NEW JERSEY DIVISION OF FIRE SAFETY

Firefighter Fatality and Serious Injury Report Series

Career Firefighter Killed Upon Being Run Over by Fire Apparatus

Elizabeth, New Jersey
January 2, 2009

Final Report Issued
October 1, 2010

STATE OF NEW JERSEY
Chris Christie, Governor

DEPARTMENT OF COMMUNITY AFFAIRS
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INTRODUCTION

The investigation of this incident was conducted by the New Jersey Division of Fire Safety/State Fire Marshal in conjunction with the New Jersey Department of Labor. This report was prepared in accordance with N.J.S.A. 52:27D – 25d, Duties of the Division.

The purpose of 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.

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GLOSSARY OF TERMS

Fire Apparatus Designations:

E – Engine
L – Ladder
SQ – Squad
R – Rescue

Personnel Designations:

FF – Firefighter
BC – Battalion Chief
DC – Deputy Chief
IC – Incident Commander
SO – Safety Officer

CISD……..Critical Incident Stress Debriefing

EMS……Emergency Medical Service

ICP……..Incident Command Post

IDLH…….....Immediately Dangerous to Life & Health

IMS…….....Incident Management System

NFIRS……National Fire Incident Reporting System

LDH……..Large Diameter Hoseline

NFPA……National Fire Protection Association

NIOSH……..National Institute for Occupational Safety & Health

NJDFS……New Jersey Division of Fire Safety

PAR……Personal Accountability Report

PASS……..……Personal Alert Safety System

PEOSH……Public Employees Occupational Safety & Health

PPE……Personal Protection Equipment

RIC……..Rapid Intervention Company

SCBA……Self-Contained Breathing Apparatus

TIC…….....Thermal Imaging Camera

UASI…….....Urban Area Security Initiative

EXECUTIVE SUMMARY

On Friday, January 2nd, 2009, at 0212 hours, the Elizabeth Fire Department (EFD) responded to a working house fire in the area of 335 Marshall St. Upon arrival, the first due units encountered a fully involved two and a half story dwelling fire, rapidly extending to a neighboring structure. Initial operations included a defensive attack of the fire building to protect the exposed structure, and an aggressive interior fire attack in the exposed structure to halt the fire spread. To provide the amount of water required to support these operations, crews had to establish two supply lines from opposite directions to the fire apparatus in front of the structures.

EFD E-2, under the command of Acting Captain (FF) Gary Stephens, was ordered to forward lay a supply line from the fire hydrant at the end of the block to EFD L-2. A crew member exited the fire apparatus to connect to the hydrant and was in position to lay the supply line when the assignment was changed by the IC. E-2 was now ordered to perform a reverse hose lay, which required E-2 to back down the street to the fire scene, drop their supply line, and drive to the hydrant. Acting Captain (FF) Stephens exited the fire apparatus to assist in "spotting" the apparatus as E-2 needed to conduct a 3-point turn in order to back down the street. Acting Captain (FF) Stephens was positioned near the rear passenger-side corner of the fire apparatus, visible to the driver in the passenger-side mirror; E-2 began backing down the street. While "spotting" E-2 to ensure clearances, witnesses reported that Acting Captain (FF) Stephens turned around possibly to look toward the scene and began to walk across the rear of the apparatus toward the driver's side, at which time he was struck by the E-2 and stumbled to the ground. E-2 continued backing-up, and ultimately ran-over Acting Captain (FF) Stephens.

Other firefighters on scene observed from a distance away that Acting Captain (FF) Stephens was struck, and immediately stopped E-2 from backing up farther. Personnel ran up the street, observing Acting Captain (FF) Stephens under the fire apparatus. They immediately began rescue operations to remove Acting Captain (FF) Stephens from under the apparatus, as he was entangled in the undercarriage area. Upon removing Acting Captain (FF) Stephens, he was immediately tended to by EMS personnel, and was transported to a local hospital where he was pronounced dead. While this was occurring, personnel continued to battle the fire, which was eventually extinguished without further incident.

The origin and cause investigation for this incident was conducted through a joint effort by members of various agencies associated with the Union County Arson Task Force. These included the NJDFS Arson/K-9 Unit; the Union County Prosecutor's Office, Police Department and Sheriff's Office; as well as the Elizabeth Police and Fire Departments. The fire was determined to be incendiary in nature, caused by vagrants who gained access into the home and ignited combustible materials found in the home for a warming fire. These materials ignited the surrounding combustible furniture and flooring, as the fire was started directly on the wooden floor. The vagrants fled the scene after suffering burns and smoke inhalation, but were located by police shortly thereafter.

The Elizabeth and Union County Police Departments conducted a motor vehicle accident investigation. Following this investigation, the NJ State Police Commercial Vehicle Inspection Unit impounded EFD-2 to a remote location for mechanical testing purposes. NJDFS investigators assisted in this vehicle inspection and investigation.

It should be noted that the Union County Prosecutor's Office pursued criminal charges against the two vagrants that occupied the building when the fire started. To date, one of the individuals has accepted a plea bargain resulting in a conviction for manslaughter; the other individual is facing trial for charges resulting from the fire.

ACCIDENT FACTORS / REMEDIES

In order to prevent a reoccurrence of this type of incident, NJDFS investigators identified key issues that must be addressed and remedies that should be implemented within all departments.

1. **FACTOR:** E-2 was equipped with a supplemental backing safety system which failed to operate. If operational, this system could have activated the apparatus' brakes when Acting Captain (FF) Stephens made contact with the safety system. The investigation revealed that this system was not routinely checked or properly maintained in accordance with manufacturer's recommendations. Further investigation discovered operational deficiencies and/or failure of the backing system equipped on three other EFD apparatus.

   REMEDY: *Personnel should be instructed on how to inspect fire apparatus safety items, and these inspections should be performed and documented in accordance with manufacturer's recommendations on a regular basis. Personnel should also be informed when the system is not operational.*

2. **FACTOR:** The rear step bumper of E-2 had pre-existing and undocumented impact damage that may have prevented the supplemental backing safety system from properly operating upon Acting Captain (FF) Stephens being struck.

   REMEDY: *Any vehicle damage should be reported and repaired in a timely manner regardless of the perceived insignificance, as said damage could negatively affect other vehicle systems.*

3. **FACTOR:** The reporting of minor maintenance issues may have been delayed and/or neglected by E-2 personnel, as the land-line phone and centralized computer system at their station were inoperable for an extended period of time.

   REMEDY: *These systems should be repaired in a timely manner to allow for expeditious and efficient communication of maintenance issues and/or other reporting as necessary. In the meantime, alternate reporting methods should be employed.*

4. **FACTOR:** Acting Captain (FF) Stephens was operating near the rear of the fire apparatus and was momentarily out of visual mirror contact with the driver as E-2 backed down the street.

   REMEDY: *Personnel should avoid distractions and maintain visual mirror contact with the driver whenever spotting fire apparatus. As such, the driver should immediately stop the fire apparatus until such time as that visual mirror contact is regained. Full PPE and supplemental lighting should be utilized to increase visibility.*

5. **FACTOR:** Training records within the EFD were found to be lacking details on training performed at the company level. Additionally, it was discovered that daily training is not recorded on that day but rather at the end of the month, relying heavily on the memory of the company officer as to what topics were covered and who was in attendance.

   REMEDY: *The EFD should maintain accurate training records for all members in a standardized manner, and such records should be submitted and reviewed for accuracy and thoroughness in a timely fashion.*

6. **FACTOR:** The formalized training and evaluation of personnel to be assigned as fire apparatus driver/operators was very limited in scope.

   REMEDY: *The EFD should provide additional basic and supplemental training to their driver/operators to ensure proficiency in both operating and inspecting the fire apparatus.*

7. **FACTOR:** There was a lack of formalized policies and procedures within the EFD for key factors identified during this investigation. These include backing fire apparatus, change of tour duties, inspecting equipment, and reporting faulty equipment.

   REMEDY: *The EFD should develop, implement and enforce policies in these subject areas in accordance with nationally recognized consensus standards such as those developed by the National Fire Protection Association. Additionally, the EFD should regularly review and/or update established policies and procedures that govern the operation of the EFD.*

INVESTIGATION

Note: During the course of this investigation, a dispatch recording of the fireground operations was obtained from the EFD dispatch center. Unless otherwise noted, exact times were not given by the dispatcher over the radio, and the recording was abridged, as it did not record in "real-time". Therefore, it was not possible to state with any reasonable certainty many of the timeframes involved in any operations, including exactly when Acting Captain FF Stephens was struck, and how long it took personnel to free him from underneath E-2.

Pursuant to New Jersey Incident Management System regulations, to provide for uniform identification of locations and operational forces within an incident scene, the scene is divided geographically into smaller parts which are designated as divisions. Specific areas of the incident scene are to be designated as follows:

- *Sides of incident scenes shall be identified as letters of the alphabet beginning with the letter "A."*
- *The side of the incident scene that bears the postal address of the location shall be designated as Division "A" by the Incident Commander. Where the incident scene has no postal address, the Incident Commander shall select any side to designate Division "A".*
- *Continuing in a clockwise rotation, the side adjacent to the Division "A" side shall be designated as Division "B." The side adjacent to the Division "B" side shall be designated as Division "C." The side adjacent to the Division "C" side shall be designated as Division "D."*
- *Floor levels shall be designated as Division "Basement" or "0"; "1" (ground level – not necessarily street level); "2", "3", and so on.*

The Incident

On Friday, January 2nd, 2009 at 0212 hours, the Elizabeth Fire Department (EFD) responded to a working house fire in the area of 335 Marshall St. The initial response for the EFD was E-5, E-3, E-2; L-2, L-3; R-1; BC-4; DC-4. While the companies were enroute, the dispatch center reported receiving multiple calls about the fire. E-5, the first due unit, confirmed a working fire from a distance away as they saw heavy smoke and a glow in the sky. This automatically upgraded the response to include E-1 as the Rapid Intervention Company (RIC). Upon arrival, E-5 personnel encountered a fully involved two-and-a-half-story dwelling fire (correct address, 338 Marshall St.), rapidly extending to a neighboring identical dwelling located only a few feet away on the Division B side. E-5 established command and requested a 2nd alarm assignment be dispatched, bringing E-7, E-6 and L-1 to the scene.

BC-4 arrived on scene and assumed command at 0217 hours (D+5m). At this time, crews from E-5 and L-2 had already initiated defensive fire suppression operations on the original fire building, attempting to protect the exposed structure. They also simultaneously performed an aggressive interior fire attack in the exposed structure in an attempt to halt the fire spread as well as to search for occupants. The next incoming companies, E-3 and E-2, were ordered to establish a water supply by laying LDH from fire hydrants on opposite ends of the block.

This would provide the amount of water required to support these operations, as it is typical of the EFD to utilize two water supplies on working fires to compensate for inadequate water flow from a single hydrant.

Multiple hoselines and an elevated master stream were now operating and/or in the process of being put into service. DC-4 arrived on scene and assumed command. When L-3 arrived their crew was assigned to assist with the firefighting operations. E-3 was ordered to lay a LDH supply line into the scene to supply E-5. E-2 under the command of Acting Captain (FF) Stephens was ordered to perform a forward LDH hose lay to supply L-2 from a fire hydrant at the opposite end of the block. *{A forward hose lay is the process of dispensing hose from the apparatus onto the roadway, beginning from the hydrant and driving toward the direction of the fire.}* As E-2 got into position for this forward hose lay, FF Billy Ramos exited the apparatus to prepare to connect the LDH to the hydrant. However, the IC then rescinded this assignment, and ordered E-2 to perform a reverse hose lay. This required E-2 to back down the street to the fire scene. *{A reverse hose lay is the process of dispensing hose from the apparatus onto the roadway, beginning from the fire scene and driving toward the hydrant.}*

To complete this assignment, E-2 had to back down the street approximately 250 feet underneath two large overpasses; one for the NJ Turnpike, which is a large multi-lane highway, and the other for a railroad. The roadway under these overpasses was artificially illuminated, providing good visibility. It was later reported that this change in assignment was due to the street being congested with parked cars and other fire apparatus in front of the fire buildings. Therefore, E-2 would not have been able to properly position to supply L-2. Additionally, by performing this reverse hose lay E-2 could pressurize the water directly at the hydrant, boosting the water flow to the scene.

Acting Captain (FF) Stephens exited E-2 to assist in spotting the apparatus as a 3-point turn was required in order to back down the street. *{Spotting is the act of overseeing the backing of fire apparatus to prevent blind-spot collisions as the apparatus reverses. Typically, this is performed by a FF walking a few feet behind the apparatus on the driver's side, maintaining eye contact with the driver in the side mirror as the apparatus is backing. The spotter will signal the driver with directions or to stop as needed to avoid collisions.}* Acting Captain (FF) Stephens positioned himself near the rear passenger-side corner of the fire apparatus and was visible to the driver in the right side mirror as E-2 began backing down the street. FF Ramos was going to assist in spotting on the driver's side but could not get into position due to the proximity of parked vehicles to apparatus. He then positioned himself near the driver's front corner of E-2 to monitor side clearances as the driver backed.

BC-4 radioed for E-2 to expedite the reverse lay. The engine continued reversing with Acting Captain (FF) Stephens spotting at the rear, and FF Ramos spotting at the front. While E-2 backed, it was reported that a tow truck was blocking the

area where the apparatus would be positioned. Later testimony revealed that EPD requested the towing of a parked vehicle located in front of the fire scene. However, both BC-4 and the Captain of L-3 told the tow truck driver to move because he was in the way of operations, and that they would work around the parked vehicle (a common procedure conducted in the city). The tow truck then rapidly drove across the rearward path of E-2 to get out of the way of the backing apparatus.

While spotting E-2 to ensure clearances, witnesses reported that Acting Captain (FF) Stephens possibly turned around to look toward the scene or the tow truck that just drove across their path. Additionally, the driver of E-2 stated he was momentarily distracted by the image of the tow truck's travel across his driver's side mirror, causing him to look away from Acting Captain (FF) Stephen's image in the passenger-side mirror. While this was occurring, Acting Captain (FF) Stephens began to walk across the rear of E-2 toward the driver's side. Personnel reported that he was struck by E-2, stumbled to the ground, and as E-2 continued backing he tried to recover to his feet but could not. Personnel working at the scene from a distance observed Acting Captain (FF) Stephens being run-over by E-2 and began yelling for E-2 to stop. Before realizing that the yelling was meant for him to stop, the driver felt the vehicle run over something which caused him to stop immediately. The Captain of L-3 immediately radioed a "firefighter down" message.

Immediately after the accident BC-4 along with other personnel ran to the downed FF and found Acting Captain (FF) Stephens under the fire apparatus with apparent severe traumatic injuries. While this was occurring, crews also continued to battle the fire, which was still intensifying. EFD personnel were now operating at essentially two different emergency scenes: one at the fire and one at E-2 for the rescue.

BC-4 told the driver of E-2 to engage the parking brake, turn the apparatus off, and stay in the cab, which he did. Personnel immediately began rescue operations to remove Acting Captain (FF) Stephens from under E-2, as he was entangled in the undercarriage area. BC-4 radioed for R-1 to relocate to E-2 to assist, and he then crawled under E-2 to free Acting Captain (FF) Stephens. Shortly thereafter Acting Captain (FF) Stephens was freed and pulled-out from underneath the truck. *This occurred prior to the 20-minute benchmark for the incident; however, exact times could not be determined based upon dispatch records due to the lack of times being announced over the radio.* Acting Captain (FF) Stephens was immediately tended to by EMS personnel and transported to a local hospital where he was pronounced dead. After Acting Captain (FF), Stephens was removed from the scene the driver of E-2 got out of the truck. Eventually realizing the severity of the situation and what had happened he was also transported to a local hospital for evaluation. It should be noted that the driver of E-2 was screened for any illicit substances as part of this accident investigation with negative results.

Following this, the fire suppression operations continued well into the morning hours with Chief Officers being recalled to respond to the scene, including BC-5 as the Safety Officer (SO). Mutual aid companies were called for station coverage assignments and to relieve the EFD personnel. The fire was successfully extinguished with only two other minor FF injuries: one with a sprain/strain, and the other with a cut.

The Casualty Scenario

Acting Captain (FF) Gary Stephens was a 57-year-old member of the Elizabeth Fire Department with 28 years of firefighting experience, including extensive time served as an Acting Captain. While assisting with backing E-2 down the street toward the fire scene Acting Captain (FF) Stephens was struck by the truck, causing him to stumble to the ground and subsequently to be run-over by the apparatus. This resulted in Acting Captain (FF) Stephens being severely entangled in the undercarriage of E-2. An autopsy performed by the Regional Medical Examiner's Office in Newark listed his cause of death as blunt trauma to the head, torso, and upper extremities.

Fire Department Profile

The EFD is a career fire department with 269 firefighters, 45 Captains, seven Battalion Chiefs, and five Deputy Chiefs operating under the direction of a Fire Chief and the oversight of a Fire Director. The EFD serves a population of approximately 124,000 over an area of 12 square miles. The department operates a fleet of fire apparatus consisting of seven engines, three ladders, one rescue, and specialized Urban Area Security Initiative (UASI) equipment. The department also maintains its own fire prevention division, a dispatch center, and a fleet services repair shop, which houses two reserve engines and two reserve ladders. The most current National Incident Reporting System (NFIRS) records indicate that EFD responded to 7,400 calls for service, including over 1,400 EMS responses in 2008.

ANALYSIS

The following items are areas identified by NJDFS investigators as impacting directly upon the outcome of this incident:

Fire Apparatus Inspection

Upon the completion of the motor vehicle accident/fatality investigation performed by local police agencies, NJDFS investigators impounded E-2. The truck was "flat-bedded" directly from the scene to the EFD maintenance shop and secured pending a full commercial vehicle inspection. On January 5, 2009, NJDFS investigators returned to the EFD maintenance shop along with the NJ State Police Transportation Safety Bureau to inspect E-2. The full commercial vehicle inspection was performed. No safety violations were detected in accordance with the Federal Motor Carrier Safety Improvement Act. It was noted that the visual and audible reverse warning systems were properly operating and the side-view mirrors appeared to be properly adjusted for the driver.

The investigation found that E-2 was equipped with a "BACKSTOP®" device, which is an aftermarket factory-installed supplemental backing safety system that is designed to lock the vehicle's air brakes upon the device contacting an object. The system consists of a rubber bladder mounted on the rear bumper; if this bladder is compressed, the system's control unit will detect the slight change in air pressure (as low as 0.05 psi) energizing a switch that activates a valve to immediately lock the brakes. The brakes then cannot be released until the driver shifts out of reverse gear. This BACKSTOP® system was not tested as part of the aforementioned official commercial vehicle inspection as it is not a mandated device.

However, following the official commercial vehicle inspection, investigators attempted to activate this system by applying significant pressure to various areas of the device while the vehicle was backing. The system failed to activate the vehicle's brakes as designed during each of multiple attempts. It was also observed that some components of this system appeared to be inoperable due to damage to the rear bumper near the right corner area. This damage could not be attributed to the incident that resulted in the death of Acting Captain (FF) Stephens, as it is believed to have occurred at some time after March 5, 2008, which was the last documented successful test of the BACKSTOP® system performed by the EFD maintenance shop. This bumper damage was undocumented by E-2 personnel and was therefore not repaired prior to this incident.

It should be noted that the testing performed during this investigation cannot confirm the outright failure of this system during this incident. However, if the rear step bumper area of E-2 had not been damaged, and the components of the BACKSTOP® *system had been operable, the system could have locked the truck's brakes as designed.*

PHOTO 1: Shows rubber bladder component of the "BACKSTOP" system, and pre-existing impact damage near right corner area of rear step bumper of E-2. This is also believed to be the area where FF Stephens was struck.
(Photo NJDFS)

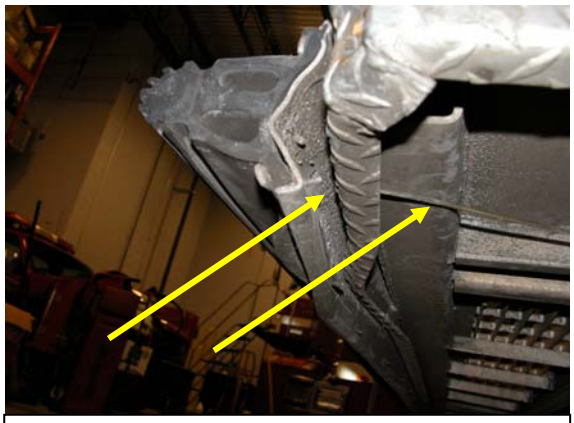

PHOTO 2: Underside view of right rear corner area of step bumper and components of the "BACKSTOP" system. The separation between the truck's bumper, the rubber bladder, and the air pressure sensor hose prevented the system from operating as designed during our testing.
(Photo NJDFS)

As a result of the E-2 apparatus investigation, the EFD maintenance shop conducted a follow-up inspection on all of their fire apparatus equipped with the BACKSTOP® system. Out of eight apparatus, three were found to be inoperable for various reasons and repairs were made accordingly. Additionally, during firefighter interviews, it was revealed that although personnel did receive initial training on this system it was not regularly checked during each shift. The manufacturer of this system outlines a procedure to check the system and recommends weekly operability checks.

Note: System design does not provide a means to confirm its operational status or warn the vehicle operator that the system is in fault. This may create a false sense of security for personnel operating behind fire apparatus.

During the investigation, personnel stated that the phone and computer lines inside the quarters of E-2 had been inoperable for an extended period of time, which may have contributed to delays in reporting minor vehicle maintenance issues through the EFD's centralized vehicle reporting software. They were provided with a department-issued cellular phone to communicate and EFD administration advised them to utilize another fire station's computer as needed to complete reports. However, personnel confirmed that major vehicle maintenance issues were reported to the shop and repaired immediately.

The investigation found a lack of documented change-of-tour apparatus/equipment checks and that EFD does not utilize standardized forms when conducting these checks. Therefore, the possibility of complacency and/or neglect in checking these items could exist.

Backing Fire Apparatus

During this incident, Acting Captain (FF) Stephens was killed after being run-over by E-2, which he was spotting as it backed toward the scene to perform water supply operations. As previously stated, spotting is the act of overseeing the backing of fire apparatus to prevent blind-spot collisions as the truck reverses. Typically, this is performed by a FF walking a few feet behind the truck on the driver's side, maintaining eye contact with the driver in the side mirror as he backs. The spotter will signal the driver with directions or to stop as needed to avoid collisions.

Although FF interviews revealed that the EFD did not have a formal policy regarding backing fire apparatus, personnel stated that it was an accepted practice for EFD personnel to "spot" the fire apparatus whenever moving in reverse. This would typically be performed by two firefighters, one near each rear corner of the fire apparatus, both maintaining visual contact with the driver through the side mirrors. It was noted that Acting Captain (FF) Stephens was wearing full PPE, including SCBA at the time of being struck. The PPE was in newer condition with highly visible reflective trim. He was also outfitted with a portable fireground radio to monitor communications and a flashlight. It could not be confirmed if the flashlight was ON to increase visibility while Acting Captain (FF) Stephens was spotting E-2, although the area in which he was operating under the overpasses was artificially illuminated. The operator of E-2 later stated that this area was well lit and that the road was dry. Additionally, personnel reported that the visual and audible reverse warning devices on E-2 were properly operating at the time Acting Captain (FF) Stephens was struck.

Training Issues

As part of this investigation an inspection and review of EFD training records was performed, including driver's training records. These records were provided by the EFD Training Division, which establishes, disseminates, and instructs the department-wide training, and also maintains the training records of all EFD personnel on both paper and computer formats. The EFD Training Division also reviews and maintains the training logs from individual companies while on duty during their shifts.

While preparing these materials for this investigation, EFD training personnel were alerted to many discrepancies within the company-level monthly training logs as compared to the EFD timekeeping records. On multiple occasions

personnel were listed as having attended company training, but were later found to have not attended due to being on vacation, sick leave, a shift swap or other reasons. It is believed that this was not necessarily an intentional falsification of training records, but was due to the lack of the EFD's guidance and/or oversight for the company-level training. Typically, these company-training logs are submitted by the shift Company Officers to the EFD Training Division at the end of the month. However, if the logs are not completed in a timely manner, the Company Officers must back-log the training entries from memory. These entries include: topic/evolution performed, number of hours and names of personnel in attendance.

This investigation also revealed a lack of formalized driver training within the EFD. The decision to become a driver is voluntary and is typically based upon seniority within the FF's assigned quarters and shift. Although many EFD drivers do attend some sort of basic emergency vehicle operations class, there is a lack of supplemental driver training such as pump operator training and vehicle mechanical inspection/maintenance training.

PEOSH & NIOSH Inspection

Following this incident, NJDFS investigators were joined by the NJ Department of Labor PEOSH Unit in conducting an investigation into the death of Acting Captain (FF) Stephens. The PEOSH inspection report listed a multi-part citation of issues that needed to be corrected in accordance with NFPA professional standards including: fire apparatus inspection and maintenance, training on testing of supplemental safety equipment, driving and/or backing fire apparatus, safety and health officer and committee, safety and health policies, risk management plans and accident prevention programs. It was noted that items cited were corrected prior to the re-inspection date of December 23rd 2009.

In April of 2009, investigators from the US Department of Health NIOSH Safety Unit conducted an investigation into this incident. The NIOSH investigation report listed recommendations including procedures for backing fire apparatus, supplemental safety equipment for backing, and procedures to ensure the proper function of safety equipment on fire apparatus. This NIOSH report, as well as many others involving firefighter fatalities from around the country, can be viewed on their website at the following web address:

http://www.cdc.gov/niosh/fire/reports/face200910.html

LESSONS LEARNED

The following items are areas identified as ways to correct issues regarding this incident and other general items designed to make incident scenes safer and more efficient:

Fire Apparatus Inspection

Accepted standards of practice such as NFPA 1500, "Fire Department Occupational Safety and Health Program," 2002 Edition, recommends that fire apparatus should be inspected at least weekly and/or within 24 hours after any use or repair to identify and correct unsafe conditions. This inspection schedule should be governed through written departmental policies and procedures and should include a preventative maintenance program for all fire apparatus. These inspections must be documented, as to provide confirmation of not only maintenance deficiencies, but also of all properly operating vehicle equipment.

Typically, this vehicle inspection would be conducted by the driver/operator upon reporting for duty. NFPA 1002, "Standard for Fire Apparatus Driver/Operator Professional Qualifications" 2003 Edition, states that the following vehicle components be inspected to verify operational status:

- Battery(ies)
- Braking system
- Coolant system
- Electrical system
- Fuel
- Hydraulic fluids
- Oil
- Tires
- Steering system
- Belts
- Tools, appliances, and equipment

As was illustrated in this incident, the failure to properly and/or regularly inspect the BACKSTOP® system on E-2 prevented the necessary repairs from being made to ensure its operation. Despite the fact that this system was aftermarket and not required, it should have been considered part of the vehicle's braking system. Although the inoperability of the BACKSTOP® system may not have warranted immediately placing the fire apparatus out of service, it would have made all personnel aware of its inoperability, thus eliminating a false sense of security while operating near the back of the fire apparatus.

Backing Fire Apparatus

Backing a fire apparatus is a challenge regardless of the conditions and should be avoided whenever possible, as the limited visibility toward the rear of fire apparatus makes it extremely dangerous for personnel to operate in this area. To this end, NFPA 1500, "Fire Department Occupational Safety and Health Program," 2002 Edition, recommends that departments establish policies and procedures for safe backing of fire apparatus, and the duties of both the driver and the crew members should be addressed.

The driver has the final responsibility for safe backing. If the driver is not sure whether the area behind the fire apparatus is clear, the driver should stop and get out to check the area. Crew members should be designated as spotters, as the proper use of spotters can reduce risks while backing. These spotters should wear their turnout gear or other approved reflective materials to promote visibility. Only one crew member should signal or communicate with the driver as he backs the fire apparatus, and approval should be given by that spotter prior to backing. This agreed upon communication may be verbal, by a remote electronic signaling device, hand signals, or radio. The signal person should take a position to the rear and side (preferably the driver's side) of the fire apparatus, maintaining eye contact with the driver in the side view mirror. Fire apparatus should always be backed slowly, despite the urgency of any situation, so as to stop immediately if necessary. If the driver is not sure if it is clear to back or cannot account for any of the crew members, the driver should stop immediately.

Although the use of mirrors is paramount while backing fire apparatus, standard side view mirrors still offer only a limited window of visibility for the driver. Adding supplemental convex, sometimes referred to as "fish-eye" mirrors, aid in reducing side blind spots. Technology exists today for fire apparatus to be equipped with supplemental backing safety devices such as sensors or video cameras to aid in safe backing operations. However, these items act only to further reduce the risk while backing, and should not be considered as a substitute for the traditional use of mirrors and spotters.

Training Issues

In accordance with recognized standards such as NFPA 1500, "Fire Department Occupational Safety and Health Program" 2002 Edition, fire departments should establish and maintain a regular training and education program that is commensurate with the duties and functions that they are expected to perform. The main goal of this training and education is to prevent occupational deaths, injuries or illnesses by ensuring that all members of a department operate in an efficient, safe and uniform manner. Additionally, proper recordkeeping is essential to certify that all personnel have received both required and supplemental training and education.

Fire apparatus driver/operator training should be based upon the recommended practices of NFPA 1002, "Standard for Fire Apparatus Driver/Operator Professional Qualifications" 2003 Edition, which outlines basic vehicle maneuvering evolutions that should be considered to be the foundation upon which additional driver training is based. Although NJ Motor Vehicle Regulations exempt drivers of fire apparatus from obtaining Commercial Driver's Licenses (CDL), the information contained within the CDL manual offers a good knowledge base of information pertaining to the safe operation and maintenance of commercial vehicles and the mechanical systems they possess.

Critical Incident Stress Debriefing (CISD)

The purpose of a CISD Team is to provide individual counseling, group sessions and, if necessary, referrals to members of an emergency response organization involved in traumatic events. The teams are made up of specially trained fire, police and EMS personnel, along with 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 FFs 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. 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.

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 include:

- *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*

Currently, CISD Teams are regionalized in New Jersey and are part of a statewide network. These teams will respond on a 24-hour basis whenever requested. Emergency contact numbers for activation of a CISD Team are as follows:

The Statewide CISD Network – (609) 394-3600
The NJ Fire & EMS Lifeline – (866) 653-3367

CONCLUSION

It is the NJ Division of Fire Safety's sincere hope that the lessons learned from this and other similar incidents will serve to educate the fire service and inspire them to take all necessary measures to reduce firefighter injuries and deaths to the greatest extent possible.

While the actual event that was responsible for the death of Acting Captain (FF) Gary Stephens was a singular event and not the direct result of the fire incident itself, it must be remembered that several contributing factors led up to the fatal outcome. They included damage to the apparatus that was not promptly reported or repaired thus rendering the BACKSTOP® device inoperable; the failure to conduct regular inspections and tests of apparatus and equipment systems; and a lack of formal policy and training on the operation of fire apparatus. The possibility that Acting Captain (FF) Stephens became distracted while spotting the apparatus as it was backing could not be determined conclusively. Inattention to a moving apparatus is a recipe for disaster that all emergency responders in situations such as this should take steps to avoid.

The issue of inadequate record keeping with regard to training may not have had a direct impact upon this incident. However, laxity to attention to detail in critical areas of an organization's operations can breed an atmosphere of apathy that can extend to every aspect of a fire department's mission. These causal factors may have contributed to the outcome of this incident.

As has been stated in previous investigative reports issued by the NJ Division of Fire Safety, firefighting is an inherently dangerous occupation. Keeping this in mind, firefighters should rededicate themselves to remove or reduce those hazards that can be eliminated or reduced.

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