

FIREFIGHTER FATALITY REPORT

NEWARK FIRE DEPARTMENT

NEWARK, NEW JERSEY

OCTOBER 29, 1994



ISSUED APRIL 1, 1996

STATE OF NEW JERSEY
Christine Todd Whitman, Governor

DEPARTMENT OF COMMUNITY AFFAIRS
Harriet Derman, Commissioner

DIVISION OF FIRE SAFETY
William H. Cane, Director

INTRODUCTION

The investigation of this incident was conducted by the New Jersey Division of Fire Safety in conjunction with the New Jersey Department of Labor and the New Jersey Department of Health. This report was prepared in accordance with N.J.S.A. 52:27D - 192 *et. seq.*, Duties of the Division. The purpose of these firefighter casualty investigations is to report the causes of serious firefighter injuries or deaths and identify those measures which may be required to prevent the future occurrence of deaths and serious injuries under similar circumstances. In some cases new information may be developed, or old lessons reinforced, in an effort to prevent similar events in the future. Recommendations contained in this report will fall into two categories: those that pertain directly to this particular incident; and, those that pertain to all incidents and/or operations. Fire cause and origin investigation is not a part of this report.

The Division acknowledges Newark Fire Director Stanley Kossup and his firefighters for their assistance in this investigation. In particular, the Division thanks Deputy Fire Chief Robert Fitzpatrick, Deputy Fire Chief James Raymond, Battalion Chief Anthony Apostolico, Captain George Daudlin, and Dr. Sunandan B. Singh, Essex County Medical Examiner, for their assistance.

Comments and/or inquiries concerning this report may be addressed to the individual at the address listed below:

James Dolan
Deputy Director
New Jersey Division of Fire Safety
CN 809
Trenton, NJ 08625-0809

SUMMARY

At 0056 hours on October 29, 1994 a structure fire was reported at 58 1/2 Chester Avenue located in the city of Newark, Essex County, New Jersey.

During the course of the incident, the ladder of an aerial apparatus was extended between overhead electrical power lines. Consequently, while working on the ladder, a 33 year old firefighter of the Newark Fire Department, Michael DeLane, apparently contacted the wires and lost his life. A second firefighter working on the ladder, Juan Ramos, age 28, suffered severe burns due to his receiving electrical charges.

As a result of the fire, a 62 year old female civilian also perished.

The incident was investigated by the Newark Fire Department Arson Squad. The cause of the fire was determined to have been a gas space heater that was improperly installed and vented.

OVERVIEW

The Municipality

The City of Newark, New Jersey's largest, is a 24.14 square mile¹ municipality in Essex County located in the northeastern section of New Jersey. One of the New York metropolitan airports, Newark International, is located within the city. Newark is also a major rail terminus for both passenger and freight lines and is a major international shipping center due to its ideal location on Newark Bay. The city is traversed by an extensive network of major roadways including Interstates 280 and 78, U.S. Routes 1 and 9, the New Jersey Turnpike, the Garden State Parkway, and State Highway Routes 21 and 22.

Newark is classified as an urban center with a mix of residential, commercial, industrial, institutional, educational and warehousing occupancies. The 1990 census data showed 275,221 year round residents and a population density of 11,401 persons per square mile.²

Fire Department

The Newark Fire Department (NFD) is responsible for providing fire protection for the city of Newark. The department responds to over 20,000 alarms annually.

The department is comprised of 586 career members operating from 22 stations. These stations house 31 individual companies equipped with fire apparatus consisting of 20 engines, 10 aerial apparatus, and one heavy rescue unit . A Deputy Chief and Battalion Chiefs respond directly to incident scenes in individual command vehicles.

Firefighters work 42 hours each week beginning with two days, ten hours per day, followed by 24 hours off. The week is then completed with two nights, fourteen hours per night.

The normal staffing compliment for each engine, aerial, and the heavy rescue consists of one officer and three firefighters.

Due mainly to budget shortages, the fire department administration was required to institute a rotational company closing policy. During each tour of duty, three engine companies and one ladder company are closed. The closings follow a rotational pattern so that for each tour, different companies are not operational.

The department operates its own training academy for the purpose of conducting a 120 hour basic recruit training and in-service training for the members of the department.

The Newark Fire Prevention and Life Safety Bureau is staffed by 17 full time employees consisting of two chief officers, 12 fire inspectors and 3 clerical persons. The bureau is responsible for the enforcement of the New Jersey Uniform Fire Code. Additionally, the bureau is charged with the responsibility of reporting the department's incident data to the Division's Fire Incident Reporting Section.

An arson squad operates within the NFD Division of Investigation.

The NFD provides its own dispatch service for department operations. The University Hospital of Medicine and Dentistry (UMD) provides primary Emergency Medical Services.

The department utilizes mutual aid from various fire departments from neighboring

municipalities in the county.

The fire department utilizes Public Employees Occupational Safety and Health Act (PEOSHA) approved personal protective equipment (PPE). The department purchases, issues and maintains the following equipment: turnout coats and pants with Nomex[®] shells and batt liners, leather gloves, leather helmets, rubber bunker boots and personal alert safety system (P.A.S.S.) devices. Nomex[®] station wear is also provided. At the time of this incident, firefighters were utilizing rubber 3/4 length boots in lieu of bunker pants as was permitted at that time by the regulations of the Department of Labor.

Fire Location

The fire was located at 581/2 Chester Avenue in Newark. The building was a two and one half story duplex, or two family dwelling. Only the right half of the building was occupied at the time of the fire. The fire began in the occupied portion. The left side of the structure was unoccupied and had 1/2" thick plywood boards covering the doors and windows. The building was of wood frame construction, built in what is commonly known as "balloon style". It was classified as Use Group R-4 and Construction Type 5B according to the BOCA National Building Code. The building was not classified as a Life Hazard Use by the New Jersey Division of Fire Safety. It should be noted that there were smoke detectors installed in the dwelling. It was not determined if the smoke detectors were operational at the time of the fire. There were no exposure buildings surrounding the structure. The fire was discovered by a passerby who first reported it to patrons of a nearby tavern, who in turn notified the fire department.

Weather

The weather conditions at the time of the incident were clear with a temperature of approximately 50 degrees.

Communications

The fire department's primary operating frequencies are 154.340 MHz. and 154.130 MHz. At this particular incident, no communications problems were noted.

Water Supply

The water supply in the city of Newark is provided by a municipal water system. The average water flow for hydrants in the area of the incident was reported to be approximately 1000 GPM. For this particular incident, no water problems were noted.

Mutual Aid

The fire department utilizes mutual aid on major incidents from the surrounding fire departments of Elizabeth, Irvington, Belleville and Bloomfield to respond directly to incidents or to fill in at vacant stations. For this incident, no mutual aid was requested.

Emergency Medical Services

The University Hospital of Medicine and Dentistry (UMD) provides basic life support (BLS), as well as advanced life support (ALS) for the Fire Department. Primary aeromedical evacuation is provided by the New Jersey State Police through Northstar.

For this incident, UMD had BLS and ALS resources standing by on the fire scene within the first few minutes.

The Incident

The fire at 58½ Chester Avenue, Newark, was reported to the NFD at 0056 hours on October 29, 1994. A first alarm assignment consisting of four engines, two aerial apparatus, the rescue company, one battalion chief and one deputy chief was dispatched. At the time of dispatch, the building was reported to be involved with fire. A patron of a nearby tavern was alerted to the fire by a passerby, who reported that an elderly woman, who was practically non-ambulatory, was thought to be inside. The patron attempted to enter the building several times before the fire department arrived but was driven back by the smoke and heat.

The first unit to arrive was Engine 13. The engine was staffed by one officer and three firefighters. Initial reports on arrival indicated the right half of the duplex was fully involved with heavy fire. Neighbors and by-standers told firefighters of the woman who was thought to be inside. Immediately, a second alarm, consisting of three engines, one

aerial and one battalion chief, was requested by Engine 13. Reports as to the possibility of a victim being in the building were transmitted to the responding units. At 0103 hours, the second alarm assignments were dispatched and a call to Public Service Electric and Gas (PSE&G) was made requesting response to the incident.

Shortly after the arrival of Engine 13, Acting Battalion Chief Raymond McGee arrived, took command of the incident and established a command post at the Division A³ side of the building.

As the remaining units of the first alarm assignment arrived on scene, suppression, ventilation and rescue operations were commenced. The units, in order of arrival were: Engine 9; Ladder Truck 7; Rescue 1; Engine 15; Ladder Truck 1; and Engine 28. Arrival times for all pieces of apparatus, with the exception of Ladder Truck 7, were not provided by the NFD and were unable to be determined during the course of the investigation. This information should have been provided by the NFD.

At 0116 hours, Ladder Truck 7 arrived on scene driven by probationary FF Juan Ramos. Ramos, with the assistance of FF Ronald Ballew and under the direction of Captain Bruce Paynter, both of Ladder Company 7, positioned the ladder truck and raised the ladder on the Division A side of the structure. The ladder was placed between overhead primary electrical supply wires above the ladder, later discovered to be carrying approximately 13,000 volts, and secondary electrical supply wires below the ladder, carrying approximately 600 volts, that ran parallel to the street on the fire building side. The primary purpose for positioning the ladder in this manner was to provide access to the roof for vertical ventilation. Once the ladder was in place, Captain Paynter, Ramos, Ballew, and a fourth firefighter, Rudy Lewis, climbed the ladder, crawling under the primary wires that were later determined to be between six and twelve inches above the railing of the ladder. All were wearing SCBA units. Upon reaching the roof, they began cutting ventilation holes with a power saw and axes they had taken with them.

Shortly after arrival, Deputy Chief John Griggs assumed command of the incident.

Shortly afterward, FF Michael DeLane, the driver of Rescue 1, who had been previously removing boards covering the windows and doors of the unoccupied side of the duplex, completed his assignment and was ordered to climb Ladder 7 to the roof. He brought with him a gasoline powered rotary ventilation saw and began to assist the members of Ladder Truck 7, who were experiencing difficulty with their power saw, with vertical ventilation. At 0126 hours, DC Griggs advised dispatch to again notify PSE&G to have

them respond to the incident scene. Heavy fire and smoke was now issuing from virtually every opening on all levels of the building. At this time, the roof began to show signs of deterioration and Captain Paynter ordered all personnel off the roof. The firefighters began descending the ladder of Ladder Truck 7 in order, first Ramos, followed by DeLane, Ballew and Lewis. Captain Paynter had not yet left the roof. As FF Ramos passed under the electrical wires, DeLane stayed above the level of the wires. Ramos had reached the base of the ladder when DeLane called for him to come back up to assist with the power saw. Ramos climbed back up the ladder but stayed below the level of the wires. DeLane then passed Ramos the power saw he was carrying, lifting it up and passing it under the wires. At approximately 0127 hours and at a point when both men were in contact with the saw, the saw apparently contacted a primary wire. Witnesses reported seeing a blinding flash and hearing a loud buzz as the electrical charge passed through DeLane and Ramos. Ramos was rendered unconscious. DeLane was still conscious. At 0128 hours, Captain Paynter, who was still on the roof, broadcast an emergency radio message to dispatch reporting a "firefighter down". He then requested another ladder be put up in the vicinity of Ladder Truck 7 and told dispatch to have PSE&G expedite their response. As Ramos was being carried off the ladder, DeLane apparently contacted the wire a second time, which ultimately resulted in his death. Both men were transported to UMD where Ramos was admitted and treated for electrical burns and DeLane was pronounced dead at 0213 hours.

The remaining firefighters on the aerial ladder above the wires exited by way of the roof and a ground ladder that had been raised on the Division C side of the building after the two firefighters contacted the wires.

A short time later, a 62 year old female civilian was found in her bedroom on the first floor. She was pronounced dead at the scene at 0235 hours.

After the fire was extinguished, it was determined that due to the extensive damage, the building was a total loss. The remaining parts of the structure were razed shortly thereafter.

The Casualty Scenario

FF Michael DeLane, a 33 year old member of the Newark Fire Department, had five and one-half years of service at the time of his death. His assignment was to Rescue Company 1.

FF Juan Ramos was 26 years old at the time he received his injuries. He had been a probationary member of the department for two months and was assigned to Ladder Company 7. He remains a member of the department.

During the course of the incident, FFs DeLane and Ramos ascended to the roof of the structure via the main ladder of Truck 7 to perform vertical ventilation. The ladder, as placed by Ramos, was between primary and secondary electrical power supply wires which were no more than six to twelve inches above and below the ladder. As firefighters ascended and descended the aerial, they were forced to crawl under the primary wires to avoid contact. This was the case with Ramos and DeLane. As they descended the ladder, Ramos first, then DeLane, Ramos passed under the wires. As Ramos returned up the ladder to assist DeLane with the power saw, he faced DeLane, who was still on the other side of the wires, above Ramos. DeLane told Ramos he was going to pass him a power saw that he was carrying. As DeLane passed the saw under the wires, and both were in contact with it, the saw apparently contacted, or came close enough to the wire as to cause an arc. The phenomenon of electrical arcing over distances of several inches is possible when dealing with high voltages as was the case in this instance.

The other firefighters that were on the ladder could not state with certainty which scenario occurred. Video tapes of the incident were also inconclusive as to whether or not direct contact was made. However, damage to the saw, which included the complete severing of the saw's handle by the electrical charge, indicate that direct contact was most likely made. As the charge was delivered, a blinding light was observed by witnesses accompanied by a loud buzzing sound.

After the initial charge, Ramos was unconscious. From the ground, Detective Ramon Irizarry of the NFD Arson Squad saw what had transpired on the ladder. Irizarry ran to the base of the ladder and climbed to Ramos' location. He stated in interviews conducted later that he had thrown his flashlight on the ladder in an attempt to determine if it might be electrically charged. Upon reaching Ramos, Irizarry felt that Ramos was more seriously injured, since he was unconscious and DeLane was conscious at the time. DeLane directed Irizarry to take care of Ramos first and to be careful not to contact the wires. Irizarry told DeLane to stay where he was and not to move while Ramos was being cared for. At this time, DeLane was lying between FF Ballew's legs and was being held by Ballew. DeLane told Irizarry that his left side was numb and he could not feel his left arm, which was resting on the top of the ladder rail. Irizarry, with the

assistance of FF Colin Archer, carried Ramos down the ladder to waiting EMS personnel.

At about this time, DeLane, who had apparently been released by Ballew, began to slide under the primary wires. He either contacted or moved close enough to a wire as to cause an arc. He then fell backward against the ladder. When Irizarry and Archer went back up the ladder, they found DeLane unresponsive and hurriedly carried him down the ladder. EMS personnel at the bottom, detecting no respiration or pulse, immediately began CPR. Both Ramos and DeLane were transported to UMD where Ramos was admitted and DeLane was pronounced dead at 0213 hours.

Firefighters DeLane and Ramos' Injuries

FF Juan Ramos suffered first and second degree burns to his face, arms, back, eyelids and eyebrows. All burns were electrical in nature and were caused by both electrical charges passing through his body and by radiant energy similar to burns produced by welding near unprotected skin tissue.

FF Michael DeLane suffered virtually no external burns except for two small wounds. One was located on the back of his left hand, where it is presumed the charge entered his body, and one was on his back above the waist, the presumed point of exit. The wound on his back was "V" shaped and was about the same size and shape as a part of the ladder's cross member where DeLane was located at the time the charge was received. This is consistent with damage sustained by the aerial ladder at that location due to the electrical charge. An autopsy conducted by the Essex County Medical Examiner's office revealed that the cause of DeLane's death was electrocution.

COMMENTS

Personal Protective Equipment

An inspection was performed on FFs DeLane and Ramos' Personal Protective Equipment (PPE) which revealed that all components were in full compliance with the New Jersey Public Employees Occupational Safety and Health Act (PEOSHA).

Risk/Benefit Analysis with Regard to Rescue Potential

During this incident, the 62 year old civilian female occupant of the fire building lost her life. In statements obtained from firefighters involved, most stated that while enroute and upon arrival, reports were received regarding the probability of a victim being trapped in the burning structure. The first unit on the scene, Engine 13, reported that the building was fully involved and immediately called for a second alarm assignment. Additionally, several firefighters stated that when they saw the level of involvement of the building, they felt that there was little if any chance of survival of the victim. This was most probably the case. It was also noted that there were no exposure buildings surrounding the structure. Yet upon commencing fireground operations, an aggressive rescue attempt and interior attack was instituted. Ladder Truck 7 was raised to provide access to the roof to provide vertical ventilation. The raising of this ladder between electrical wires exposed firefighters to an unacceptable risk.

SOPs Regarding Operations Near Electrical Hazards

The NFD did not produce written standard operating procedures concerning operations involving overhead electrical lines during this investigation. It was stated that, for the most part, evolutions were conducted in accordance with the International Fire Service Training Association's (IFSTA) *Essentials of Firefighting, third ed., Chapter 8-Ladders*⁴. This chapter addresses electrical hazards in two short paragraphs, one on page 249, and the other on page 272. Neither paragraph details safe working distances from overhead electrical wires, but simply state that caution should be used when raising ladders, particularly metal ladders, near overhead electrical wires.

Citations Issued by New Jersey Department of Labor

The Newark Fire Department was issued violation citations concerning the operations performed in close proximity to energized electrical equipment by the Division of Workplace Standards' Office of Public Employees Safety of the New Jersey Department of Labor. The specific citation was from the United States Occupational Safety and Health Administration's General Industry Standards 29 CFR 1910.333 (c)(3)⁵. This section states: "If work is to be performed near overhead lines, the lines shall be deenergized and grounded, or other protective measures shall be provided before work is started." The standard states in a subsequent paragraph: "When an unqualified person is working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances: 1. For voltages to ground 50,000 volts or below-10 feet; 2. For voltages to ground over 50,000 volts-10 feet plus 4 inches for every 10,000 volts over 50,000 volts."

Specialized Training for Electrical Hazards

Sources within the NFD reported that, from time to time, specialized training concerning electrical hazards was conducted by Public Service Electric and Gas. Training records submitted by the NFD indicate that of the three chief officers working at this incident, none had taken this training. Of the twelve captains working at this incident, only two had taken this training in 1971. Of the five firefighters who were acting as captains at this incident, none had taken this training. Specialized training with regard to positioning apparatus; ladder operations, both aerial and ground ladders; and the National Fire Academy course, *Firefighter Safety and Survival*⁶, were offered at various times within the NFD training system. Within the content of this training are portions pertaining to electrical hazards. Some of the officers at this incident attended these training sessions. It is important to note however, with the exception of *Firefighter Safety and Survival*, which was held in 1990, most of the courses were attended between the mid 1970s and the early 1980s. Captain Bruce Paynter, who was appointed to his present rank in February 1989, was the officer in charge of Ladder Truck 7. Paynter's training records indicate he had attended *Firefighter Safety and Survival* and a ladder pipe operations course.

It was related during the investigation that various fire handbooks are available to firefighters for self study with regard to safety of operations near electrical hazards.

Those noted include IFSTA *Essentials of Firefighting, third ed., The Fire Chief's Handbook*⁷, and the student manual from the course *Firefighter Safety and Survival*. It was also stated that the company officer to whom particular firefighters are assigned plays a significant role in teaching the practical everyday applications of handling electrical hazards.

The Apparatus Operator's Training

The operator of the aerial apparatus at this incident was Juan Ramos, who was later severely injured due to its placement. At the time of the incident, Ramos was a probationary firefighter with two months of service with the department. He had just completed basic recruit firefighter training at the NFD Training Academy. Additionally, training records for Ramos indicate he had attended a ladder operations course and had been certified by the department as a driver on October 26, 1994.

Firefighter DeLane's Descent After the Initial Electrical Charge

During the course of this investigation, it was not able to be determined why Michael DeLane began to descend the aerial ladder after he received the initial charge from the overhead electrical wires. He was told by Ramon Irizarry to stay where he was so as to avoid contacting the wires again. It was also undetermined why the firefighters above DeLane allowed him to move without taking action to prevent his movement. At the very least, the firefighters above should have insured that DeLane remained safely away from the wires.

Critical Incident Stress Debriefing Team Use

The purpose of a Critical Incident Stress Debriefing (CISD) Team is to provide individual counseling, group sessions and, if necessary, referrals to members of an emergency response organization involved in traumatic events. These events include death or serious injury of a co-worker, multiple deaths or the death of a child. The teams are made up of specially trained fire, police and EMS personnel. Teams include mental health professionals who provide training and guidance to the team members and assist at the debriefing sessions. The assistance provided by the CISD Team helps to sensitize the firefighters to the possibility of stress reactions, hopefully avoiding future stress

related problems. It allows the members to understand the range of normal reactions and provides a method to deal with the incident and its after effects. CISD Teams are regionalized in New Jersey and are part of a statewide network.

NFD Director Stanley Kossup stated that a CISD Team was available to firefighters for this incident. It was related however, that the team was not used by personnel involved with this incident. Additionally, several firefighters and Director Kossup himself had stated that the services of the team were not needed. Many felt that they would deal with the situation in their own way.

It must be remembered that the use of a CISD Team in situations such as this is not a sign of weakness on the part of emergency personnel. Failure to deal completely with the emotional stress of such a traumatic occurrence can negatively affect both the professional and personal lives of those involved.

RECOMMENDATIONS

Incident Management System

The NFD utilizes the National Fire Academy's (NFA) *Incident Command System* (ICS) as the department's Incident Management System. It is important to note however, that of the twenty officers and acting officers at this incident, NFD training records indicate that only five had received formal training for the ICS. These records do not reflect training that may have been received outside of the department's training program.

The Division of Fire Safety recommends that all fire departments adopt a nationally recognized incident management system. NFPA 1500, *Fire Department Occupational Safety and Health Program*⁸ recommends the use of an incident management system on all incidents. Recently adopted state legislation makes the adoption of an Incident Command System, as determined by the Division, mandatory for all fire departments in the state.

Safety Officer

At this incident, as is the case with most incidents, the NFD did not assign a dedicated safety officer to observe operations and terminate potentially unsafe actions. Normally this function is retained by the incident commander at the scene.

The Division of Fire Safety recommends the assignment of a dedicated safety officer(s) on all significant incidents. This action lessens the load on the incident commander and allows for continuous monitoring of safety conditions at the incident scene. Additionally, NFPA 1500, *Fire Department Occupational Safety and Health Program* and NFPA 1501, *Standard for Fire Department Safety Officer*⁹ suggest the use of a dedicated safety officer.

At this particular incident, a safety officer could have, and the incident commander and line officers should have, noted the unsafe positioning of the aerial apparatus between the electrical wires and ordered the correction of the situation. Additionally, all firefighters should have been prevented from climbing the apparatus until it was placed in a safe position. If there had been no way to utilize the apparatus safely, it should not

have been used at all.

Positioning and Operation of Aerial Devices, Training of Operators, and Specialized Training for Electrical Hazards

The primary responsibility for an apparatus operator and the officer in charge of the apparatus is the safe and efficient placement and operation of the particular piece of apparatus. If a piece of apparatus cannot be placed and operated safely, it should not be used. Safety and efficiency of operation must be considered on an equal basis. In this particular case, safety was sacrificed for efficiency. As a result, one firefighter lost his life and another was seriously injured.

Training on complex pieces of firefighting equipment, such as aerial devices, must be extensive. Competence must be achieved, not only in the mechanics of actual operation of the equipment, but also with regard to precautions that are needed to be exercised, particularly regarding limits of operation, and dangers posed by improper operation. In this case, as with all cases involving the use of ladders, both of the aerial and ground varieties, the hazards of electricity must occupy a position of paramount importance in the training program. A good source of information and training for electrical hazards is the local electric utility. PSE&G had offered this training to the NFD in the past, however only a handful of personnel had availed themselves of it several years ago.

It is important to note that each aerial apparatus is provided with detailed instructions for placement and operation which are specific to that particular apparatus. These instructions are customarily in the form of printed manuals, manufacturer provided training at time of delivery, and various warning labels, gauges, and meters, placed directly on the apparatus. Additionally, a wealth of standards and manuals regarding the safe use of ladders exists. These include those published by the NFA, NFPA, IFSTA and the Division of Fire Safety.

The Division of Fire Safety recommends that all apparatus operators be continually trained in accordance with manufacturer's recommendations and recognized standards, such as ones published by the organizations listed previously, regarding the proper and safe use of the apparatus utilized by the fire department. Further, the Division recommends that all personnel, regardless of their assignment, receive substantial training in dealing with electrical hazards. Training for apparatus operators should include, as an integral part, instruction regarding operation of apparatus near electrical

hazards.

The Division of Fire Safety recognizes that on-the-job training is a significant part of the overall fire department training program, especially where apparatus operation is concerned. However, the Division recommends that such training be conducted beginning with company drills, progressing to lesser incidents as the trainee develops and demonstrates proficiency, and culminating with larger, more complex incidents. Supervision and evaluation of such training, particularly regarding safety, must be intensive until complete competency is demonstrated.

Risk-Benefit Analysis of Operations

Risk/benefit analysis plays a vital role in all fire department operations. When deciding upon incident operations to be undertaken, decision makers must consider the risk of an action and weigh it against the probable benefit that may be *reasonably and realistically* expected. This must be determined using the information available at the scene; size-up of conditions, building construction, etc.; as well as past experiences, training and accumulated knowledge. The chance of success must substantially outweigh the risks to personnel before undertaking a particular action. If this is not the case, then the risk must be reduced before the action is taken. At this incident, risk/benefit analysis of certain operations does not appear to have been conducted. Examples include: initiation of rescue operations when conditions indicated that this course would not, in all likelihood, be successful; and of course, placement of the aerial device between and in extreme proximity to electrical wires.

The Division of Fire Safety recommends that all fire departments consider the concept of risk/benefit analysis in their day to day operations and training. Firefighters should be taught how the process works. One way of accomplishing this goal is to hold training sessions, either in the classroom or on the training grounds. At these sessions, scenarios are presented to participants, including relevant information which would include conditions on arrival, occupancy, time of day, etc. Individual participants would then be asked to formulate an action plan for the mitigation of the incident. Operations would be evaluated by a facilitator and the other participants. The "Incident Commander" of each scenario would be required to defend and justify the operations undertaken and explain how the potential benefits of each operation outweighed the risks involved. The student manual for the National Fire Academy course *Fire Command Operations*¹⁰ provides excellent scenarios for this type of exercise and assists in the identification of

risks for the particular operations undertaken.

Standard Operating Procedures for Operations Involving Electrical Hazards

The NFD had no formal written SOP for operations involving electrical hazards. Several department personnel stated in interviews conducted during the investigation, that although they were aware that the placement of ladders and aerial devices in close proximity to overhead electrical wires was an unsafe practice, it was a common place occurrence. It was stated that in many sections of the city, especially residential areas, overhead wires are basically a fact of life and in order to utilize aerial apparatus, it is necessary to maneuver around and through wires.

The Division of Fire Safety recommends that all fire departments establish written SOPs for operations involving electrical hazards. These SOPs should be developed in accordance with 29 CFR 1910.333, *General Industry Standards* regarding minimum proper, safe distances for operations in proximity to electrical hazards. Additionally, these SOPs should be included in the department's training program and strictly enforced.

Reliance upon aerial apparatus should not overshadow the use of ground ladders, particularly where the use of an aerial device is not indicated due to safety concerns. Stated quite simply, if an aerial apparatus cannot be operated safely, or an operation performed safely in proximity to overhead electrical wires, an alternate means of accomplishing a goal or objective must be found. Ground ladders are an alternate means.

Personnel Accountability System and Firefighter Assistance and Search Team

The NFD does not currently use a personnel accountability system for its firefighters. A system such as this provides for the safety of personnel by providing a means of accounting for and quickly locating each firefighter at the incident scene. The use of a Firefighter Assistance and Search Team (FAST) is a tenet of a department's accountability system. This team is a group of firefighters designated for the sole purpose of locating and rescuing other firefighters who become trapped or incapacitated at an incident.

The Division of Fire Safety recommends that all fire departments adopt a personnel accountability system which incorporates the use of the FAST concept and is compatible with the operations of the department. This provides a method for locating and rescuing each firefighter at the incident.

Emergency Evacuation Signal

The NFD utilizes an emergency evacuation signal which incorporates multiple blasts of apparatus airhorns and a radio tone alert with voice message.

The Division of Fire Safety recommends that all fire departments adopt an emergency evacuation signal for use when personnel must exit a structure or other hazardous area due to deteriorating conditions. This may consist of a pattern of airhorn blasts or similar distinctive signals or alerts tailored to the needs of the department. All members should be aware of and train on the procedures concerning the use of and response to the signal and accompanying radio evacuation broadcast.

Cardiopulmonary Resuscitation

The NFD provides training and certification for all members in the application of Cardiopulmonary Resuscitation (CPR).

The Division of Fire Safety recommends that CPR certification training be given to all firefighters, career and volunteer. The ability to immediately initiate CPR could be vital in reviving a civilian or firefighter at an incident scene, in training, during normal station duties, etc. The first few minutes are critical for providing CPR and if all firefighters were certified in its application there would be an increased chance of survival for any victims that may be encountered.

With the protection from infectious diseases of members who provide EMS treatment being critical, fire departments should also issue each CPR-trained member a pocket mask with a one-way valve and appropriate gloves, or have them immediately available for use on an apparatus. Members should receive appropriate training for the use of these universal precautions.

Fire departments should also consider the purchase of minimum emergency medical services equipment, such as oxygen, blood pressure cuffs and an assortment of bandages and immobilization devices, to allow trained personnel to handle incidents while awaiting the arrival of EMS.

Critical Incident Stress Debriefing Team Use

The NFD made the services of a CISD Team available to their personnel for this incident.

The Division of Fire Safety recommends the notification and use of CISD teams when the CISD trigger events are found to be present. Such significant events may include¹¹:

- line of duty death of a co-worker
- mass casualty incidents
- death of a child
- death occurring after prolonged rescue efforts
- when a victim reminds an emergency worker of a loved one
- during highly dangerous or highly visible events
- when the emergency worker influences death or injury
- co-worker suicides
- any other unspecified highly traumatic event

Further information on critical incident stress debriefing is available from the CISD Network of New Jersey at (201) 592-3528. The statewide emergency contact number for activation of a CISD team is (609) 394-3600.

New Jersey Fire Incident Reporting System

The NFD provides some incident data to the Division's Incident Reporting System.

New Jersey's Fire Incident Reporting System (NJFIRS) is a component of the National Fire Incident Reporting System, which is operated by the United States Fire Administration. This system provides a means for tracking and identifying trends in fire incidents; injuries and fatalities, both firefighter and civilian; and, types of fires, causes and related factors. Additionally, it can be used by departments and fire code authorities as a planning tool in training, equipment purchase, and code administration and

implementation.

The Division recommends that all fire departments report incident data in the prescribed form to the Division's Fire Incident Reporting Section. For more information on how your department can begin reporting, or if your department is currently reporting on printed forms and would like to begin reporting electronically via computer, contact NJFIRS at (609) 633-6324.

CONCLUSION

During the course of this investigation, no violations were noted with regard to the New Jersey Uniform Fire Safety Act. However, as stated earlier, violations of the New Jersey Department of Labor were cited by that department's Division of Workplace Standards for the improper operations conducted at distances closer than the minimum allowable distance of ten feet from energized overhead electrical wires.

The tragic and unnecessary consequence of this incident serves as an example of traditional well intentioned actions which were promulgated with little regard for firefighter safety. Clearly, unacceptable risks that should have been evaluated, particularly considering the lengthy experience of many of the fireground officers, were either not identified or totally disregarded. The lack of dedicated safety officers, whose sole function would have been to identify these risks and institute corrective measures, further exacerbated the situation. For the risks that may have been identified, the process of balancing the potential, probable benefits against those risks was either not undertaken or the process was seriously flawed.

The belief that all risks involved with firefighting are inherent and unchangeable, and that "business as usual" includes taking risks that are sometimes unacceptable must not be perpetuated in the fire service. Rather, "business as usual" should embrace the concept that the protection of life assigns the highest priority to firefighters. The fire service cannot afford to trade the lives of firefighters for the lives of civilians.

Evidence obtained by the Division of Fire Safety indicates with certainty that this apparatus was placed and operated in an unsafe manner, in direct violation of the United States Occupational Safety and Health Administration's General Industry Standards 29 CFR 1910.333 (c)(3). It can be concluded that the primary cause of this occurrence was the improper placement and use of the aerial device coupled with the failure to terminate and/or correct an obviously unsafe operation.

It appears that there was limited training offered by the NFD concerning electrical

hazards. However, few of the officers operating at this incident availed themselves of this specialized training as noted previously in this report. It is also clear that this training was not a requirement for firefighters and officers.

At this particular incident there were multiple failures of the Newark Fire Department's safety protocols. This began with the apparatus operator and the apparatus officer for the improper placement and operation of the aerial device. Further responsibility for the occurrence is proportionately shared between the officers who were operating in the area of the occurrence, and ultimately, the incident commander, who may delegate authority to subordinates but retains overall responsibility for the incident.

AFTERWORD

Events such as these can prove traumatic to fire department members. However, it must be remembered that in such instances, the department administrators must take the responsibility from the outset to make certain the proper actions are initiated to provide needed assistance to the firefighter's family and to ensure that investigating agencies will have the necessary documents, information and evidence to conduct a thorough assessment of the incident.

As a reminder, in the event of a line of duty firefighter serious injury or death, fire departments should immediately contact the Division of Fire Safety to report the casualty and obtain necessary information regarding actions to take. Equipment that was involved with the injury or death and all firefighter protective clothing and equipment, including SCBA, should be impounded to preserve it for evidence. Written statements and/or depositions should be obtained from firefighters who may have been involved and from any other witnesses to the incident.

The Division of Fire Safety has made available to all fire departments in the state the *Firefighter Line of Duty Death and Serious Injury Guidelines*. If your department has not received a copy and would like one, please call the Fire Department Programs Unit at (609) 633-6071.

Following these guidelines will help ensure that the family of the fallen firefighter will receive the benefits and assistance they are entitled to and will aid in the process of any investigations that may follow.

FOOTNOTES

¹Square mileage data taken from *1990 Statement of Financial Condition of Counties and Municipalities*, Division of Local Government Services, New Jersey Department of Community Affairs

²Population data is taken from *Total Resident Population, New Jersey, Counties and Municipalities, 1980 and 1990*, State Data Center, New Jersey Department of Labor

³*National Fire Academy, Incident Command System*, Federal Emergency Management Agency, Emmitsburg, MD

⁴*International Fire Service Training Association, Essentials of Firefighting, third ed.*, Fire Protection Publications, Oklahoma State University, Stillwater, OK 74078

⁵United States Occupational Safety and Health Administration, *Title 29 Code of Federal Regulations 1910.333, General Industry Standards* Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁶*National Fire Academy, Firefighter Safety and Survival*, Federal Emergency Management Agency, Emmitsburg, MD

⁷*The Fire Chief's Handbook*, James F. Casey, Technical Publishing Company, New York, NY

⁸*National Fire Protection Association Standard 1500, Fire Department Occupational Safety and Health Program, 1992 edition*, National Fire Protection Association, Quincy, MA

⁹*National Fire Protection Association Standard 1501, Standard on Fire Department Safety Officer, 1992 edition*, National Fire Protection Association, Quincy, MA

¹⁰*National Fire Academy, Fire Command Operations*, Federal Emergency Management Agency, Emmitsburg, MD

¹¹Trigger events information from the Critical Incident Stress Debriefing Network of New Jersey