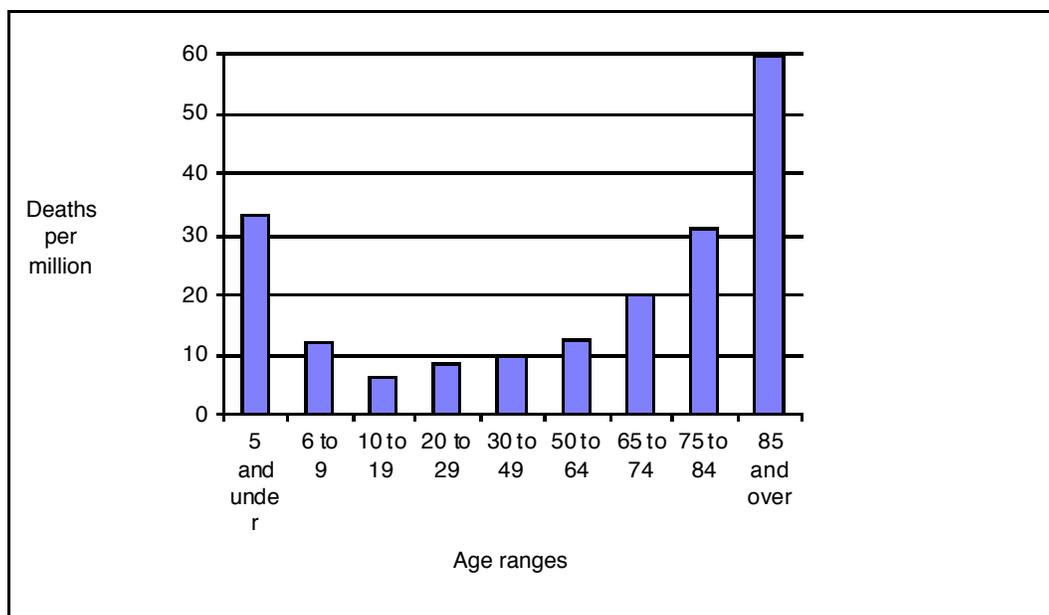


Chart 1. Number of fire fatalities vs. age⁴

The issue of how age impacts upon the reaction time and evacuation capabilities of older people was discussed in recent studies conducted by the National Research Council-Canada. In two separate studies involving seven buildings, the evacuation process during fire drills was documented by video cameras and statistical analyses

³ *Patterns of Fire Casualties in Home Fires by Age and Sex, 1991-95*, John R. Hall Jr., NFPA, January 1998.

⁴ *Ibid.*

were done by NRCC. One report states that “those over 65 traveled significantly slower than younger people during evacuations.” It goes on to state:

Most occupants tended to evacuate in groups. The majority of these groups were couples. Children, for the most part, evacuated in groups which included an adult. These group formations likely delayed the speed of movement of the whole group because members tended to assume the speed of the slowest person. In most cases, the slowest person was a young child or an elderly person.”⁵

In one of the reports that studied the evacuation of three separate buildings, the following results were reported:

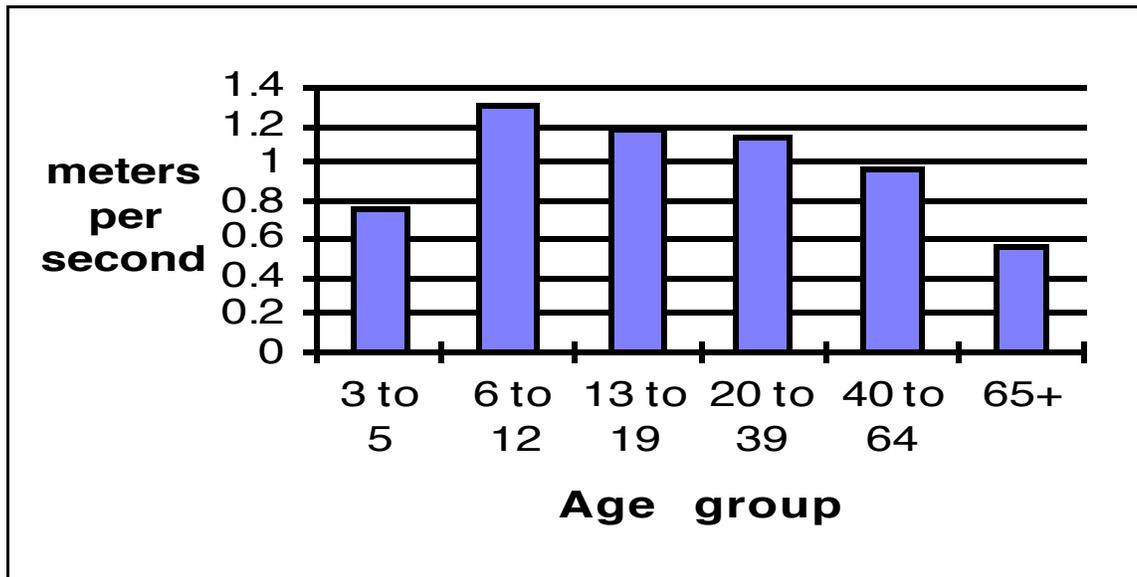


Chart 2. Speed of evacuation vs. age⁶

In 1997, in a survey conducted for NFPA, the public’s views of how rapid a fire’s spread can endanger them were measured. According to the survey 25% of the people believed that if a fire were to start in their living room, they would have 10 minutes or longer before conditions in their bedroom would be life threatening.

⁵*Housing Evacuation of Mixed Abilities Occupants*, Guylene Proulx, John Latour, John MacLaurin, National Research Council Canada, July 1994.

⁶*Housing Evacuation of Mixed Abilities Occupants in Highrise Buildings*, Guylene Proulx, John C. Latour, John W. McLaurin, Joelle Pineau, Lana E. Hoffman, and Chantal Larouche, National Research Council Canada, August 1995.

Furthermore, only 4% felt that they were at major risk of a fire in their home (“homes” includes one and two-family dwellings, manufactured homes, and apartment buildings). However, in 1997, 83% of the fire deaths in the United States occurred in the home.⁷ Based on this survey, most people feel safest in their homes, where indeed they are at the most risk.

VII. CONCLUSION

This incident very tragically demonstrates the speed with which a fire can spread. Despite the fact that the fire department was only one quarter of a mile away and was able to respond very quickly, the fire was able to spread extremely quickly, trapping and killing four elderly residents. Even though this was not a designated “elderly housing” facility, this fire is indicative of the high-risk bracket that this age group occupies. Other recent fires in residential apartments in New York City and St. Louis involving elderly residents further reinforce the need to ensure that the buildings where our elderly live are provided with adequate fire safety and protection to avoid a repetition of the circumstances of this tragic fire.

⁷1997 NFPA National Fire Escape Survey, October 1997.

NFPA's Fire Investigations Department has been investigating technically significant incidents for over 100 years. These investigations have provided the global fire safety community with valuable information for improving the level of fire safety through better codes, standards and procedures. A full list of reports is available from NFPA's Fire Investigations Department or by visiting our web site.

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The following is the executive summary from the One-Stop Data Shop's report, "Patterns of Fire Casualties in Home Fires by Age and Sex". This report covers patterns in deaths and injuries by age of victim, including relative risk and leading ignition causes. If you are interested in obtaining a copy, please contact the One-Stop Data Shop, 617-984-7450 or osds@nfpa.org. The cost of the report is \$38.70 for NFPA members; \$43.00 for non-members; and free to the fire service.

PATTERNS OF FIRE CASUALTIES IN HOME FIRES BY AGE AND SEX, 1991-95

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EXECUTIVE SUMMARY

Each year, thousands of civilians die and tens of thousands are injured in home fires in the U.S. In fact, roughly eight out of ten fire deaths in the U.S. occur where people generally feel safest - in their own homes.

In order to prevent future home fire deaths and injuries, it is necessary to look at who is dying in home fires, and why. This report identifies the high fire risk groups defined by age and sex.

Preschool children (age 5 and under) and older adults (age 65 and over) accounted for a disproportionate number of fire deaths in homes. Home fire death rates were roughly twice the national average for adults age 65 and older, nearly three times the national average for adults age 75 and older, and more than four times the national average for adults age 85 and older. Preschool children died at a rate more than two and one-third times the national average.

Smoking materials were the leading cause of fire deaths for all age groups combined - 23 percent of all deaths and a rate of 3.2 deaths per million population per year. The rate increased as age increased among adult age groups, from 1.9 for ages 20-29 to 12.4 for ages 85 and over. Child-playing fires accounted for by far the largest number of preschooler home fire deaths - 39 percent, or nearly two of every five deaths in this high-risk age group. The leading cause of fatal fires was also child-playing for ages 6-9; incendiary or suspicious for ages 10-19; smoking for ages 20-29, 30-49, 50-64, 65-74, and 75-84; and heating equipment for ages 85 and over.

Half of all victims (52 percent) were asleep with no special limitations or impairments noted when the fire occurred. The majority of victims overall (57 percent) were outside the room of fire origin when fire began. Older adults ages 65 and older were different, as half these victims were in the room of fire origin,

and one-fourth were intimate with ignition, compared to one-sixth of the victims of all age groups. Drug or alcohol impairment was cited for at least one-sixth of victims in the 20-29, 30-49, and 50-64 age groups - all adults except older adults. One-third of preschool victims had the physical and developmental limitations captured by the phrase "too young to act." Three-tenths of older adults, ages 65 and older, had either specific physical or mental disabilities or the more general limitations captured by the phrase "too old to act."

In addition to the differences in risk by age group, the numbers also show gender differences. The fire death rate for males during 1991-95 was 16.8 fire deaths per million population, or 51 percent higher than for females. This pattern of higher risk for males is reflected in varying degrees across all age groups. The risk index difference was least pronounced for children ages 6-9, where it was only 15 percent.

For non-fatal civilian injuries in home fires, the 85 and over age group was the only high risk age group that was also high-risk for home fire deaths. Their injury rate was 78 percent higher than the national average. Adults age 20-29 were the second highest risk group for fire injuries, with an injury rate one-third (35 percent) higher than the national average.

Smoke inhalation alone accounted for the largest share of civilian home fire injuries overall - 43 percent. Smoke inhalation alone accounted for more than half of the injuries to children age 0-5 and 6-9 and to older adults age 75-84 and age 85 and older. A higher percentage of children 5 and under and adults 75 and older were deemed "unable to act" at the time of injury compared with other age groups.

Males were more at risk from injury in home fires than females for all age groups. The most dramatic difference can be seen in the 85 and older group.