

Executive Summary

On Wednesday, October 23, 2024, four Delaware firefighters were injured while battling a residential structure fire in Wilmington, Delaware. At 5:04:34 PM, the New Castle County Fireboard dispatched Elsmere Fire Company along with mutual aid fire companies to a residential structure fire located at 113 S. Colonial Avenue Wilmington, Delaware. The responding companies included Elsmere, Cranston Heights, Belvedere, Mill Creek, Five Points, Minquas, and the Wilmington Fire Department. Ladder 17



from the Five Points Fire Company arrived on the scene at 1709 hours. They reported that it was a single-family dwelling with smoke visible and assumed the role of the first due special assignment. According to the New Castle County Fire Chief's policy, first-due special assignments are divided into two categories: inside and outside teams. The inside team is responsible for conducting a primary search, while the outside team provides reports from the Charlie side, handles ventilation, sets up ladders, and secures utilities. Three firefighters from Ladder 17 entered the residence through the front door and began searching the first floor. While doing so, they reported that the sectional sofa was engulfed in flames and began extinguishing with a pressurized water can. Crews from Wilmington Fire Department's Ladder 2, along with Battalion 1, then arrived on the scene. As the firefighters from Ladder 2 approached the structure's front door, it was communicated via radio that there was no hose line available, and they were instructed to exit the residence. Firefighters from the Wilmington Fire Department positioned adjacent to the front door, quickly noticed a change in conditions and began ordering crews out of the structure. Shortly thereafter, the front bay window failed, resulting in a large fireball erupting from the house. This resulted in firefighters not being accounted for and a Mayday was activated. Three firefighters managed to exit the residence, while one firefighter self-extricated through a first-floor window on the delta side. All four firefighters sustained thermal burns and were transported to emergency medical centers for treatment.

Video's

Engine 16 Arriving



Witness Video 1



Witness Video 2



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Contributing Factors

Delay in First Arriving Engine Company Operations - There was a delay in the response of the first arriving engine company. They initially responded to an address that was one block away from the actual fire scene, which caused a setback in stretching and operating the initial handline. This error was quickly recognized by command, and the arriving engine companies were reassigned accordingly. Upon entry, the first arriving special service companies used a 2½-gallon pressurized water extinguisher to suppress the fire on the burning couch. While the extinguisher was effective in knocking down the flames, unburned combustion particles in the overhead area remained preheated. Once oxygen was introduced into the fire building, the firefighters had no effective means to apply a substantial amount of water to lower the heat.

Identification of Flow Paths- Through video and still photographs, it appears that the fire entered a "ventlimited" phase before the fire department's arrival. This occurred because the occupant closed the front door upon exiting the structure. When the available oxygen in the fire compartment becomes limited, the combustion process cannot be completed. This creates a higher volume of unburned combustion particles (smoke) that accumulate in the compartment due to insufficient oxygen. The first arriving firefighters entered the structure through the front door to locate and assess the fire's extent and to search for any trapped victims. Unfortunately, the front door was not closed behind the crew when they entered. This allowed oxygen to enter the previously oxygen-deficient space. The introduction of oxygen caused the fire to intensify rapidly, igniting the unburned combustion particles that had collected throughout the compartment.

Key Recommendations

Recommendation 1: When entering a preheated fire compartment, it is important to make sure that door control is maintained at the point of entry so that air flow does not create a flow path to the preheated fuel in the room or building.

In a structure fire, the floor plan and openings within the structure determine the available flow path. For example, hot gasses from a fire in a bedroom will travel out the doorway and into a hallway if the door is open. If other doors in the structure are also open, the adjoining rooms also become possible parts of the flow path. The pressure in these other rooms is lower than the pressure in the fire rooms; therefore, hot fire gases and smoke will travel through those areas unless the direction of flow is altered, for example, through tactical ventilation or door control. Air in those rooms will entrain toward the fire as the structure fills with fuel gases and the fire grows and spreads. [International Fire Service Training Association IFSTA, Essentials of Fire Fighting, 7, CH 4, Fire Dynamics]



Recommendation 2: Flow Path Control.

Controlling available flow paths can be as simple as keeping an exterior door closed until a charged line is in place or as complex as performing vertical ventilation. However, even with coordinated tactical ventilation, there will be an increase in the combustion rate when the fire is ventilation-limited until water is applied to cool the fire gases. To control the flow path, firefighters can be positioned at the doors that the crew passes through along their entry path, Normally, this is just the entry door in residential fires. Their role would be to close any doors as much as the hose line in use will allow. Additionally, these personnel can help pull additional hose-line deeper into the structure or shift it around, if necessary.

- Keeping exterior doors closed until a charged line is in place.
- Positioning firefighters to close doors along the entry path.
- A firefighter may be stationed at a door to control the flow path. (When Personnel permits)



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Introduction

On Wednesday, October 23, 2024, the Delaware State Fire Commission was notified by New Castle County (Fireboard) Communications that the Elsmere Fire Company experienced a Mayday during a structure fire. Four firefighters were transported to a local emergency department for injuries. Members of the Fire Commission's F.I.R.E Team responded to the scene of the incident. Investigators documented the scene by taking ground and aerial photographs. During the investigation, investigators interviewed both the injured firefighters and several other personnel. Investigators reviewed the following documents: New Castle County (Fireboard) CAD report, radio transmissions, fire school training transcripts, medical reports, and video footage from helmet cameras. The focus of this report is to determine the following: the root causes of the firefighter injury, if current training standards were followed by the firefighter(s); if the proper protective equipment including SCBA was utilized, and whether there was a command-and-control function.

Fire Department (Departments listed are from injured personel)

Five Points Fire Company is a combination fire company located in New Castle County, Delaware. The company is staffed 24/7 with a minimum of 2 part-time EMTs, 1 full-time firefighter/EMT, and 3 part-time firefighters, in addition to support from volunteer members.

The fire company operates the following equipment: - 2 Basic Life Support (BLS) ambulances (1 frontline, 1 reserve) - 1 fire engine (750 gallons per minute pump capacity, 2000-gallon water tank) - 1 squad (1000 gallons per minute pump capacity, 2000-gallon water tank) - 1 tractor-drawn aerial (specifications: N/A, N/A, 100 feet) - 1 Gator UTV equipped with a pump - 1 utility vehicle - 2 command vehicles

Annually, Five Points Fire Company averages approximately 1,000 fire calls and 1,800 EMS runs within the county and the city of Wilmington. The company is responsible for a primary response area of 2 square miles, as well as providing mutual aid to other areas in New Castle County.

Training and Experience

The state of Delaware has the following requirements for volunteer firefighters. These requirements must be completed before an individual is allowed to participate in emergency responses and incident scene operations. Delaware Fire Regulations, Chapter 7, 1.0, minimum training requirements require the following training.

• Minimum training is required to ensure firefighters can safely and adequately perform functions at emergency scene operations. Fire Companies are required to track and maintain training records for all members. Members shall only be assigned duties commensurate with their training.

• For members to perform independently or as a part of a team, they must have completed the Delaware State Fire School curriculum or an approved equivalent training of basic fire skills, structural skills, hazmat response skills, and vehicle rescue.

• Members not yet trained at these levels must be closely supervised by trained members when operating at scenes. Members who are not trained in structural fire skills shall not be assigned interior duties at structural fires and may only participate as support personnel.

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• Sufficient equivalency of training shall be determined by the Commission through the Director of the Delaware State Fire School (DSFS).

The Delaware State Fire School offers 16 different certifications through the National Board on Fire Service Professional Qualifications (Pro-Board) and the International Fire Service Accreditation Congress (IFSAC).

The following are Pro Board certifications for firefighters and fire officers:

DELAWARE FIRE FIGHTER I

- Basic Firefighting Skills (36 hours) or Fire I
- Structural Firefighting Skills (24 hours) or Fire II
- Hazardous Materials Response Skills or Fire II or Hazardous Materials I or II
- Fire Fighter Self-Survival
- Vehicle Rescue Fire Fighter First Aid or Emergency Medical Technician (EMT)
- Or Pro-Board/IFSAC Fire Fighter I plus EMT

DELAWARE FIREFIGHTER II • Delaware Fire Fighter I PLUS • Firefighting Foam

- Rope Rescue I or Ropes and Rigging
- Arson Awareness or National Fire Academy's, Arson Detection for the First Responder
- Rapid Intervention Training Introduction

• Crew Leader or Fire III AND • 4 Electives from list or Pro-Board/IFSAC – Fire Fighter II plus Crew Leader and 4 electives.

DELAWARE FIRE OFFICER LEVEL I

- Delaware Fire Fighter II PLUS
- Emergency Vehicle Operator (EVO)
- Driver Operator or Pumps
- DSFS Fire Officer I Course or Company Officer Course / Skills or Strategy AND

3 Electives from list or Pro-Board/IFSAC – Fire Officer I plus EVO and 3 electives

DELAWARE FIRE OFFICER LEVEL II

• Delaware Fire Officer Level I

DELAWARE ADMINISTRATIVE OFFICER I

- NFA Leadership I
- NFA Leadership II
- NFA Leadership III AND
- 4 Electives from any list of electives

APPARATUS OPERATOR I

- Delaware Fire Fighter I or Introduction to Emergency Services
- DSFS Driver Operator Course
- Emergency Vehicle Operator Course
- Emergency Vehicle Operator Competency Course
- A 36-year-old firefighter from Five Points Fire Company had the following training through Delaware State Fire School.
 - Basic Firefighting Skill
 - Structural Firefighting Skills
 - o Vehicle Rescue
 - o Hazardous Materials Response Skills
 - o Numerous firefighting and EMS continuing education training

The firefighter met the minimum training standards to perform the task he was completing when injured.

- The 25-year-old injured firefighter from Five Points Fire Company had the following training through Delaware State Fire School.
 - Basic Firefighting Skills
 - Structural Firefighting Skills
 - Vehicle Rescue

The firefighter met the minimum training standards to perform the task he was completing when injured.

- The 23-year-old injured firefighter from Five Points Fire Company has the following training through the Delaware State Fire School.
 - Basic Firefighting Skills
 - Structural Firefighting
 - o Hazardous Material Response Skills incomplete
 - Vehicle Rescue
 - o Driver Operator

- The 52-year-old injured firefighter from the City of Wilmington Fire Company had the following training through the Delaware State Fire School.
 - Basic Firefighting Skills
 - o Structural Firefighting Skills
 - o Vehicle Rescue
 - o Hazardous Material Response Skills
 - o Numerous firefighting and EMS continuing education training

The firefighter met the minimum training standards to perform the task he was completing when injured.

Medical Findings

Three Five Points Fire Company firefighters were transported to Christiana Care Hospital for thermal burn injuries to the shoulder, neck, and face area. One Wilmington firefighter was transported to Christiana Care Hospital with thermal burns to the hand and face. All were treated and released from the hospital.

Structure

The building is a Type III Construction, Colonial-style residence located at 113 Colonial Drive, Wilmington,

Delaware. Built in 1950, this two-story structure is approximately 1,200 square feet and contains six rooms,

including three bedrooms and one full bathroom. The exterior features brick walls and a flat roof made of

compressed wood, and it has an unfinished basement. Although the residence is not equipped with an automatic fire sprinkler system, it was reported that a smoke detector was installed on the second floor of the residence.





Image 1 -113 S. Colonial Ave.-Alpha Side

Image 2 -113 S. Colonial Ave. - Charlie Side

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Image 3 -113 S. Colonial Ave. - Delta Side



Image 5 – Alpha Side



Image 4 -113 S. Colonial Ave. -Bravo Side



Image 6 – Alpha Side



Image 7 – Delta Side



Image 8 – Bravo Side



Image 8 – Charlie Side

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Google 3D View of 113 Colonial Ave





Colonial Avenue





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Explore 3D Space of 113 Colonial Avenue by Matterport

(Click the link or copy-paste)



https://my.matterport.com/models/byd6Y46o3uj

Weather Conditions

Underground weather recorded the following observations.

11:51 AM	74 °F	50 °F	43 %	WNW	13 mph	20 mph	29.71 in	0.0 in	Mostly Cloudy
12:51 PM	77 °F	50 °F	39 %	WSW	14 mph	0 mph	29.68 in	0.0 in	Partly Cloudy
1:51 PM	78 °F	50 °F	37 %	W	16 mph	23 mph	29.66 in	0.0 in	Partly Cloudy
2:51 PM	76 °F	50 °F	40 %	WSW	15 mph	21 mph	29.65 in	0.0 in	Cloudy
3:51 PM	77 °F	50 °F	39 %	WSW	9 mph	0 mph	29.63 in	0.0 in	Mostly Cloudy
4:51 PM	79 °F	50 °F	36 %	W	9 mph	0 mph	29.63 in	0.0 in	Fair
5:51 PM	77 °F	49 °F	37 %	SSW	9 mph	0 mph	29.63 in	0.0 in	Partly Cloudy

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Were Current Training and Standards Used

The Delaware State Fire School, in conjunction with the International Fire Service Training Association's Essentials of Fire Fighting, 7th Edition, offers a comprehensive study of fire attack strategies, ventilation techniques, and the crucial importance of controlling flow paths during fire incidents. The Delaware State Fire School teaches these concepts through a combination of classroom instruction and practical applications of firefighting techniques. As part of the hands-on training, scenarios are set up in which the Truck Company arrives before the Engine Company. This allows firefighters to practice how to safely conduct searches ahead of a hose line. In interviews, all injured firefighters reported that they had completed the Delaware State Fire School Phase V training or received equivalent training from other institutions. Each firefighter acknowledged that this training enabled them to recognize changing heat conditions and respond effectively to those changes.

Chapter 10 of the International Fire Service Training Association (IFSTA) 7th Edition, titled "Recognition and Avoidance of Hazards - Air Emergencies," underscores the importance of being ready for the possibility of a facepiece being dislodged. The best way to prepare for such a scenario is to participate in a Firefighter Survival Class and engage in practice within a safe training environment.

Was Proper Protective Gear Used (PPE)

The personal protective equipment (PPE) used by the affected firefighters was examined by the investigative team. The PPE sustained thermal damage due to the intense heat of the incident. Firefighters involved in the injury were equipped with full personal protective gear and self-contained breathing apparatus (SCBA).

The SCBA worn by the Wilmington firefighter showed thermal damage in several areas, including both right and left shoulder straps, the cylinder guard, the carrier, the hose tether, the shoulder strap pull, and the cylinder gauge. Additionally, the PPE assigned to the firefighters from the Five Points Fire Company, along with their SCBA, was sent to the distributors for thorough inspection. The inspection report is attached for your review.

All PPE examined met the standards set by the National Fire Protection Association (NFPA) 1971, which outlines the requirements for protective ensembles for structural firefighting and proximity firefighting.

FIVE POINTS GEAR | SET ONE

23-year-old Firefighter from Five Points Fire Company









Image 9 – SCBA Face Piece

Image 10- Sta 17 Back of Jacket

Image 11- Back of Nomex Hood Image 12 - Front view of Nomex Hood









Image 13 - Top view of Helmet

Image 14- Front/Side View

Image 15- Top View SCBA

Image 16 - Top/Side View SCBA

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FIVE POINTS GEAR | SET TWO

36-Year-old Firefighter from Five Points Fire Company



Image 17 – Side View of Helmet



Image 18 – Left Sleeve and Back Image



Image 19- SCBA Face Piece



Image 20 - Right Shoulder/Sleeve View



Image 20- Right Lower Jacket View w/Equipment

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Five Points Gear/Set Three

25-year-old Firefighter from Five Points Fire Company



Pic 21 - Left Side View Pic 22 - Right Side View Pic 23 - Back of Coat & Front Pants Pic 24 - SCBA & Hardness



Pic 25- SCBA Mask



 $Pic\ 26-Radio,$ Holder and Back of Coat

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Wilmington Fire Department

52-year-old Firefighter from Wilmington Fire Department









Image 27 - Front/Side View

Image 28- Inside View of Helmet Image 29 -Back View of Jacket Image 30 - Back View with Sleeves



Image 31- Back Right Shoulder View



Image 32- Back Right Arm Sleeve View



Image 33 - Manufacture Date



Image 34- Top View of Gloves Worn



Image 35- Inside View of Gloves Worn



Image 36- Back View SCBA Worn

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Image 37- Right Side View SCBA Image 38- Top/Back View of SCBA Image 39- Harness Bracket View Image 40- SCBA Gauge View

Root Cause of Injury

Firefighters entered a fire compartment that had progressed from the incipient stage to the free-burning stage and then to the smoldering stage by the time they arrived. All the fuel sources within the room had been preheated to their ignition temperatures, and the only missing element was oxygen. Just inside the front door (the A side) was a sofa that was reportedly on fire. Video evidence collected for the investigation indicates that the front glass storm door remained open while the firefighters prepared to enter.

This front door acted as a ventilation opening, allowing air from outside to enter easily. The preheated sofa was located just to the right of the doorway, meaning that the incoming air did not have to travel far before mixing with it, which could potentially cause the sofa to reignite.

Inside the residence, firefighters reported that conditions changed rapidly, and they felt an immense amount of heat through their gear, which resulted in thermal burns. Hence, firefighters should maintain control of the entry door when entering a burning building to reduce airflow into the fire area. During the investigation, it was suggested that a firefighter might have ventilated a window; however, based on interviews, photographs, body camera footage, and surveillance footage, there is no evidence to support this claim.

Was Proper Command Structure Utilized

Investigation revealed that there was a command-and-control structure utilized. Responding units followed the New Castle County Fire Chiefs' arrival assignments for the incident.

Was there a Command-and-Control Function

The investigation revealed the presence of a command-and-control function. The first engines arrived at an incorrect address, but the incident commander quickly corrected this error. The incident commander then began reassigning engine units to adjust for the location of the first arriving engine.

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References

- New Castle County Fireboard Report. (CAD)
- New Castle County Fireboard Radio Transmissions
- Photographs/Videos-Various Sources
- New Castle County Tax Map <u>New Castle County, DE Parcel # 0803010099 (newcastlede.gov)</u>
- Delaware State Fire School Training Records and Curriculum <u>State Fire School State of Delaware Welcome</u> to the Website for the Delaware State Fire School - Excellence Through Training
- Google Maps https://www.google.com/maps
- Incident Command System 300 Manual https://www.usda.gov/sites/default/files/documents/ICS300.pdf
- NFPA NFPA LiNK® 2020 NFPA-1561 Chapter 5 Functions and Structure of Command
- NFPA <u>NFPA LiNK® 2024 NFPA-1026 Chapter 4 Incident Commander</u>
- Underground Weather -<u>Weather History & Data Archive | Weather Underground</u>
- IFSTA 7th Edition -<u>Essentials of Fire Fighting</u>, 7th Edition | IFSTA

The objectives of the Delaware State Fire Prevention Commission are to protect the public, specifically, those persons who are the direct recipients of services regulated by this chapter, from unsafe practices. The State Fire Commission shall have the power to investigate injuries to firefighters sustained in the line of duty and issue reports of its findings and conclusions concerning such investigations. The Commission established an investigative team for those purposes known as Firefighter-Investigative-Review-Education ("The F.I.R.E. Team"). The F.I.R.E Team works in conjunction with the Delaware State Fire Commission Investigators, Delaware State Fire School, Delaware State Fire Marshal's Office, and other necessary agencies that may be needed to complete such investigation.

The program does not seek to determine fault or place blame for the injuries. Rather, the purpose is to determine factors that cause or contribute to firefighter deaths and or injuries sustained in the line of duty. Identification of cause and contributing factors enables researchers and safety specialists to develop strategies to prevent future similar incidents. This report represents a review of the situation at issue and a path forward toward safer practices for Delaware. This report is limited by the information known to the F.I.R.E. Team.

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