

**FIREFIGHTER
FATALITY / INJURY REPORT**

RUTHERFORD FIRE DEPARTMENT

RUTHERFORD, NEW JERSEY

JANUARY 4, 1994



SEPTEMBER 15, 1994

STATE OF NEW JERSEY
Christine Todd Whitman, Governor

DEPARTMENT OF COMMUNITY AFFAIRS
Harriet Derman, Commissioner

DIVISION OF FIRE SAFETY
William H. Cane, Acting Director

TABLE OF CONTENTS

INTRODUCTION Page 1

SUMMARY Page 2

OVERVIEW Page 3

SECOND FLOOR DIAGRAM Page 9

COMMENTS Page 10

CROSS SECTION OF STRUCTURE..... Page 14

RECOMMENDATIONS..... Page 15

CONCLUSION Page 19

AFTERWORD Page 20

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. Fire cause and origin investigation is not a part of this report.

The Division acknowledges Rutherford Fire Chief Anthony Dombrowski and his firefighters for their assistance in this investigation. In particular, the Division thanks Rutherford Fire Official Paul Dansbach, Investigator William Stallone of the Bergen County Prosecutor's Office, Det. Sgt. Anthony Ravenda of the Bergen County Sheriff's Office, and Dr. Sunandan B. Singh, Bergen County Medical Examiner, for their assistance.

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

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SUMMARY

At 0102 hours on January 4, 1994 a structure fire was reported at 13 College Place located in Rutherford Borough, Bergen County, New Jersey.

During the course of the incident, a 40 year old firefighter of the Rutherford Fire Department, Thomas E. Dunn, lost his life. A second firefighter, Michael Jacobs, age 39, suffered severe burns and broken bones. Four other Rutherford firefighters suffered minor injuries.

The incident was investigated by the Bergen County Prosecutor's Office. The cause of the fire was determined to have been a short circuit in an electrical wire in the basement.

OVERVIEW

The Municipality

The Borough of Rutherford is a 2.60 square mile¹ municipality in Bergen County located in the northeast corner of New Jersey. State Highway Routes 3 and 17 traverse the borough.

Rutherford is classified as urban/suburban with a mix of residential and commercial occupancies. The 1990 census data showed 17,790 year round residents and a population density of 6,842.3 persons per square mile.²

Fire Department

The Rutherford Fire Department (RFD) is responsible for providing fire protection for the Borough of Rutherford. The department responds to over 600 alarms annually.

The department is comprised of 80 volunteer members operating from three stations. The stations, located at Ames Avenue, Union Avenue, and Mortimer Avenue, house fire apparatus consisting of three engines, a reserve engine, an aerial apparatus, a heavy rescue unit and a foam/air supply unit. The Chief responds directly to incident scenes in a command vehicle.

A Fire Prevention Bureau staffed by three full time employees; a Fire Official, Fire Inspector and a clerical person; enforces 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 .

The Rutherford Police Department (RPD) provides dispatch service to the department and the Rutherford First Aid Squad (RFAS) provides primary Emergency Medical Services.

The department has an active local mutual aid system. Members train and drill with various fire departments from the other 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 PPE: turnout coats and pants with Nomex shells and batt liners, leather gloves, composite helmets, Nomex hoods, rubber bunker boots and personal alert safety system (P.A.S.S.) devices.

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

Fire Location

The fire was located at 13 College Place in Rutherford. The building was a two story single family dwelling with a partially finished attic. The building was of wood frame construction, built in what is commonly known as "balloon style" in 1886. It was classified as Use Group R-3 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 no smoke detectors installed in the dwelling. There was, however, an antiquated heat detector system that operated at some time during the fire, after the occupants had exited the building. The owner of the structure reported being alerted by "popping" sounds which were most likely caused by exploding spray paint cans in the basement.

Weather

The weather conditions at the time of the incident were snow, sleet and freezing rain. The temperature was about 26° F.

Communications

The fire department's primary operating frequency is 154.160 MHz. Two other frequencies are available, 155.760 MHz., and the Bergen County mutual aid frequency, 154.280 MHz.

Water Supply

The water supply in the Borough of Rutherford is provided by a municipal water system. For this particular incident, no water problems were noted.

Mutual Aid

The fire department utilizes mutual aid from the surrounding fire departments to respond directly to incidents or to fill in at vacant stations. For this incident, mutual aid was provided at the fire scene by the fire departments of East Rutherford, Lyndhurst, Wallington, North Arlington and Carlstadt. Moveup and stand-by operations were provided by the fire departments of Wood Ridge, Hasbrouck Heights and Secaucus.

Emergency Medical Services

The Rutherford First Aid Squad (RFAS) provides basic life support (BLS) for the Fire Department.

Paramedics from Hackensack Medical Center (HMC) provide advanced life support (ALS). Primary aeromedical evacuation is provided by the New Jersey State Police through Northstar.

For this incident, the RFAS had resources standing by on the fire scene within the first few minutes which provided BLS. ALS was provided by the paramedics of the HMC upon their arrival.

The Incident

The fire at 13 College Place, Rutherford, was reported to the RPD at 0102 hours on January 4, 1994, which in turn dispatched the RFD. At the time of dispatch, the building was reported to be involved with fire.

Upon arrival, RFD Chief Anthony Dombrowski began scene operations by sizing up the structure and establishing a command post.

The first unit to arrive was RFD Rescue 5. After speaking briefly with police and the evacuated occupants of the structure, Captain Michael Sartori and Firefighter (FF) Michael Jacobs of the rescue unit, entered the house on the Division D³ side. With a 2.5 gallon pressurized water fire extinguisher, they proceeded to the basement where they believed the fire was located. They reported light smoke at the ceiling level on the first floor and negligible heat conditions. As they proceeded down the basement stairs, they found moderate smoke banked down to approximately four feet above the floor and moderate heat levels. Upon reaching the basement level, they saw an orange glow at the ceiling level on the Division B side. They then began to discharge the water extinguisher. Noting no positive effect, and, in fact, worsening conditions, the two firefighters retreated back up the basement stairs into the kitchen and finally out the door they came in. Once outside, they radioed a report on the conditions found to Chief Dombrowski.

As the preceding events transpired, first due Engine 3 arrived. After connecting to a nearby hydrant, the engine's crew stretched a two-inch handline to the Division D side and two members, FF Leonard LaForgia and Captain Christopher Seidler, advanced the line into the kitchen and down the basement stairs. They found moderate heat and heavy black smoke banked down to approximately two to three feet above the floor. They entered the area and found a basement window on the Division D side and broke it out. Upon opening the nozzle in a fog pattern to vent out the window in the hope of improving visibility, they saw some electrical sparking and a glow in the same vicinity as the initial team of firefighters had reported. The glow intensified and flames began rolling across the ceiling from the Division A-B corner. The firefighters attacked the fire and it darkened down.

At the same time that the basement operations were being conducted, various other operations were

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

ongoing. RFD Truck 1 arrived on the scene and its crew was ordered to the Division C side of the building to begin ventilation. A second line from Engine 3, a three-inch line fitted with a gated wye and one two-inch handline, was stretched to the Division C side. The line was advanced into the rear door after the truck company crew effected entry. Simultaneously, FFs Michael Jacobs, Thomas Dunn and Captain Michael Sartori entered the first floor from the Division D side and began primary search and ventilation operations. They did not have a handline with them. They found light smoke at the ceiling level, no elevated heat conditions, and were standing during their search.

After completing operations on the first floor, the three proceeded to the second floor to continue their search, ventilating as they went. When they reached the second floor, they found conditions to be similar to those on the first floor. FFs Jacobs and Dunn entered the front bedroom while Sartori stayed at the top of the stairs. Officers on the outside of the building noticed conditions were beginning to deteriorate. Heavy black smoke was now issuing from the gable end vents and the hose team entering the first floor from Division C was now suddenly experiencing heavy fire coming from the Division B side in the living room. They were unaware that flames were rolling across the ceiling over their heads. Members from the ventilation crew working outside alerted them to this and assisted them in exiting the area. Smoke was now issuing under pressure from various openings on the first floor. Chief Dombrowski, realizing the urgency of the situation, told Assistant Chief Paul Dansbach to order the sounding of the apparatus air horn evacuation signal via radio. As the signal was sounding the crew in the basement evacuated and the first floor crew completed its retreat. At about the same time as the evacuation signal was sounded, Captain Sartori, still at the top of the stairs encountered a sudden blast of heat accompanied by heavy smoke coming up the stairs. Unable to go down the stairway, he dove into a bedroom at the Division C side of the structure and climbed out the window onto the roof of the first floor sun porch. He then climbed down a ladder that the truck company had raised during their ventilation operations. FFs Jacobs and Dunn, making their way from the front bedroom area to the stairs, encountered the heat and smoke and became separated. Jacobs, feeling the intense heat, called to Dunn and told him that they had to find a window. Dunn called Jacob's name several times as the two firefighters struggled, independently of each other, to reach the rear bedroom, from where moments earlier, Sartori had escaped. Reaching the window in the rear bedroom, Jacobs dove through and slid off the porch roof onto the ground. By this time flames were coming out of most first floor openings. Firefighters aiding Jacobs on the ground realized FF Dunn was still inside. Firefighters Joe Hartnett, Scott Buell and Mike Fleming took the line that had been operating in the door at the rear of the first floor (Division C) to the porch roof and operated it in the second floor window where Jacobs and Sartori had exited. After clearing smoke and heat, Buell and Fleming entered the window and found Dunn in the rear bedroom, his legs entangled in a bed frame. Freeing him, they removed him to the porch roof and down the ladder. Members of the RFAS, already treating Jacobs, began attending to Dunn. Both were transported to HMC where Dunn was pronounced dead and Jacobs was treated for his injuries until his release on January 28, 1994.

After all crews were out of the building, a second two-inch handline was connected to the wye, already in place. A crew took the line and directed it through the first floor door on the Division C side. Once in operation, fire on the first floor darkened down but conditions on the second floor worsened, with fire eventually breaking through the roof. Chief Dombrowski at this time decided

to change from an offensive mode to a defensive operation.

As word of the casualties spread, RFD members were gradually relieved of duties by mutual aid companies and began debriefing. Mutual aid companies completed the extinguishment of the fire and mop up operations. The building was totally destroyed and the remains were razed on January 4th and 5th, 1994.

The Casualty Scenario

FF Thomas Dunn, a 40 year old member of the Rutherford Fire Department, had three and one-half years of service at the time of his death. His assignment was that of interior firefighter.

FF Michael Jacobs was 39 years old at the time he received his injuries. He has been a member of the department for sixteen years and was also assigned to interior firefighting operations. He remains a member of the department.

During the course of the incident, FFs Dunn and Jacobs ascended to the second floor to search for possible trapped occupants, perform horizontal ventilation in the area and search for fire extension. The conditions on the second floor were tenable. There was little heat. Visibility was good, with only a light haze of smoke at the ceiling level. They first proceeded to the front bedroom located at Division A of the structure. As they were leaving the bedroom and re-entering the hallway, conditions changed dramatically. Extreme heat and pressurized smoke came up the stairway at about the time they were passing by the top of the stairs. Both firefighters immediately dropped to a prone position and then were obscured from each other by dense smoke that filled the entire space between the ceiling and the floor. During this time the two were communicating, calling to each other by name and trying to locate one another. Jacobs yelled that they must find a window. They continued through the hallway into the bedroom at the rear of the second floor. This room had now become untenable. Jacobs was able to reach the rear exterior wall of the room and subsequently a window. He exited through the window and onto the sun porch roof, which was coated with ice and snow. Jacobs slid off the edge of the roof and impacted the ground.

When FF Dunn entered the rear bedroom, he apparently did not realize where the window was located and rather than traveling in a straight line, turned to his left and encountered a bed frame. His feet became entangled in the bed and he was unable to escape. When he was found by his comrades, his facepiece was removed. The firefighters who found him reported during interviews conducted after the incident that his facepiece was found nearby and was not entangled. After locating Dunn, the firefighters removed him through the bedroom window, onto the porch roof and down the ladder to the ground.

After being treated at the scene by members of the RFAS and the paramedics from HMC, both men were transported to HMC where Jacobs was admitted and Dunn was pronounced dead.

Firefighters Dunn and Jacobs' Injuries

FF Michael Jacobs suffered second and third degree burns to thirty percent of his body. Areas that sustained the most damage were his hands and arms, areas of his back and shoulders and areas of his head including his ears and the area of his face around the outside of his facepiece. Due to his impact with the ground, Jacobs also suffered a severe fracture of his left wrist, which required the insertion of pins, and a fracture of the number one lumbar vertebra in his back. He suffered no respiratory injuries due to the fact that his facepiece remained in place. He required twenty-five days of hospitalization at HMC.

FF Thomas Dunn suffered first and second degree burns on approximately thirty-six percent of his body. The burned areas included the face about the nose and mouth, the rear of the torso, arms and wrists, the buttocks and the rear of the legs. Severe respiratory tract burns were also present and the lungs revealed extensive pulmonary edema. Dunn was pronounced dead on arrival at HMC. An autopsy conducted by the Bergen County Medical Examiner's office revealed the cause of death to be acute smoke inhalation and first and second degree burns of the body.

SECOND LEVEL FLOOR PLAN

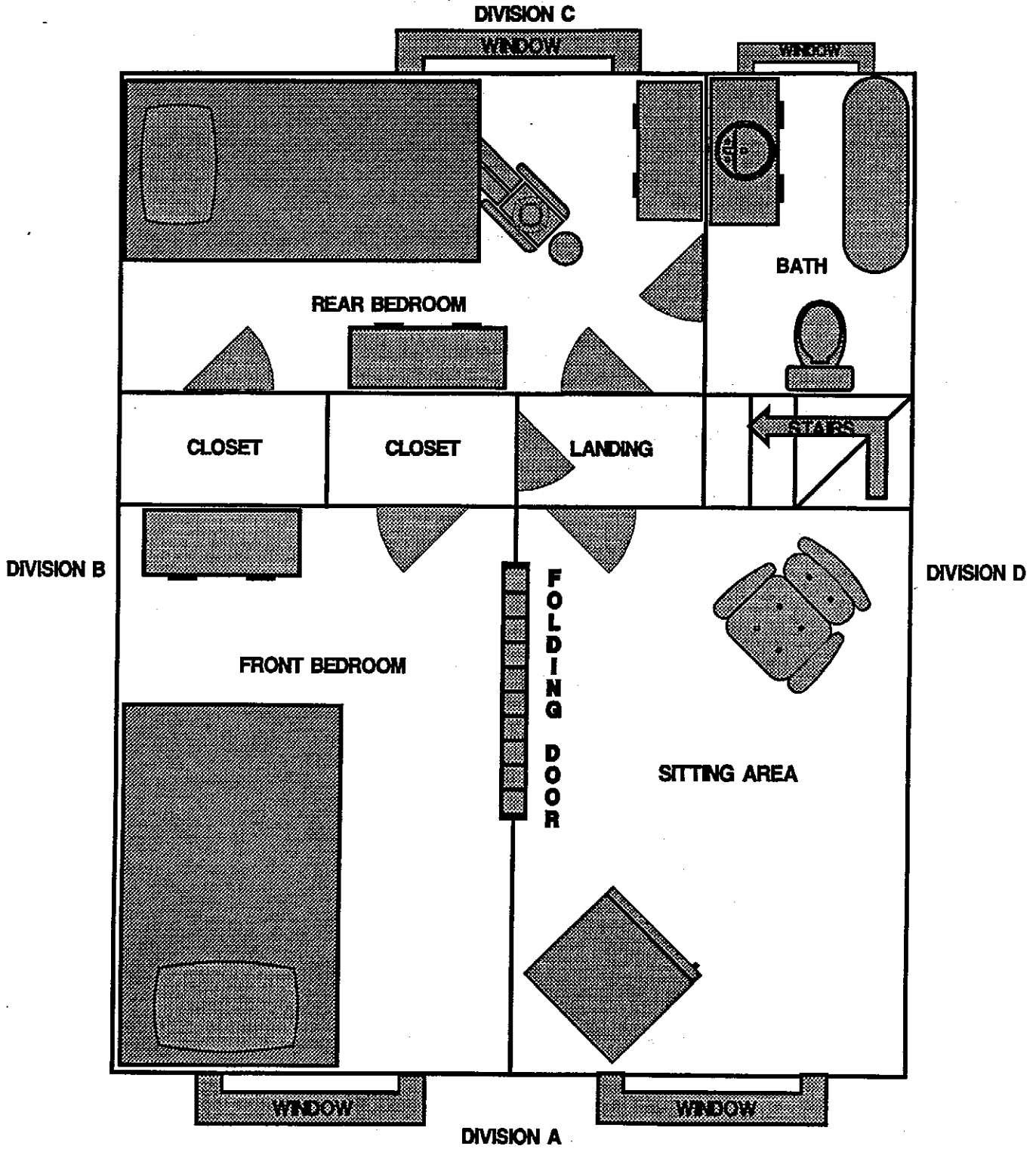


Diagram not drawn to scale

COMMENTS

Personal Protective Equipment

An inspection was performed on FFs Dunn and Jacobs' 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). It should be noted, however, that the SCBA each firefighter was wearing, although compliant, was equipped with nylon backpack harness straps. Both men experienced failure of the straps due to melting. Jacobs' straps failed several feet from the window where he exited the structure. As he realized the SCBA was beginning to fall off his back, he reached behind his back with his left arm and grabbed the unit as it began to dislodge and dragged it with him to the window. He left the unit behind when he exited through the window. Dunn's straps failed at some point after he was overcome as evidenced by the fact that the SCBA was with him when found. Due to Dunn's facepiece being removed or dislodged, the interior was covered with soot and by-products of combustion. The injuries that resulted in Dunn's death were directly related to his facepiece being removed or dislodged in the hostile atmosphere. Jacobs' facepiece had no soot on the inside.

Damage to each firefighters' turnout gear was moderate to severe. Both sets of bunker pants sustained light damage, with the outer shell and reflective material generally uncompromised. The thermal liners sustained no damage. The turnout coats of the firefighters sustained more serious damage. The reflective material on each was completely melted off and the outer shells showed fairly extensive discoloration and charring as well as between five to ten burn throughs of three inches or less. Dunn's coat contained what appeared to be a tear measuring twelve inches vertically in the center of the rear portion of the outer shell. No burn throughs were noted in either firefighter's coat's vapor barrier or thermal liner. Discoloration from heat was apparent on each thermal liner, however.

Each firefighter wore leather bunker boots, purchased by their individual company, which sustained no apparent damage. FF Jacobs wore a Cairns New Yorker style leather helmet which he purchased himself. It sustained heavy charring but did not show signs of degradation. FF Dunn wore a Cairns model 880 style polycarbonate helmet which also sustained heavy charring and moderate bubbling of the outer surface. The helmet did not deform and its integrity did not appear compromised. Both men wore leather gloves which sustained heavy charring and minimal burnthrough in some areas.

FF Dunn utilized a Nomex hood which was only discolored due to heat but not compromised. FF Jacobs did not utilize a protective hood on the day of the incident. Burns he suffered in the areas of his head where a hood would have provided protection are consistent with this fact. Protective hoods are not required to be utilized at this time by PEOSHA. Both men were equipped with PASS devices, however, neither turned them on. The PASS devices sustained little exterior damage other than discoloration.

Construction Type Relating to Fire Spread

The involved structure was constructed of wood framing in what is commonly known as "balloon style". Unlike "platform style" wood frame construction, which is a wood stud framing system in which studs are story height and floors provide some inherent firestopping, balloon style utilizes studs that are continuous for the full, two-story building height and inherent firestopping is not provided between floors. This characteristic allows for fire spread from lower levels in the structure to all areas above the fire floor, often into the attic space. Fire spreading in this manner is usually concealed until it burns through a wall or the roof. The fire in the Rutherford building burned in this fashion, spreading from the area of origin in the basement through the Division B wall and, ultimately, into the attic.

Although the events that led to the death of FF Dunn and the injuries to FF Jacobs may have displayed some of the characteristics of a flashover, the photographic evidence recorded after extinguishment, and statements of the firefighters involved, possibly indicate a different scenario. Flashover is generally a gradual progressive process occurring within a room or a space. Fire normally proceeds from its incipient stage through a sequence of events that include the steady increase of temperature, highest at the uppermost portion of a space and radiating downward; an increase in the amounts of combustible and/or explosive by-products of combustion, including carbon monoxide; and the pyrolysis of solid fuels in the space, liberating flammable gases. When the gases and solid fuels are heated to their ignition temperature, all combustibles in the room, from ceiling to floor, simultaneously burst into flame. At that point, flashover has occurred.

The firefighters who were involved with the incident, both those inside and outside the structure, consistently reported that the preceding events did not occur. Those working at the exterior of the building reported that almost until the time when flames were observed in the living room area of the first floor, there was only a light smoke condition at the ceiling level. They stated that they could see through from one end of the house to the opposite end. Crews working on the interior confirmed the observations of the exterior firefighters and added that there were almost no elevated heat levels detected. This fact was further evidenced by the fact that the interior crews entered standing, and remained in that position until the rapid deterioration of conditions occurred.

The firefighters working on the second floor, including Jacobs, reported similar non-threatening conditions. They stated that conditions became untenable in a matter of seconds, as they experienced a sudden blast of heat and heavily charged smoke that quickly filled the space from ceiling to floor. They noted, however, little or no flame at this time. The crew working inside the doorway of the Division C side of the first floor at this time did not realize the conditions had changed so dramatically. It was reported that they were unaware that flames were rolling over their heads and out of the doorway, and had to be pulled out of the structure by the ventilation crew working at the outside. These descriptions do not appear consistent with the traditional phenomenon of flashover. In addition to the firefighters' observations, photographs taken of the interior of the structure show the level of burning from the ceiling down, known as the demarcation line, is between three and four feet above the floor level. When flashover occurs, the demarcation line, if present at all, is usually extremely

close to the floor level of the space involved. Often in rooms that have flashed over, the area may appear to have been exposed to accelerants due to the low level of charring and the burn patterns on the floor.

It is possible for flashover to occur in a confined space or void. If a fire breaks through to an uninvolved space, the products of combustion may fill that previously uninvolved space rapidly, under elevated temperatures and pressure. Although not conclusive, a more likely explanation of the events that transpired may be that fire in concealed spaces in the Division B wall, and above a false tin ceiling in the living room broke through into the living room. This would be consistent with the reports of the crew working in the doorway of the Division C side, who witnessed fire on the Division B wall of the living room. It is conceivable that fire may have broken through on the second floor from the walls and from the attic above. It was noted that the attic contained a small room in the center, surrounded by a considerable concealed space. Examination of the space between the interior and exterior walls of the Division B side of the building revealed that fire had traveled from the area of origin in the basement directly into the concealed space in the attic. The sudden introduction of heavy fire and large amounts of superheated gases into a previously uninvolved space could very well account for the rapid build-up of heat and smoke. The intensity of the fire was most likely increased by a chimney effect created by the ventilation that had been undertaken below and above the level of the fire. Additionally, a hoseline in a fog pattern was being operated in the area of the living room at the time. It is conceivable that the operation of this hoseline could have produced considerable steam expansion. This would most likely have upset the thermal balance in the space and also contributed to the pressurization and the extreme heat the firefighters on the second floor experienced.

Emergency Evacuation Signal Use

The RFD has incorporated an emergency evacuation signal into the department's safety procedures. It consists of three blasts of the apparatus airhorns and was utilized at this particular incident with great success. At the sounding of the signal, firefighters were alerted to increasingly hazardous conditions in the structure and, with the exception of FF Dunn, were able to exit the building. It is quite conceivable that had this emergency procedure not been utilized, other firefighters working inside the structure could have been injured or killed.

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.

Chief Dombrowski called in a CISD Team for this incident. He reported that the CISD team provided a significant amount of assistance to the fire department members in dealing with FF Dunn's death and FF Jacobs' injuries. He also stated that continuing counseling for his firefighters by the CISD team has been extremely beneficial in helping them deal with the long term effects of this traumatic occurrence.

CROSS SECTION OF STRUCTURE AND ROUTE OF FIRE TRAVEL

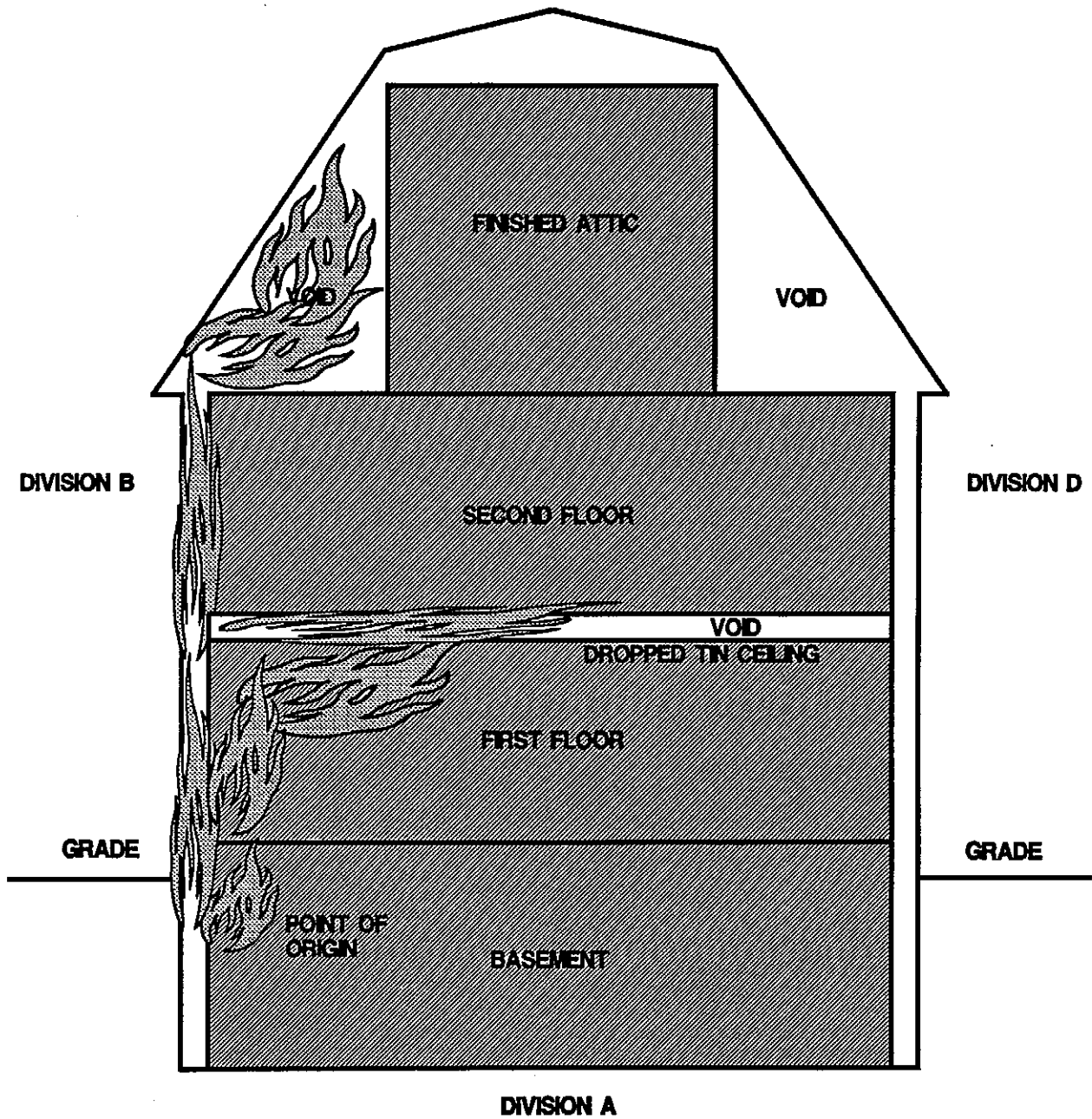


Diagram not drawn to scale

RECOMMENDATIONS

Self Contained Breathing Apparatus Straps

Rutherford's SCBA met the existing PEOSH standard and will continue to meet the standard until the harness straps or units became un-serviceable. At that time any new items purchased must meet the National Fire Protection Association's (NFPA) 1981; 1987 edition, *Standard on Open Circuit Self Contained Breathing Apparatus for Firefighters*⁴. This standard requires Kevlar or similar non-meltable harness straps to be utilized.

The Division of Fire Safety strongly recommends the immediate replacement of all Nylon or other plastic SCBA straps on units that may still have them. The failure of these types of straps has been reported in several instances nationwide. An example of this type of failure resulted in the deaths of several firefighters in Orange County, Florida. A similar failure occurred in Sea Girt, New Jersey in 1992. This incident was investigated and reported on by the then New Jersey Bureau of Fire Safety in September of that year⁵.

Nylon straps melt or burn off thus releasing the SCBA assembly from the wearer's back. In such a situation, there is the potential for the released SCBA to fall to the floor and dislodge, or remove, the facepiece. This would cause the firefighter to be exposed to the lethal atmosphere of the fire. SCBA manufacturers make straps of Kevlar, or with metal bands enclosed in the strap, to correct this problem. These straps are usually available as a retrofit kit, and may be ordered from the New Jersey Contract⁶ listing to obtain a discounted price.

Self Contained Breathing Apparatus Face Mask

The face masks worn by FFs Dunn and Jacobs contained Nylon mesh harnesses, which were compliant with the current PEOSH standard until they would have become un-serviceable. Although these harnesses did not melt or contribute to the injuries sustained by either firefighter, the Division of Fire Safety also strongly recommends the immediate replacement of these meltable harnesses and related assemblies. These parts may fail rapidly due to high heat conditions, potentially exposing the firefighter to the lethal atmosphere of fire.

⁴*National Fire Protection Association Standard 1981, Standard on Open Circuit Self Contained Breathing Apparatus for Fighters, 1987 edition, National Fire Protection Association, Quincy, MA*

⁵*Sea Girt Fire Department Firefighter Injury Report, September 1992, New Jersey Department of Community Affairs, Bureau of Fire Safety, Trenton, NJ*

⁶*New Jersey State Contract for Firefighters' Protective Clothing and Equipment, 1994⁷ edition, New Jersey Department of Treasury, Division of Purchase and Property, Trenton, NJ*

Use of Protective Hoods

At this time, protective hoods made of Nomex or similar materials are not required to be utilized under current PEOSHA regulations. However, it is clear that the burns suffered by FF Jacobs in the areas where a hood would have normally provided protection are a direct result of a hood not being worn. In contrast, FF Dunn, who was wearing a hood, did not suffer serious burns to the protected areas of his face and head. NFPA 1500, *Fire Department Occupational Safety and Health Program*⁷ advocates the use of protective hoods as part of the total personal protective equipment ensemble.

The Division of Fire Safety recommends the use of protective hoods in all instances where the potential for exposure to elevated heat levels or direct flame impingement exists.

Ventilation Operations Relating to Vent Location and Construction Type

Ventilation operations and the benefits and/or disadvantages of such must be considered carefully before undertaking these actions. Considerations include construction type, fire location, adequate water supply and ability to deliver it, expected path of fire travel, and presence of firefighters and/or occupants in the structure. Ventilation is normally conducted above the fire at the exterior of the structure to vent superheated gases and smoke. When firefighters perform ventilation above the fire from the interior of the structure, they expose themselves to the convected heat from below traveling in the direction of the ventilation openings they have created. Such was the case at an October 21, 1990 incident which occurred in Camden. In a two story row house with fire on the first floor, two firefighters were severely burned while venting horizontally on the second floor.

Occasionally, firefighters may vent at locations they believe to be above the fire, not realizing that fire has traveled in concealed spaces into areas above the vent level. This is particularly true with balloon construction. The effect of the fire intensifying can be equated with a wood-burning stove. When air is introduced below the fire level, the fire intensifies greatly. This can place firefighters above the fire in extreme jeopardy.

The Division of Fire Safety recommends that all fire departments review their standard operating procedures and training regarding ventilation, especially concerning coordination of ventilation and fire attack and search and rescue operations at and above the level of ventilation.

Incident Management System

The RFD utilizes the National Fire Academy's (NFA) *Incident Command System* as the department's Incident Management System. At this incident, all command staff positions were utilized.

⁷*National Fire Protection Association Standard 1500, Fire Department Occupational Safety and Health Program, 1992 edition, National Fire Protection Association, Quincy, MA*

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* recommends the use of an incident management system on all incidents. Proposed legislation, currently being discussed in the state legislature, would make the adoption of the NFA's *Incident Command System* mandatory for all fire departments in the state.

Safety Officer

At this incident, the RFD assigned a dedicated safety officer to observe operations and terminate potentially unsafe actions.

The Division of Fire Safety recommends the assignment of a dedicated safety officer on all significant incidents. This action lessens the load on the fire chief 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*⁸ suggest the use of a dedicated safety officer.

Personnel Accountability System

At the time of the incident, the RFD used a personnel accountability system consisting of tags that were left on the piece of apparatus each firefighter was assigned to. Since the time of the incident, this system has been expanded to include an additional tag that a firefighter leaves with a personnel accountability officer before entry to the hazardous area.

The Division of Fire Safety recommends that all fire departments adopt a personnel accountability system that is compatible with the operations of the department and provides a method for locating each firefighter at the incident scene.

Emergency Evacuation Signal

The RFD utilized an emergency evacuation signal with great success at this incident.

The Division of Fire Safety recommends that all fire departments adopt an emergency evacuation signal for use when personnel must exit a structure due to deteriorating conditions. This may consist of a pattern of airhorn blasts or a similar distinctive signal. 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.

⁸National Fire Protection Association Standard 1501, *Standard on Fire Department Safety Officer*, 1992 edition, National Fire Protection Association, Quincy, MA

Cardiopulmonary Resuscitation

The Division of Fire Safety recommends that Cardiopulmonary Resuscitation (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.

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 RFD utilized a CISD Team for this incident. The department continues to provide counseling for its members through the use of the team.

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 include⁹:

- > 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.

⁹Trigger events information from the Critical Incident Stress Debriefing Network of New Jersey

CONCLUSION

The Rutherford Fire Department displayed a high level of professionalism in handling this incident, especially considering the extreme emotional stress experienced by the department's members. While the building was destroyed, the actions of the RFD in instituting the department's emergency action plan most certainly helped to prevent additional injuries and loss of life. Chief Dombrowski and his firefighters did a commendable job in providing appropriate emergency medical services to their stricken comrades.

During the course of this investigation, no violations were noted with regard to the New Jersey Uniform Fire Safety Act, and/or regulations of the New Jersey Departments of Health and Labor.

It is important to note that the construction of the building at this incident played a significant role in the tragic events which occurred. It is imperative for all firefighters and fire officers to consider the characteristics of each type of construction they may encounter regarding fire spread and structural stability, especially when formulating ventilation strategies and tactics.

It has become apparent that ventilation strategies developed without full awareness of actual or probable fire travel, especially within the concealed spaces of a structure, can have dire consequences. The practice of venting above the level of the fire from the interior, while performing search and rescue or other operations; venting below the level of the fire; or, a combination of the two, has contributed to firefighters being injured or killed. Recent examples include the incident in Camden, previously referenced in the recommendations portion of this report, and a similar incident in New York City which occurred on March 28, 1994 resulting in the deaths of three firefighters.

Ventilation strategies and tactics such as these may need to be reconsidered, particularly regarding the benefits of such operations versus the potential human risks.

AFTERWORD

Events such as these can prove trying 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. The Rutherford Fire Department fulfilled their obligation in this respect.

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.