NEW JERSEY DIVISION OF FIRE SAFETY

Firefighter Fatality and Serious Injury Report Series

Firefighter Runs Out of Air and Dies While Operating at a Structure Fire

Newark, New Jersey
May 22, 2001

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STATE OF NEW JERSEY
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DEPARTMENT OF COMMUNITY AFFAIRS
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INTRODUCTION

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

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EXECUTIVE SUMMARY

On May 22, 2001 at 1600 hours, the Newark Fire Department (NFD) responded to a working structure fire at 47 Beaumont Place. Upon arrival, initial companies found fire venting from the rear upper level of a 2.5 story wood-frame residence. Truck 6 began rooftop ventilation, with Engines 13 and 28 initiating an interior fire attack by stretching two 1.75" hose lines to the upper floor via the unprotected interior stairwell. Upon reaching the top of the stairwell, firefighters encountered high heat and heavy smoke, but did not immediately locate the fire. At some time during the hoseline advancement, interior conditions deteriorated as firefighter (FF) Noel Santiago from Engine 13 suddenly ran out of air in his self-contained breathing apparatus (SCBA). In this time of urgency, FF Santiago removed his SCBA mask, and it appears that his partner, FF Lawrence Webb pushed him down the stairs to get out of the structure. Upon exiting, FF Santiago looked for FF Webb, but did not see him. Although FF Santiago and other personnel on scene thought that FF Webb had also come out, they soon realized that he was still inside the structure. Frantically, FF Santiago reported that FF Webb was missing; upon hearing this, personnel still operating inside the structure immediately attempted to locate and rescue FF Webb.

Firefighter Webb was quickly located in a front room on the upper floor of the structure. He was found face-down, confined by furnishings and debris, with his SCBA mask off and lying next to him on the floor. Personnel immediately pulled FF Webb down to the second floor, where EMS was waiting to assess his condition. In realizing that he was in cardiac arrest, he was removed from the structure and transported to Clara Maas Hospital in Belleville where he was pronounced dead.

The origin and cause investigation for this incident was conducted by the Newark Fire Department Arson Squad in conjunction with the Essex County Prosecutor's Office. The fire was determined to be accidental in nature, caused by an electrical malfunction that was located in the ceiling of a rear room on the second floor of the structure.

In order to minimize the risk of similar incidents, the New Jersey Division of Fire Safety identified key issues that must be addressed and remedies that should be implemented within all departments.

1. FACTOR:

Although the fire was in the rear of the structure, both fire suppression and ventilation personnel operated at the front of the structure. This pulled the fire and its products directly on top of the interior personnel.

REMEDY:
Proper coordination and communication between ventilation and fire suppression teams is vital in assuring safety of interior personnel.

2. FACTOR:
Although FFs Webb and Santiago entered as a team, they failed to exit together during FF Santiago's SCBA emergency.

REMEDY:
Fire departments must take all possible measures to ensure that firefighters maintain crew integrity to provide for their safety and to prevent freelancing during fireground operations.

3. FACTOR:
The personnel accountability system utilized by the NFD was not capable of effectively tracking the location, function, and time of personnel operating at the incident scene. Hence, it was not immediately realized that FF Webb was still inside the structure.

REMEDY:
Fire departments shall adopt and utilize a personal accountability system that is compliant with the current Incident Management System (IMS) regulations under N.J.A.C. 5:75. Departments shall further designate personal accountability officers (PAOs) to monitor each entry point into a structure so as to monitor the locations, functions, and times of personnel.

4. FACTOR:
FFs Webb and Santiago failed to monitor their SCBA air supplies, including their low air alarms, if properly working. Furthermore, although FF Webb was equipped with a Personal Alert Safety System (PASS) device, all indications are that he did not activate it prior to entering the structure. It should be noted that his PASS device was not automated; it had to be manually turned "on" by the user.

REMEDY:
Firefighters must continually monitor their SCBA air supply gauges while conducting operations in an IDLH atmosphere; the low air pressure alarm should not be solely relied upon to advise the user when to exit. Additionally, PASS devices must be provided, used, and maintained in accordance with PEOSH regulations under N.J.A.C. 12:100-10 et seq. Although many departments still rely on PASS devices that must be turned "on" manually – devices that are acceptable by PEOSH regulations – they are not ideal because the

firefighter must remember to activate the PASS device. For this reason, fire departments should strongly consider upgrading their SCBA to those employing automatic PASS devices.

4. FACTOR:

Although multiple Thermal Imaging Cameras (TICs) were on scene, there were no indications that any were utilized by personnel during operations, including during the initial search efforts for FF Webb.

REMEDY:

Fire departments that possess TICs should routinely employ the use of them during structural firefighting operations. Furthermore, the TIC should be an integral part of rescue operations, as it can save precious time in locating and removing victims.

5. FACTOR:

A Firefighter Assist and Search Team (FAST) was dispatched and responded upon the receipt of a working fire, however, the FAST personnel had to first obtain a TIC prior to entering the structure to help rescue FF Webb.

REMEDY:

Incident Management System (IMS) regulations under N.J.A.C. 5:75 require that fire departments utilize a FAST to rescue distressed firefighters when operating in a hazardous atmosphere. The FAST members should be properly equipped with any special tools or equipment that may be needed to effectively perform their duties.

6. FACTOR:

The NFD communications system was and still is inadequate, as there is only one radio channel dedicated for all fire department dispatching and operations. Having units dispatched on the same channel as fireground operations can hamper the ability for important messages to be transmitted. Additionally, the NFD's system contains multiple geographic "dead spots" throughout the city, which make radio communications ineffective.

REMEDY:

Incident Management System (IMS) regulations under N.J.A.C. 5:75 require that larger fire departments have a main dispatch channel, as well as several other radio channels to provide for the volume of communications associated with multiple alarm situations or complex incidents.

INVESTIGATION

The New Jersey Division of Fire Safety / Office of the State Fire Marshal was significantly delayed in the issuance of this report due to the Essex County Prosecutor's Office investigation and subsequent criminal case against the landlord of the property for her role in this incident. She was indicted under N.J.S.A. 2C:40-18 "Violation of Laws Intended to Protect Public Health and Safety" in the 2nd Degree. Facing a jail sentence, she eventually pled-down to a 3rd Degree violation. As a result of this plea agreement, she was sentenced on December 19, 2003 to 5 years of probation and was fined $7500.

It should be noted that according to the Essex County Prosecutor's Office, this case marks their second conviction under this Statute. To date, Essex County has been the only county in the State to prosecute for this crime.

The Structure

The structure located at 47 Beaumont Pl. in Newark was a circa-1915 residential occupancy. It was wood-framed construction, 2.5 stories high, with a partially above-grade basement level. Records obtained from the Newark Division of Property Inspections and Enforcement dating back as far as April 1996 indicate multiple code complaints have been made against the property. These records indicate that the basement was converted into a beauty salon, and at least 2 dwelling units; these violations were "abated" in December 1996. It should be noted that the municipal court was required to take action on multiple occasions to gain compliance on these issues. A second complaint came in June 1999, when it was believed that the walk-up attic area was converted into dwelling units. During this complaint inspection, it was found that the home was converted into a "rooming house" with multiple dwelling units in both the attic and again in the basement; there were no supplemental reports provided regarding the abatement / unabatement of these violations.

On the day after this fire incident, an inspection was performed by the Newark Fire Department Division of Fire Prevention and Life Safety. This inspection resulted in the issuance of multiple NJ Uniform Fire Code violations, including deficiencies in: electrical wiring, smoke detectors, corridor doors, combustible storage, and means of egress.

The Incident

On May 22, 2001 at 1600 hours, the Newark Fire Department (NFD) was dispatched to a report of smoke in the area of Montclair and DeGraw Aves. Initial response for the NFD consisted of Engines (E) 13 and 28, Truck (T) 6, and Battalion Chief (BC) 3 (BC-1 also responded due to BC-3 being delayed at headquarters). Shortly after the initial dispatch, it was updated that the smoke was coming from a structural fire on Beaumont Place. Upon confirming the heavy smoke in the area, the incident was upgraded to a full assignment at 1602 hours, which also brought E-9 and E-15, T-7 and T-11, Rescue (R) 1, and Deputy Chief (DC) 1.

> *NOTE: Due to the large amount of responding units, this narrative will concentrate on only those units and/or personnel directly involved with fireground actions surrounding the death of Newark Firefighter Lawrence Webb. This is solely an attempt to avoid confusion while reading this report.*

E-13 and T-6 arrived together at 1604 hours, reporting that the 2.5 story wood-frame residential structure at 47 Beaumont Pl. had fire venting from a window on the upper level of the Division C side.

> *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."*
> - *Continuing in a clockwise rotation, the side adjacent to the Division "B" side shall be designated as Division "C."*
> - *Continuing in a clockwise rotation, the side adjacent to the Division "C" side shall be designated as Division "D."*

E-13 pulled past the structure to give T-6 room to operate their aerial ladder. While E-13 FFs stretched a 1.75" hoseline to the upper floor to initiate an interior fire attack, T-6 pulled up to the Division A / B corner of the structure, and deployed their aerial ladder to the front rooftop which allowed FFs to cut a ventilation hole in the roof. E-28 arrived soon after, laying a 4" supply line from a fire hydrant into E-13. The crew of E-28 stretched another 1.75" hoseline from E-13, advancing it to the upper floor to back-up the crew already inside the structure.

By this time, E-13 FFs Noel Santiago and Lawrence Webb, under the direction of Capt. Albert Mauriello, had already reached the second floor landing with the hoseline. After donning their SCBA masks due to increasing smoke conditions, they proceeded further up the interior stairway and reached the top floor. At this point, they encountered high heat and heavy smoke, but still could not locate any

visible fire. Capt. Mauriello later reported that he stayed in the stairway to monitor conditions and personnel while FFs Santiago and Webb further advanced the hoseline in attempt to locate the fire; he also requested rooftop ventilation due to the poor interior conditions. As the E-28 FFs followed the initial hoseline, both crews operated their lines in attempt to cool high heat they encountered.

During these interior operations, the driver of T-6 along with another firefighter ascended the truck's aerial ladder, and proceeded on the rooftop toward the rear of the structure. They reported encountering deteriorating rooftop conditions toward the rear of the structure, which forced them to retreat toward the aerial ladder to safely cut a roof opening near the front of the structure. They proceeded to cut a 4' by 4' ventilation hole and to break out dormer windows, allowing heat and smoke to escape.

The first NFD supervisory officer, Battalion Chief Cawley (BC-1) arrived on scene at 1610 hours and became the Incident Commander (IC). By this time, interior crews had already been working for approximately 6 minutes. After surveying the scene, BC-1 proceeded into the structure to meet with the interior Captains from E-13 and E-28 for an update; he was advised that 2 lines were in operation on the upper level and that a third line was stretched but uncharged. Additional units began to arrive at the scene, and began conducting various fireground duties. Soon after, BC-1 exited the structure to update and transfer command to Deputy Chief Rydzewski (DC-1), who had also just arrived at the scene.

It is at this point that the details of the incident become increasingly vague, as there were very few radio transmissions, and many conflicting reports as to what exactly happened. Nevertheless, it appears that while continuing to advance the hoseline in search of the fire, FFs Santiago and Webb along with E-28 FFs entered a room. This room was later noted to be at the front end of the structure and less than 4' away from the stairway. As conditions continued to deteriorate, Capt. Mauriello called for the personnel to retreat. At this same time, FF Santiago's SCBA suddenly ran out of air; he yelled to FF Webb to alert him, and then ripped off his mask. As FF Webb pulled him out of the room and pushed him to get out, FF Santiago stumbled down the stairs along with other personnel who were on the stairs. Disoriented, FF Santiago thought that FF Webb had fallen down the stairs with him, but did not see him on the landing. While yelling for FF Webb, he was told by multiple personnel that FF Webb had already exited the structure. Capt. Mauriello then instructed FF Santiago to go outside to find FF Webb. Upon getting outside, FF Santiago soon realized that FF Webb was not yet out of the structure; he frantically ran back inside yelling that FF Webb was not out.

It was at this point that personnel realized that FF Webb was missing, and immediately began rescue operations from both the interior and exterior of the structure. With the crew of R-1 already inside, and the T-11 FAST personnel

mobilizing, FF Webb was quickly located in the front room where he and FF Santiago had been operating. Firefighters removed him to be treated by the waiting EMS personnel on the 2nd floor. Realizing that FF Webb was in cardiac arrest, personnel brought him out to a waiting ambulance for transport to a hospital.

Following FF Webb's removal and transport, the IC pulled all initial companies from the structure, instructing the second alarm companies to continue with the fire suppression operations. The fire was successfully extinguished some time later, but not before personnel received the message that FF Webb had died.

The Casualty Scenario

Firefighter Lawrence Webb was a 36-year-old member of the Newark Fire Department, with 15 years of experience. As previously stated, during interior fire suppression operations, his partner FF Santiago suddenly ran out of air in his SCBA, ripping off his mask. FF Webb pulled him out of the room and pushed him down the stairs to get out of the smoke. It was initially thought that FF Webb had also exited the structure, however they soon realized that he had not. Crews rapidly deployed to rescue FF Webb, and he was quickly located in the front where FF Santiago had last seen him. FF Webb was found face-down, entangled and/or confined by furnishings and debris, with his SCBA mask off and lying next to him on the floor. Personnel immediately pulled FF Webb down to the second floor, where EMS was waiting to assess his condition. In realizing that he was in cardiac arrest, he was removed from the structure and transported to Clara Maas Hospital in Belleville where he was pronounced dead at 1703 hours. An autopsy performed by the NJ Regional Medical Examiner's Office revealed that FF Webb received 3rd degree burns on his right ear, left hand, and right abdomen. However, the cause of his death was listed as "inhalation of products of combustion", due to soot material found throughout his airway.

This incident resulted in two other injuries:

- FF Mustafa Abdul-Haqq of E-28 received a shoulder and knee injury which was tended to at University Hospital in Newark, where he was treated and released.

- FF Noel Santiago received smoke inhalation and suffered chest pains following the removal of his partner. He was also admitted for treatment into University Hospital.

ANALYSIS

Ventilation Factors

Ventilation is the systematic removal of the products of combustion, including heated air, smoke, and gasses from within a structure. It replaces these products with cooler, fresh air which aids interior personnel by decreasing the temperature and improving visibility. However, if not properly performed, ventilation can actually hinder interior operations and endanger personnel, as the fire and its products will move toward the ventilation openings. Typical openings are considered vertical such as roofs, or horizontal such as windows or doors.

During this incident, FFs from T-6 proceeded on the rooftop to cut a ventilation hole over the fire, to the rear of the structure. Due to the poor structural conditions encountered on the roof, they retreated toward the aerial ladder to safely cut a roof opening near the front of the structure. They proceeded to cut a 4' by 4' ventilation hole and to break out dormer windows, allowing heat and smoke to escape. However, this opening caused the fire and its products to follow the path of least resistance, which in this case was directly toward FFs from E-13 and E-28 who were operating at the front of the structure.

As the interior conditions worsened following the ventilation, the crews operated their hoselines in an attempt to cool the air, but the pressure created by the water streams actually caused a draft that pulled the fire and its products toward the personnel. These rapidly worsening conditions occurred at the same time that FF Santiago experienced his SCBA emergency, and possibly contributed to the confusion that followed regarding FF Webb's location.

Crew Integrity

In following the concept of crew integrity, firefighters are paired in teams that enter the hazardous area together, perform their assigned task together and exit together.

During this incident, although FFs Webb and Santiago entered the structure as a team, they failed to exit together during FF Santiago's SCBA emergency. Although FF Webb pushed FF Santiago from the room, there were no indications that FF Webb attempted to follow his partner. Instead, it appears that he remained on the hoseline and continued to operate until the time that he ran out of air. As previously stated, FF Webb was found entangled in furnishings and debris; since he was alone at the time of his death, it is unknown to what extent this entanglement played a part in his failing to exit prior to running out of air.

Personnel Accountability System

A personnel accountability system is utilized to provide the IC with an improved means of tracking the location, function, and time of personnel operating at the incident scene.

During this incident, the NFD utilized a 2-tag accountability system in which the first tag was kept on the apparatus during the shift, and the second tag remained on the firefighter's turnout gear at all times. Although this system can track personnel that are on the incident scene, and which apparatus they responded on, it does not allow for the tracking of their specific location or assignment at an incident scene.

Additionally, the NFD did not designate any accountability officer(s) to monitor the points of entry into the structure. Thus the concept of accountability of personnel location, function, and time was subject to, and did in fact fail. Normally, when operating under an IMS, the IC retains this function if it is not delegated to a subordinate. At this incident, the IC (DC-1) arrived after multiple units were on scene and crews were already working inside the structure. Although he knew which units were on scene, he could not know exactly who was operating or where they were deployed.

Due to this failure in accountability, confusion ensued upon FF Santiago's belief that FF Webb was still inside the structure. Furthermore, interviews revealed that FF Santiago had even been told that FF Webb had exited and was seen outside.

Self-Contained Breathing Apparatus (SCBA) Issues

During this incident, FFs Santiago and Webb were equipped with 4500 psi / "30-minute" SCBAs manufactured by SCOTT Aviation. It should be noted that 30 minutes refers to the theoretical amount of air supply in the tank, however, this amount of can be drastically reduced depending on many factors, including physical exertion, which will exhaust the air supply much sooner.

The SCBAs that FFs Santiago and Webb were wearing were also equipped with two safety devices, a Personal Alert Safety System (PASS), and a low air pressure alarm. A PASS device is designed to assist rescuers in locating a downed or disoriented firefighter even in dense smoke. It is worn on the SCBA or turnout coat, and must be manually or automatically activated prior to entering an atmosphere that is considered Imminently Dangerous to Life & Health (IDLH). Should the firefighter collapse or remain motionless for approximately 30 seconds, the PASS will emit a loud, pulsating shriek. The alarm can also be activated manually if the firefighter becomes endangered and needs assistance. Rescuers will follow the sound to locate the distressed firefighter. The low air pressure alarm is a device that will alarm once the air supply of the SCBA reaches approximately ¼ capacity, alerting the FF to begin exiting the structure

prior to running out of air. During this incident, the NFD used SCBAs with "VibraLert" which causes the regulator attached to the face mask to continually vibrate upon having low air pressure.

An interview of FF Santiago indicated that he did not remember his low air pressure alarm activating, however he suddenly ran out of air and was forced to rapidly retreat from the structure. Minutes later at 1618 hours (14 minutes after E-13 arrived on scene), FF Webb was reported "unaccounted for", and he was rescued within two minutes. Interviews also revealed that during FF Webb's rescue, neither his PASS device nor his low air pressure alarm was sounding.

FF Webb's SCBA was removed inside the structure to aid in his rescue; it was recovered and secured for analysis. Photos of FF Webb's SCBA show that the PASS device was in the "OFF" position, and the air pressure gauge was reading "Empty". This SCBA was sent out for an independent operational test, in which it passed all testing aspects and criteria. An SCBA maintenance log provided by the NFD reported that the last repair to this SCBA was on April 6, 2000. It should be noted that FF Santiago's SCBA was not tested following this incident, therefore it is unknown if he suddenly ran out do to a factor out of his control.

Thermal Imaging Cameras (TICs)

A TIC is a device that translates a thermal picture into an electrical picture and then a visual image for the human eye. This is accomplished because the TIC relies on the thermal energy emitted by all objects and not on reflected visible light, providing vision capability even with no light present. Thermal energy is characterized by its long wavelength, and fortunately for firefighters, the nature of this long wave thermal energy allows it to travel through smoke. The TIC generates a true black and white image; hotter objects appear white and cooler objects appear black to gray. It is this image that allows firefighters to "see" through the smoke, providing a more rapid means of locating victims or hidden areas of fire.

At the time of this incident, the NFD was provided with 16 TICs from a State-funded program; there were TICs on many apparatus at this incident scene. However, at no time did FF interviews reveal that any of the TICs were utilized during this incident. Even the FAST did not initially possess a TIC when deployed to locate FF Webb; a member of the FAST was told to go back to get a TIC before entering the structure.

Firefighter Assist & Search Team (FAST)

During this incident, T-11 was dispatched and responded as the dedicated FAST. Upon arrival, the crew members of T-11 proceeded to the Division A side of the

structure to meet with the IC and await deployment. As previously stated, although members of the FAST quickly entered the structure upon hearing that FF Webb was missing, they first had to obtain a Thermal Imaging Camera (TIC) off one of the apparatus. Interior personnel had already located FF Webb prior to the FAST members getting to the upper floor of the structure.

Communications

This investigation revealed a significant problem with the NFD communications system. At issue is that NFD communications consists of only one dedicated fire department radio frequency, and another secondary frequency that is shared between multiple Newark agencies. This problem was evident in listening to the fireground communications during this incident; as this incident escalated; the dispatch of additional units tied up the frequency, and even cut out attempted fireground communications on multiple instances. Furthermore, a separate incident was dispatched over these operations, and although the separate units were told to utilize the secondary channel, many communicated on the main channel, both tying up the system, and possibly causing confusion on scene. The escalation of this incident alone quickly overburdened the main radio channel, which required the dispatcher to "clear the air" for emergency fireground communications only.

NFD officials have further stated that there are many geographical "dead spots" in the communications system, in which messages can neither be transmitted nor received adequately in various areas of the city. They acknowledge that the communications system is frequently overburdened by radio traffic, and that fireground messages often get cut-out by the dispatch of additional units and/ or multiple incidents occurring simultaneously, which is common in Newark.

Critical Incident Stress Debriefing (CISD) Team Use

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. 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, 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 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.

Immediately following this incident, the NFD contacted a CISD team called the "Phoenix Team" to respond to their fire training academy to be available to assist any FFs who chose to attend on a voluntary basis.

Public Employees Occupational Safety & Health (PEOSH) Inspections

Following this incident, inspections of the NFD were performed by both the NJ Department of Labor (DOL) and the NJ Department of Health (DOH) to determine compliance with PEOSH regulations. A letter sent to the NFD from the NJ DOL indicated that no apparent safety hazards and/or violations were found during their inspection on June 22, 2001. However, on July 20, 2001 the NJ DOH cited the NFD with violations of the PEOSH Respiratory Protection Standard 29CFR1910.134 for failing to provide the following respiratory protection documentation:

- That all employees received a medical evaluation prior to fit testing and the use of a respirator.
- That all employees using a tight-fitting facepiece respirator pass an appropriate fit test.
- That all employees received annual respiratory protection training.

LESSONS LEARNED

Ventilation Factors

The decision to perform ventilation is dependent on several factors which can be determined by the proper coordination and continual communication between the ventilation and fire suppression teams. The factors that must first be determined include:

- *The need for ventilation* – This will be determined by the heat, smoke, and gas conditions experienced by the interior personnel.
- *The location for the ventilation* – Typically, ventilation should be performed as close to the seat of the fire as possible. A hose team must be positioned and ready to attack the seat of the fire in unison with the ventilation. Additionally, interior personnel must be advised of any change in ventilation location or method.
- *The method of ventilation* – The decision to perform vertical or horizontal ventilation (or both) should be made by considering the anticipated effects the ventilation will have on both the fire and the interior personnel.

Crew Integrity

The concept of crew integrity is paramount to ensuring the safety of firefighters and helps to prevent freelancing. Simply stated, firefighters are paired in teams that enter the hazardous area together, perform their assigned task together and exit together. As a team, they formulate tactics that will most efficiently and safely accomplish what is to be done. Through continual training, the concept of crew integrity will become second nature and firefighters will understand that working as an individual is neither desirable nor tolerated.

Fire departments must take all possible measures to maintain crew integrity to prevent freelancing on the incident scene. Company officers and training officers should work within the context of ongoing training programs to create a culture in the department's ranks that freelancing is never acceptable or tolerated. Company officers and safety officers on incident scenes need to be constantly vigilant with respect to crew integrity and immediately intervene if they see that freelancing is occurring.

Accountability System

Although not enforceable at the time of this incident, the regulations for the NJ Personal Accountability System (NJPAS) under N.J.A.C 5:75 require that fre

departments utilize a two-tag accountability system. The first tag is placed by the FF on the responding apparatus, and the second tag is given to a designated accountability officer prior to entering the IDLH. This system includes the use of PARs / roll calls, all within the framework of the IMS that is required to be utilized at all incidents.

The NJPAS is more than simply handing tags to the designated officer. It is also a system that must be based upon communication between crews working inside the structure or hazardous area and company officers and the IC. Interior crews must continually apprise their company officers regarding conditions, location, and what they are doing. At the same time, company officers responsible for crews must solicit information from their crews and pass it along to the IC or planning chief. With proper two-way communication, everyone on the incident scene is cognizant of what each team is doing and generally has a sufficient idea of where they are, therefore lessening the chance of firefighters freelancing.

Currently, this office is working with the NFD to develop an SOG that is compliant with the NJPAS requirements.

Self-Contained Breathing Apparatus (SCBA) Issues

As previously stated, the air supply of an SCBA can be drastically reduced depending on many factors, including physical exertion, which will exhaust the air supply much sooner. In fact, the Philadelphia Fire Department conducted extensive testing in a firefighting skills proficiency course with FFs using SCBA. For the 750 FFs tested, the average air consumption for a SCBA rated for 30 minutes was less than 15 minutes from full tank to low air pressure alarm.

Again, the low air pressure alarm is designed to activate when the air supply reaches approximately ¼ capacity. However, FFs should not rely solely on this alarm to notify them when to exit a hazardous area, as all mechanical devices are subject to failure. Even with proper SCBA maintenance, FFs must periodically monitor their SCBA air pressure gauge during operations.

PASS devices can save lives, however they must be provided, used, and maintained in accordance with PEOSH regulations under N.J.A.C. 12:100-10 et seq. Although newer technology automatically activates an integrated PASS device upon turning-on an SCBA, many departments still rely on PASS devices that must be activated manually. Although these devices are acceptable by NFPA standards, the burden is on the firefighter to remember to activate the PASS device. As is the case with anything else, adding the human factor into the equation increases the chance for error.

Thermal Imaging Cameras (TICs)

Fire departments that possess TICs should routinely employ the use of them during structural firefighting operations. Cameras can also play a vital role during search and rescue operations. While TICs must not replace time-honored skills, they serve as an important tool to make searches for victims more efficient and result in a higher level of safety for firefighters. Just as firefighters equip themselves with a set of irons and flashlight, they must include the TIC in their cadre of tools every time they enter a situation where visibility is reduced. Furthermore, the TIC must be an integral part of rescue operations for lost or trapped firefighters from the inception of the rescue. The TIC can help speed a FAST to the firefighter saving precious time in locating and removing the victim(s).

Fire departments must continually train utilizing their TIC in order for all firefighters to become proficient in its use, to interpret the images it displays and understand its limitations.

Firefighter Assist & Search Team (FAST)

Incident Management System (IMS) regulations under N.J.A.C. 5:75, which adopts the National Fire Protection Association (NFPA) Standard 1561, require fire departments to provide at least two firefighters outside of an atmosphere that is immediately dangerous to life and health (IDLH). These firefighters are tasked with searching for and rescuing lost or trapped firefighters, should the need arise. It is recommended that this concept be taken to a higher level with the establishment of dedicated Firefighter Assist and Search Teams (FAST).

These teams should be specially trained and equipped to deal with rescue of firefighters under the worst possible conditions. The teams can be composed of departmental personnel or mutual aid personnel, however, it is important for the IC to request a FAST as soon as possible after dispatch to allow for the team to arrive quickly. Some fire departments have refined their response plans to dispatch a FAST automatically upon receipt of a report of a working fire.

If this concept is adopted by the fire department, it is crucial that the members of the FAST obtain all necessary training and equipment. Additionally, once on scene, team members should not be utilized for any other tasks. Other fire department members need to be well versed in the duties, responsibilities and operations of the FAST, and what needs to be done by fire crews in support of the team.

Communications

The aforementioned IMS regulations state that a communications system should meet the demands of the fire department for both routine and large-scale emergencies. The regulations further state that larger fire departments *shall* require several additional radio channels (in addition to the main dispatch channel) to provide for the volume of communications associated with multiple alarm situations that can be common in larger municipalities. Additionally, the communications system should be compatible with typical mutual aid departments, and should provide reserve capacity for unusually complex situations.

As previously stated, the communications system utilized by the NFD is significantly deficient in many of the above aspects. It is strongly recommended that the NFD communications system be upgraded to provide a reliable means for their personnel to operate during emergency incidents, as the radio is often the only link between personnel operating inside and outside of a hazardous area or situation.

Critical Incident Stress Debriefing (CISD)

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.

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, there are many CISD team throughout the state, most of which are made up of other public safety individuals. These teams will respond on a 24-hour basis whenever requested.

The statewide emergency contact number for activation of a CISD team is (609) 394-3600. Other numbers, including toll-free may be available on a regional basis.

Firefighter Survival Techniques

Since fire incidents are dynamic events and can change drastically at any given time, it is imperative that firefighters be prepared for dire situations should they occur. No matter how cautious FFs are, conditions can deteriorate rapidly and they can become lost or trapped. With this in mind, fire departments need to train firefighters to deal with situations such as these. Through repetitive training, firefighters can learn such emergency survival techniques as “skip-breathing” to conserve precious air supply, entrapment self-extrication techniques, wall breaching techniques, ladder escape “bail-out” methods and so forth. It is also important that firefighters be equipped with small items such as wire cutters, personal flashlights and personal lengths of rope or nylon webbing.

Firefighters must be taught that if they become lost or trapped the most important thing they can do is notify others of their plight and their best guess of their location. For this reason, every interior crew should be equipped with a portable radio equipped with a sufficient number of operational frequencies as well as a dedicated command frequency. Utilizing their radio, they need to notify the incident commander of their situation using a pre-determined emergency term such as “May-Day.” Additionally, firefighters need to immediately activate their PASS devices manually so as to help rescue crews locate them quickly.

Above all, firefighters must be conditioned to respond to personal emergencies calmly in order to make reasoned decisions. Many times panic takes over and firefighters do things such as removing their masks that hastens their death. It is difficult to simulate a training scenario where a firefighter actually feels his/her life is threatened but creative, realistic and safe training exercises can be developed to help prepare firefighters for dire situations.

CONCLUSION

Due to the fact that Firefighter Lawrence Webb was operating on a hoseline alone at the time of his distress and subsequent death, his actions in the minutes prior to his death can not be directly ascertained. Therefore, it is not possible to determine the factors that contributed to his death.

FF Webb was last seen alive when he pushed his partner, FF Noel Santiago out of the room to escape upon suddenly running out of air. At that time, FF Webb expressed no signs of distress, and he continued operations. Some time followed until it was realized that he was in fact still inside the structure. As previously stated, he was quickly located, however, his SCBA mask was off, he was entangled and/or confined by furnishings and debris, and he was not breathing. Despite immediate EMS care and transport, FF Webb died due to the smoke inhalation he received in the time following FF Santiago's emergency escape.

Although we can only speculate about the factors that directly contributed to his death, we do, however know that certain factors did play a circumstantial role. The following points can be reasoned:

- Ventilation and fire suppression activities at the front of the structure pulled the fire and its products on top of E-13 and E-28 FFs.
- FF Webb should have maintained crew integrity by exiting with FF Santiago.
- Both FFs Webb and Santiago should have better monitored their SCBA air supplies, including their low air alarms if properly working.
- FF Webb should have manually turned "ON" his PASS device prior to entering the structure, and activated it upon coming under distress.
- The NFD's failed personnel accountability provided no way to determine that FF Webb was in fact still inside the structure.
- The NFD communications system possibly hindered the transmission of important interior and/or fireground messages.
- Multiple TICs were on scene, but went unutilized, including initially by the FAST.

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