

**FIRE INVESTIGATION REPORT
FIREFIGHTER FATALITIES**

Hackensack Ford
320 River Street
Hackensack, NJ
July 1, 1988



INTRODUCTION

This report has been prepared by the State Bureau of Fire Safety, Division of Housing and Development, Department of Community Affairs.

Subject: Five Firefighter Fatalities

Location: Hackensack Ford

Date: July 1, 1988

Date of Report: January 18, 1989

This report is based on visits to the site where the fire occurred, interviews with members of the Hackensack Fire Department, including personnel present during the fire, and a review of pertinent documents as well as an unofficial video tape made of the fire. There is no authoritative determination of the actual cause of the fire. It is known to have originated in the attic space above the auto service area. Evidence indicates it could have resulted from a problem with the exhaust fan.

This report describes conditions at the fire building and presents an analysis of collected data. It is not intended that this report pass judgment on, or fix liability for, the loss of life resulting from this fire. It is our intention to document what happened at this fire and to use this information to recommend positive improvements to prevent recurrences.

A proper understanding of the impact and interrelationship of these factors requires consideration of the complete report. Implementation of the corrective measures recommended in the report will significantly reduce the risk of fatalities from similar conditions.

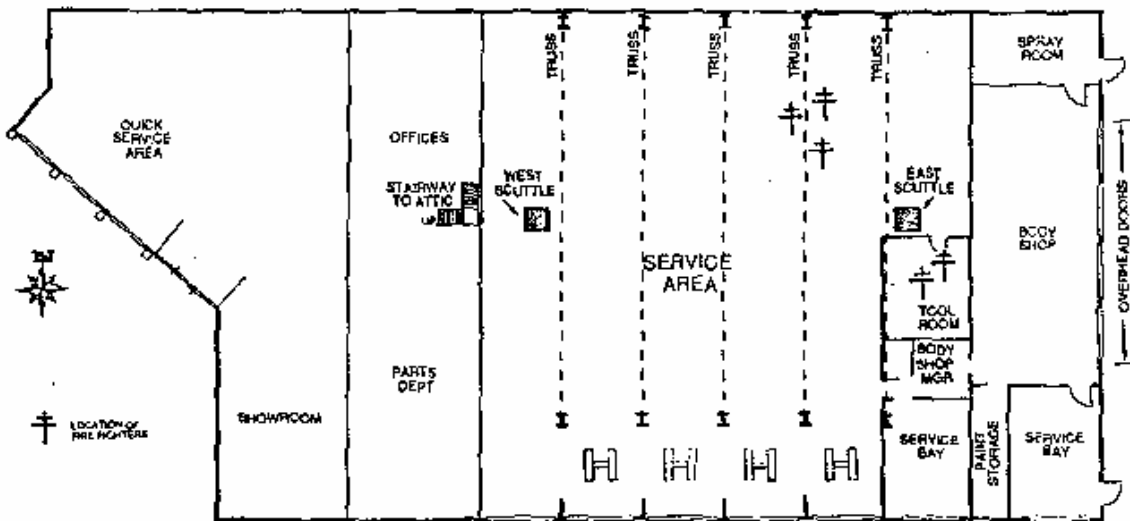
THE BUILDING

BUILDING DESCRIPTION

Hackensack Ford was a new car dealership. The building was constructed in 1948 and was of ordinary construction which consisted of masonry exterior walls and interior walls that were constructed of both wood frame and masonry. The outside dimensions of the building were 100' x 225' x 22' with an irregular layout. The building had a total ground floor area of approximately 18,000 square feet. The area over the showroom contained a small second floor office.

The service area of the building was approximately 10,000 square feet. The roof over the service area was supported by wood bowstring trusses. 2" x 10" 's on a 2" x 4" ledger board spanned the trusses on the lower cord, to which a ceiling was attached beneath the trusses. This ceiling was wire lathed and cement plastered, with the plaster ranging in thickness from one-half inch to four inches. Plywood had been placed on top of the 2" x 10" ceiling to form a floor. The second floor attic area was used for storage of automobile parts and janitorial supplies.

There were five means of egress in the building as well as service doors and overhead garage doors. The building had no fire suppression or detection systems. The only fire protection within the building consisted of portable fire extinguishers.



BUILDING CODE

The building was constructed in 1948 prior to the adoption of the State's Uniform Construction Code. It was originally built under a local building code. The building was renovated in 1973, under the 1970 B.O.C.A. Basic Building Code with 1971 supplements. Alterations, at that time, involved extending the service area, renovating the parts department and replacing the stairs to the attic area. It is unknown when the attic storage began, although it appears that the attic was in use for this purpose prior to 1973 since ceiling scuttles shown on the plans were referred to as "hoistways". If the same structure were built today, with the intention of using the second floor attic as a storage area, it could only be done if a suppression system were installed. It does not appear, however, that approvals were given then, or at any other time, for the use of an attic space for storage.

FIRE CODE

The fire code in effect at the time of the fire was the New Jersey Uniform Fire Code. During the course of the investigation it was learned that there were two violations of the State Fire Prevention Code that led to serious consequences in this fire. Section F-305.1 of the Code would have required the storage of combustible materials to have been confined to approved storage areas. The attic above the service area of the building had not been approved for storage. The stored combustibles in the attic provided fuel for the fire that eventually led to the roof collapse that caused the fatalities. In addition, Section F-503.1 of that Code prohibits storage in a means of egress. It is clear that materials were stored in the attic stairway, creating conditions that interfered with ready access to the attic by fire fighting personnel.

The Fire Prevention Bureau in the Hackensack Fire Department was designated, by municipal ordinance adopted July 23, 1985, as the agency to administer the Uniform Fire Code. The bureau has had the responsibility since that date of conducting a minimum of one inspection per year at Hackensack Ford, since the dealership is defined in the code as containing life hazard uses. The records maintained by the Fire Prevention Bureau indicate no inspections were conducted there.

Had thorough inspections been made at intervals required by the Uniform Fire Code the change-in-use that had occurred, after the floor had been installed creating the attic storage space, should have been observed.

At that time, corrective measures should have been taken to insure the discontinuation of the storage or the addition of required fire protection to accompany the change-in-use in accordance with the Uniform Construction Code. Since the storage attic was a windowless story, the protection that would have been required includes the installation of an automatic fire suppression system or, as an alternative, fire fighter access from the exterior.

Provisions of the Uniform Fire Code, which are to be submitted to the New Jersey Register in January, 1989, contain requirements for the addition of an automatic fire suppression system in windowless spaces where firefighter access is not provided.

FIRE DEPARTMENT

On July 1, 1988 the Hackensack Fire Department consisted of 97 career members including 1 chief, 5 battalion chiefs, 5 captains, 16 lieutenants, and 70 firefighters. Firefighting apparatus consisted of four engines, one tower ladder and one rescue vehicle. In addition, there is a unmanned reserve engine and an aerial ladder truck.

The duty roster on July 1, 1988 was as follows:

Chief Anthony Aiello
Battalion Chief Sandy Williams

(Duty roster cont)

Engine - 304

Capt. R. L. Williams
Firefighter T. Uzzalino
Firefighter D. Walker
Firefighter J. Nilond

Engine - 302

Lt. R. Reinhagen
Firefighter L. Radumski
Firefighter J. Everett

Reserve Ladder Truck 307*

Lt. G. Marquis
Firefighter R. Pizzella
Firefighter S. Lindner

Engine - 305

Lt. D. Venanzi
Firefighter P. Ionuole
Firefighter J. Ianeli

Rescue 308

Firefighter S. Ennis

Desk (Dispatchers)

Firefighter B. Heyer
Firefighter F. Fiarenzo

Engine - 301

Acting Lt. S. Ferlise
Firefighter H. Thuman
Firefighter W. Krejsa

Fire Prevention

Capt. Carrucci

* Tower ladder 314 was at the city garage for repairs.

TRAINING

According to Hackensack Fire Department policies and procedures, each recruit is required to work steady days for an eight-week period in order to participate in the department's orientation program. The orientation program consists of on-the-job training which is under the direction of the recruit's engine or truck company officer.

As soon as space is available all recruits are then required to complete training at the Bergen County Fire Academy. The training consists of a 69-hour firefighter, level 1, course. All fire department personnel serving in line positions participate in in-house-training consisting of drills and seminars while on-duty. Records of the training are maintained at fire headquarters and are incomplete. No formal advanced training is required of firefighters or fire officers.

In February of 1986 the Bergen County Fire Academy, at the request of Chief Aiello, conducted a 48 hour course for Fire Prevention Inspector. The course was given over a twelve week period. Four classes were held each week in an effort to enable Hackensack firefighters to attend classes while on-duty. The purpose of the course was to enable firefighters and officers to recognize potential problem areas during company inspections of businesses for referral to the fire official if necessary. The course was also intended to better prepare individuals to recognize potential hazards when preparing pre-fire plans.

THE FIRE

Employees from Hackensack Ford reported that at approximately 2:50 P.M., July 1, 1988, a hose from the exhaust system in the attic storage area above the service area, fell burning to the floor. It was extinguished by the service director using a portable extinguisher. At approximately the same time, one of the employees in the parts department went to the attic storage area to retrieve some supplies via the stairway at the west side of the repair shop.

Upon discovering a heavy smoke condition in the attic area the employee ran back down the stairs and alerted everyone in the parts department that there was a fire in the attic.

At 2:59 P.M. the Fire Department was notified of the fire and was dispatched. On the original alarm two engines and one truck company, manned by a total of ten firefighting personnel, responded to the building. At 3:01 P.M. engine 304 arrived on the scene and reported to headquarters they had a working fire. Smoke was emitting from the exhaust vent on the roof and there was a light haze in the interior of the building on the first floor.

Engine 304, under the command of Captain Richard Williams, located on the south side of the building. Captain Williams reportedly went up the stairs to the attic area and came down, telling firefighter D. Walker, "There is a door up here. I can't get it open. Let's back the line out." Shortly after this Battalion Chief Williams arrived at the fire scene and was advised of the above situation.

Battalion Chief Williams went to the base of the stairs himself, looked up and saw, about half-way up, that the stairs were filling with smoke and were partially blocked with boxes. He agreed with the Captain, although the attic should have been accessible, especially since it has been established that the lock for this door was on the stairway side.

It has been suggested that firefighters should not have entered the building to fight the fire since it contained a bowstring truss roof. The following passage from Building Construction for the Fire Service by Francis L. Brannigan has been cited as authoritative guidance on all such circumstances:

"If there is enough heat and fire to require ventilation of the truss roof, the roof is unsafe. Men ventilating the roof should be supported independently of the roof. Truss roofs may well justify an aerial platform apparatus, even if there are no tall buildings in the response district. It is just as hazardous to be under the truss roof as on top of it.

Several fatal fires seem to have the same scenario: Firefighters arrive and find smoke but little or no visible fire. Inside operations commence; the ceiling collapses without warning. If you have smoke and no fire, be wary. The fire may have possession of the truss roof void. It is possible to have serious fire in the roof void but little or no smoke visible in the building. Fire can build up with explosive suddenness."

However, throughout his text, Brannigan uses the word "void" interchangeably with the term "concealed space". A void, therefore, is a building space which is inaccessible for firefighting purposes. The fire affecting the roof trusses at Hackensack Ford was not inaccessible during the early stages of the fire.

In his book , Fireground Tactics , Emanuel Fried lists rules concerning engine company operations. Fried's third rule is, "Get the line inside-to the seat of the fire whenever possible." He then lists a logical sequence to be followed in firefighting, which includes three phases: locate the fire, confine the fire, extinguish the fire.

William Clark, in Firefighting Principles and Practices, when discussing a plan of action for working at a fire, states, "If a fire is to be fought in an intelligent manner, it must be located."

At this early stage in the fire, the proper tactic would have been to ascend the stairs, enter the door to the attic and aggressively attack the fire from this vantage point. The hot gases and smoke would have been vented out the east side, through the vent hole being created by the truck company. If the attack had not been successful, a defensive, exterior attack should have been established.

Instead, the initial fire attack was made through two scuttles in the first floor ceiling. At the same time, a ventilation hole was being cut through the roof on the east side of the building. The smoke initially venting from the opening in the roof was light grey in color. The service area continued to have only a light haze.

A second alarm was called at 3:09 P.M. bringing in an additional engine company.

As the ventilation of the roof proceeded, the fire in the attic storage area intensified. The smoke changed from grey to black and became more dense. The two engine companies operating in the service area were still trying to enter the attic storage space through the scuttles. They experienced difficulty opening the scuttles due to storage above them. At 3:23 P.M. fire began emitting from the roof ventilation hole which was being widened by the fire.

At this time and for approximately the next ten minutes, three 1 1/2-inch hand lines were operating in the attic area. Two lines were operated from inside in the service area where crews had accessed the attic through the scuttles. A third line on the roof was being used to wet down the area around the ventilation hole to prevent extension across the roof.

Due to poor radio communications, Battalion Chief Williams was unable to raise the firefighters on the roof. He climbed a ground ladder on the east side of the building to observe conditions there. Once he observed from the roof that the conditions had worsened, Williams returned to the ground and ordered all companies by radio to "...back your lines out." This message was repeated. The order to retreat was given at 3:34 P.M.

At 3:36 P.M. a ceiling collapse occurred, followed immediately by a partial collapse of the roof over the east scuttle, trapping three (3) firefighters under the debris. Two firefighters in the vicinity were able to retreat to an adjoining tool room, immediately adjacent to the area they had been working in. This fact was not immediately known by rescuers.

A sixth firefighter who was wearing full protective clothing was able to run through the flaming debris to the exterior of the building. Battalion Chief Williams was immediately aware that there were firefighters trapped inside the building and ordered a general alarm. At this point the battalion chief ordered all available manpower to begin a rescue attempt.

Initial rescue efforts were directed toward the area where they were last seen. For approximately sixteen (16) minutes after the collapse, Lieutenant Rainhagen, who was trapped in the tool room with firefighter Ennis, used his portable radio to request help and to try to explain where they were located.

Since only one radio frequency was available for both dispatching and fireground communications there was a great deal of radio traffic on the one channel. Due to the amount of radio traffic, the initial calls for help from the firefighters trapped in the tool room were not heard. Three minutes after these transmissions began, the base station at headquarters relayed to the fireground the information about the two men who were alive, although still trapped in an unknown location in the building. Efforts then focused upon locating these firefighters.

Once it became apparent that they were in the tool room, the intensity of the fire precluded the rescuers from entering since the room could be entered only from the service area side. Despite several attempts, rescuers were unable to pierce the flaming barrier. The battalion chief ordered the use of battering rams to open a hole in the wall from the body shop in the rear into the tool room. Before this could be done, a large amount of stock and tools had to be removed from the wall on the body shop side. They then battered a hole measuring approximately two feet by three feet in the block wall.

During the rescue attempt, the remaining trusses and roof collapsed and the entire service area was destroyed by fire.

Following the collapse, master streams were used to extinguish the remaining fire and protect the area where the rescue attempts were being made. After the fire was extinguished, crews were able to enter the building to locate and remove the bodies of the trapped firefighters.

Three of the firefighters were located north of the east scuttle and were pinned by the weight of the cement and plaster ceiling and other debris which fell on them. The remaining two firefighters were found in the tool room. The autopsy report identified the firefighters as; Captain Richard Williams, age 53; Lieutenant Richard Reinlagen, age 48; firefighter Steven Ennis, age 30; firefighter William Krejsa, age 51; and firefighter Leonard Radumski, age 38. The autopsy reports showed that all five firefighters died of smoke inhalation and burns.

RADIO COMMUNICATIONS

There was only one radio frequency available to the Hackensack Fire Department. This one frequency was being utilized by the base station at Fire Headquarters to dispatch firefighting units and to call in off duty personnel, by mobile units that were either on the scene or responding to it, and by command personnel at the fire scene. The base station transmitter, being the most powerful, "stepped on" simultaneous transmissions from mobile and portable units.

Portable units, such as those being used by Battalion Chief Williams and Lieutenant Reinhagen, who was trapped with firefighter Ennis in the tool room, lost the battle for air time whenever their transmissions conflicted with the more powerful base station and mobile units.

There were approximately 151 radio messages between the time of the apparatus being dispatched and the approximate time of the roof collapse. Thirty two (32) were from the base station and twenty one (21) from mobile units. These messages were sent and received without incident. The remaining messages were made primarily from hand held portable radio units and resulted in a total of 98 calls. Thirty two (32) , or approximately one third of these calls were repeated messages due to the poor reception of the hand held portable units. An audit of the radio communication transcripts showed that approximately 50% of all radio calls from portable units at the scene were not received causing a tremendous hardship to the command function.

CONCLUSIONS AND RECOMMENDATIONS

The factors contributing to the deaths of five Hackensack firefighters are not unique to Hackensack. In its position as the State agency that interacts with all fire departments throughout New Jersey, the Bureau of Fire Safety has concluded that many of those departments, both career and volunteer, suffer from similar shortcomings. We must all learn from this incident and take steps to reduce, as much as possible, any recurrence of its tragic consequences.

INSPECTIONS

The first goal of any fire department must be the prevention of fire. The most essential component of an active fire prevention program is the enforcement of the New Jersey Uniform Fire Code by local enforcing agencies. Violations of code provisions, such as the presence of large quantities of combustible storage in unapproved areas, must be abated. If inspections had taken place at Hackensack Ford, as is required by the Uniform Code, violation notices should have been issued to the management and the storage either would have been removed or proper fire protection would have been installed. If protection had been in the form of an automatic fire suppression system, an alarm would have sounded as the system began to extinguish the fire. Neither would the fire have had a chance to grow, undetected, to the point where the building's structural elements were weakened to the point of collapse.

If, instead of automatic fire suppression, the option providing firefighter access to the attic storage area had been selected, the fire department could have effectively vented hot gases from the storage area quickly upon their arrival and before the fire had been given several more minutes to grow in intensity. Firefighter access panels would also have given them the opportunity to apply water directly on the fire, without entering the space from below.

While these requirements can currently be applied to any building in New Jersey, pursuant to provisions of the Uniform Construction Code, whenever a change-of-use occurs creating a windowless space, the same provisions are to become part of the Uniform Fire Code. These requirements will then apply to any existing windowless space.

It is recommended that all fire departments establish local enforcing agencies and enforce the Uniform Fire Code provisions

Another important component of any fire prevention program is the conduct of in-service inspections of properties within their response districts by firefighting personnel. These inspections serve several important functions, not the least of which is the removal of common fire hazards, the education of the public to fire safety needs, and the familiarization of firefighting personnel with the buildings in which they may someday have to fight a fire. A well-organized program of in-service inspections permits the development and use of pre-fire plans for major properties within a response district. Once pre-fire plans have been developed, they can be reviewed during in-house training sessions at the fire house, insuring the familiarity of all personnel with their provisions.

It is further recommended that all fire departments carry out in-service inspections of all major properties within their response districts.

The allocation of statewide resources to fire prevention efforts such as inspections remains at appallingly low levels. Less than 5% of most fire department's budgets are allocated to this primary concern.

FIRE SERVICE TRAINING

Firefighters experience the highest rate of death on-the-job of any occupational group in the United States. Miners, whose occupation ranks second, experience a rate only 64% as high as firefighters.

Similarly, firefighter's occupational injury rate is one of the highest in the U.S. An entry on firefighting in the Encyclopedia of Occupational Safety and Health published by the International Labor Organization states, "The extreme danger in firefighting has hazards unmatched by any other occupation."

Many firefighter injuries and deaths are preventable. The single most effective way to improve firefighter safety is through effective training. This will insure that each person operates at acceptable performance levels, reducing the number of costly injuries and tragic deaths.

New Jersey's fire protection is provided by approximately 39 fully paid fire departments, 80 part paid fire departments under the authority of municipalities or fire districts, and 675 volunteer fire companies. There is currently no state requirement for any specific amount of training as a prerequisite of active firefighting. The various fire departments do not share a common approach to training. Some departments operate their own training academies. Some counties have facilities which are made available to local fire departments. At the local level, the training provided varies from stringent requirements for both basic and in-service training to little or no training for new members.

The first step in developing training and education programs is to establish minimum standards for firefighter recruits, officers, and fire service instructors. This will provide the necessary tools to ensure that every member of the fire service will have the chance to acquire the basic skills and knowledge required for safe and effective service as well provide as an opportunity to continue to expand upon that knowledge.

The law that established the Fire Safety Commission and the Bureau of Fire Safety in the Département of Community Affairs provides for the implementation by this Department of training programs for the fire service. Soon after their creation the Commission's Training and Education Advisory Council and Bureau staff undertook the development of minimum training standards for recruit firefighters and minimum educational requirements for the instructors, who would implement the training programs. Concurrent with this undertaking, the Department has laid the groundwork for the implementation of a system to certify individuals who have completed fire service training programs.

In January, 1989, the Fire Safety Commission will review the first of these recommended training standards for firefighter, as well as standards for two levels of fire service instructor. It is recommended that these training standards be adopted.

The Department of Community Affairs has established as a priority the development of these training standards and an effective system for their implementation. These standards will be expanded to include programs for first line supervisors and senior level officers. Fire service officers must receive training, through formal educational programs, in essential subject areas such as building construction if they are to be expected to safeguard personnel under their command from the hazards which are inherent, in varying ways and degrees, in all structures. According to Emanuel Fried, one of the leading authorities in firefighting tactics and strategy, "...the type of building construction is probably the major controlling factor in a fire."

Advanced training for supervisory personnel in the use of an incident command system must be made available to all fire departments in the state. Such a system makes possible a reasoned approach to all activities on the fireground. It assures that everyone working at the scene will function smoothly as a member of the team.

In addition, at the urging of organizations representing career firefighters and fire chiefs, legislation has been introduced to mandate the training contained in these standards for the career fire service. The Department of Community Affairs supports the passage of this legislation.

FIREGROUND COMMUNICATIONS

The ability of fireground commanders to communicate effectively with units under their command is crucial if firefighting efforts are to be successfully controlled and implemented. Radio communications are of paramount importance on the fireground in order to keep all units working at the scene immediately informed of any and all developments.

There were serious radio equipment problems encountered during this fire. Poor reception of hand-held units and an insufficient number of fire ground channels were factors both before and after the fire building collapsed.

The National Fire Protection Association's standards 1221 - Public Fire Service Communications Systems, and 1201 - Organization for Fire Services both address radio frequencies used for fireground communications.

NFIPA-1221 3-4.1.7 states: "Radio dispatch channels shall be separate from radio channels used for routine or fireground communications."

NFIPA-1201 14-4.2.2 states: "Frequency at large fires or emergencies. Sufficient frequencies should be provided so that one or more frequencies may be used for fireground communications (tactical channels)."

To the extent that the use of separate channels for radio dispatching and fireground communication results in limiting the total number of transmissions on any one channel, efficient communication between a fireground commander and the personnel under his command is dramatically improved. The interference by a more powerful base-station transmitter with mobile and portable units on the fireground is also eliminated.

It is, therefore, recommended that all fire departments within the state establish a minimum of two radio channels to permit the separation of fireground communications from other functions. The Bureau of Fire Safety will undertake a study of radio communications statewide in order to identify the extent of the problem and to ascertain the most cost effective method for ensuring each department will have adequate and secure communication capability.

PERSONAL ALERT SAFETY SYSTEMS

Personal alert safety systems must be made available to all firefighting personnel, any one of whom, at an emergency scene, may become separated from others in their unit, become disoriented within unfamiliar surroundings, be physically trapped by rapidly changing fireground conditions, or otherwise be rendered incapable of unaided escape. Effective rescue operations require prompt notification of their situation to commanders and effective means to determine their positions.

Such devices must be capable of sounding an adequate alarm automatically, in the event that the firefighter becomes disabled.

While these personal alarm devices are not among the equipment mandated by the Public Employees Occupational Safety and Health Act (PEOSHA) or regulations for personal protective equipment, they are recommended by NFPA and have been made available, through a cooperative state purchase agreement negotiated by the Bureau of Fire Safety.

It is our understanding that the PEOSHA Board has been presented with a proposal to mandate the use of these devices by all firefighting personnel. It is recommended that the PEOSHA board adopt this requirement.