



PRINCE GEORGE'S COUNTY, MARYLAND
FIRE/EMS DEPARTMENT



Investigative Report House Fire with Subsequent Injuries 87 Herrington Drive



Wednesday, April 8, 2009
Box 4601

Investigative Report 87 Herrington Drive

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Introduction

On April 8, 2009 a Prince George's County Fire/EMS Department (PGCF/EMSD) fire fighter was seriously injured during firefighting operations at a residential structural fire. The 22-year old male career fire fighter received injuries, including respiratory burns, while attempting to exit the single family dwelling. He fell unconscious, was rescued by fellow fire fighters, and transported by paramedics to a local burn center medical facility where he received extensive inpatient critical care treatment. Two additional fire fighters, one career and one volunteer, received less severe burn injuries during the course of the incident which required treatment at the local burn center medical facility.

The PGCF/EMSD, under the direction of Fire Chief Eugene Jones, formed a Safety and Investigations Team (SIT) to examine the circumstances surrounding this injury. The responsibilities of the SIT included collecting and reviewing information on the incident, developing reports on causal factors, and making recommendations for policy and procedural changes intended to reduce the possibility of future occurrences.

The SIT was made up of the following personnel:

Jerome LaMoria, Major, Emergency Operations Command, SIT Leader
Sayshan Conver-White, Battalion Chief, Operational Safety Office
Joseph Cardello, A/Battalion Chief, Operational Safety Office
Paul Gomez, A/Battalion Chief, Fire Investigations
Scot Williams, Captain, Operational Safety Office
Fred Haas, Captain, Operational Safety Office
John Thompson, Captain, Operational Safety Office
Ernest Hughes, Captain, Advanced Emergency Medical Services
Robert Wells, Volunteer Safety Officer
William Corrigan, Volunteer Safety Officer
Bradley Keith, Volunteer Safety Officer
Alan Doubleday, Lieutenant, Fire and EMS Training Academy
Binokar Harris, Fire fighter, Fire and EMS Training Academy
Andrew Pantelis, Union Representative, Local 1619
Israel Tabak, Union Representative, Local 1619

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As a part of the investigation, the SIT conducted interviews with responding fire fighters and officers, reviewed written witness statements, examined photographs of the incident scene and analyzed dispatch transcriptions and audio recordings. A review of departmental Standard Operating Procedures (SOP's) and the training records for responding personnel was conducted. An extensive examination of the Personal Protective Equipment (PPE) related to the injuries was completed.

Key contributing factors identified in this investigation include failure to establish an initial water supply, incomplete size-up reports, improper tactics, lack of company level supervision, lack of effective crew integrity, inadequate communication on the fire ground, failure to provide adequate ventilation and lack of training and experience in fire fighter survival skills.

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Investigation

On Wednesday April 8th, 2009 at 02:01:18 hours, Prince George's County Public Safety Communications (PSC) received an emergency 911 call reporting a house fire at 87 Herrington Drive in the Kettering section of Largo, Maryland. Three additional 911 calls were received within the following three minutes indicating a house on fire.

The fire had originated in an automobile in an attached carport of a single family detached house. The fire extended to the interior of the house through a wooden exterior door leading from the dining area into the carport. Additionally, fire had spread to the roof structure of the carport and was extending into the second floor of the home. The fire was later determined to be the result of arson by Fire Investigators from the PGCF/EMSD Fire Marshalls Office.

Box Alarm 46-01, consisting of four engine companies, two truck companies, a rescue squad and a command officer was dispatched at 02:01:55 hours over PSC fire channel 1. The command officer dispatched was the Career Departmental Duty Chief who was covering for the first due battalion chief. In addition, the volunteer chief and volunteer deputy chief for the first due company also responded on the call. The volunteer chief and deputy chief responded from the station of the third due engine and the rescue squad, which is the "main" station for the volunteer corporation.

The house at 87 Herrington Drive is located on the southwest corner of the intersection of Herrington and Joyceton Drive. The structure is a two story, with a basement, single family dwelling of ordinary wood and masonry construction. The structure includes a porch roof that spans the exterior of the A quadrant on side Alpha and an attached carport on side Bravo. The structure has no other unusual features, does not have security bars on the windows, and has four doorways for entry and egress.

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At 02:03:20, a roll call was announced on PSC fire channel four and the staffing levels were reported as the following:

First due engine – six personnel

Second due engine – four personnel

Third due engine – five personnel

Fourth due engine – five personnel

First due truck – four personnel

Second due truck – five personnel

Rescue squad – five personnel

At the conclusion of the roll call, PSC advised the first due engine and units responding that they had received supplemental information that indicated a car was on fire next to the house.

The staffing for the first due engine consisted of a career lieutenant, career driver, two career fire fighters and two volunteer fire fighters. The running route utilized was as follows: left on Campus Way South, a right on Central Avenue, a right on Kettering drive, right on Joyceton Drive to the intersection of Herrington Drive. It was reported that this running route was commonly utilized due to speed bumps on Joyceton Drive.

At 02:06:24, the first due engine reported on the scene and advised that they were “split laying at the intersection of Joyceton and Herrington.” The initial scene size-up report provided was “a single family, a car on the carport, holding all units.” The officer initially established the command but quickly transmitted that he was passing command. PSC repeated the size up and layout instructions on fire channel four. The second due engine acknowledged the layout instructions at 02:07:13.

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The first due engine driver positioned the apparatus on side Alpha of the address and hand-jacked a single three-inch supply line approximately one hundred feet to the intersection. The first due engine officer directed a career fire fighter (fire fighter 1) and a volunteer fire fighter (fire fighter 3) to advance a two hundred foot, one and three-quarter inch attack line with an automatic fog nozzle to the front door of the house on side Alpha. The second career fire fighter (fire fighter 2) proceeded to the front door to complete forcible entry into the structure. While this was occurring, the officer and the second volunteer fire fighter (fire fighter 4) advanced a one hundred foot, one and three-quarter inch trash line with an automatic fog nozzle to the carport and initiated a fire attack onto the car fire. The officer operated the nozzle with fire fighter 4 backing him up.

On side Alpha of the structure, fire fighter 2 found the screen door closed; however, the main front door was partially ajar. The crew donned their Self Contained Breathing Apparatus (SCBA) face pieces. Fire fighter 2 opened and chocked the screen door. Fire fighter 1 bled the air from the hose line, and advanced through the front door, straight down the hallway adjacent to the stairs, and into the kitchen area. Fire fighter 3 followed and assumed the position of back-up while fire fighter 2 performed a brief search in the area surrounding the doorway prior to joining the remainder of the interior crew.

The first due engine driver reported that heavy black smoke was issuing from the front door and verbally reported to the officer that he believed the fire had extended into the house. The first due engine officer relinquished the trash line to fire fighter 4 and instructed him to continue attacking the car fire. The first due engine officer donned his SCBA and entered the house to join his crew on the interior of the house. Fire fighter 4 assumed control of the nozzle and continued to attack the car fire from the Side Bravo/Alpha corner of the structure.

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At 02:07:55, the volunteer chief and volunteer deputy chief arrived on the scene. The Incident Command System (ICS) was established by the volunteer chief and the command post was established at his vehicle on side Alpha. The volunteer deputy chief was assigned as the Division 1 Supervisor. The working fire dispatch was requested by command which added an ambulance, medic unit, EMS officer and safety officer.

As the interior crew from the first due engine advanced the hose line, they encountered heavy smoke conditions. Additionally, they observed fire in what they believed to be the upstairs as they passed through the interior hallway. Visibility was extremely poor, and personnel reported difficulty in identifying the interior floor plan and associated furnishings.

The first due engine officer entered the structure to join the interior hose line crew. He reported that he observed fire fighter 1 turn left into the kitchen and then lost sight of him. However, he could still see the two remaining crew members. The officer also reported encountering low visibility as a result of heavy black smoke throughout the structure.

Fire fighter 1 reported encountering visible fire upon entering the kitchen and initiated fire attack in this area. Fire fighter 1 stated that when he initially opened the nozzle, the pressure seemed insufficient to the point that "...it felt like the nozzle would fold back against the hose." Fire fighter 3 heard fire fighter 1 calling for more water, but stated the hose still felt charged. Fire fighter 1 continued to operate the hose line despite believing that pressure and flow were inadequate.

Shortly after initiating the fire attack, the interior crew members reported hearing glass crashing and felt debris falling which they believe to be a portion of the ceiling. Crew members further reported a significant increase in heat and rapid deterioration of fire conditions. Fire fighter 1, on the nozzle, and fire fighter 3, closest to him, both reported being struck by a large,

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heavy object which they believed to be the ceiling falling. The crew members became disoriented and temporarily separated from each other when the ceiling, or object, came down.

Fire fighter 1 stated he rapidly stood up to exit and informed a crew member behind him, who he believed was fire fighter 2, “it was time to get out of the house”. He then moved in a fully standing position towards what he believed was the exit. Fire fighter 3 reported seeing fire fighter 1 stand up and move to fire fighter 3’s right. Fire fighter 3 hears fire fighter 1 but does not understand him, nor did he realize that anything was wrong.

Fire fighter 1 left contact with the attack line and frantically searched for an exit. In the process he passed beside an outward opening glass door which leads to the basement. After passing the door way he felt a brick wall with his right hand. Feeling the brick led him to believe that he was outside of the structure and he proceeded to remove his helmet, hood, and SCBA face mask, which was now encased in thick black soot. Immediately inhaling smoke, he realized that he was still inside the structure but was unable to re-don his SCBA face mask and PPE. Recognizing that he was in distress, fire fighter 1 called verbally for help prior to losing consciousness as a result of inhaling carbon monoxide and other toxic byproducts of combustion. It is believed that fire fighter 1 frantically moved around the family room, dislodging items of furniture searching for an emergency exit prior to losing consciousness.

The officer of the first due engine reached the kitchen area and encountered near total fire involvement of this area. He reported hearing an audible PASS alarm from an area behind him and conducted a brief search but was unable to locate the source. He then returned to the last known location of his interior crew at the hoseline in the kitchen.

The officer made contact with fire fighter 2 who is operating the nozzle. Fire fighter 2 advised the officer that she felt like she had been burned. The officer takes control of the nozzle

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and instructs fire fighter 2 and fire fighter 3 to follow the line out. The officer continues to flow the line while they exit and then made his way out himself.

The arrival of the second due engine is not recorded but is reported to be about the same time as the third due engine was laying out their supply line at approximately 02:09. The crew consisted of four volunteer fire fighters and was commanded by a volunteer lieutenant. The running route was from Central Avenue to a right on Kettering Drive and south on Herrington Drive to the intersection of Joyceton Drive, with the first due engines supply line layout in front of them. The closest available hydrant listed on the map page is behind them at 78 Herrington Drive. This necessitates turning the apparatus around in the intersection, connecting the split lay and completing the lay to the hydrant approximately three hundred feet away.

Command directs the second due engine to advance a back-up line to division 1. The crew pulls a four hundred foot attack line from the first due engine which is broken down to two hundred foot with the assistance of the driver of the first due engine. This line is utilized to extinguish fire on division 1, the exterior of side Charlie and mop-up operations in the car port.

The rescue squad responded with a crew of four volunteers, commanded by a volunteer lieutenant. This unit responded from the same station as the third due engine and was the first special service¹ to arrive. They were assigned first due special service responsibilities (first due truck) by Command. The officer and one fire fighter entered the structure through the Side Alpha entrance. They initiated a left hand search through the A quadrant into the B quadrant where the team encountered high heat and low visibility. The driver of the rescue squad, along with another

¹ Special Service is a term which is synonymous for truck companies and rescue squad companies and their assigned emergency scene duties.

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fire fighter formed an exterior team and supplied ground ladders and exterior ventilation on sides Charlie and Delta.

The third due engine laid a single three inch supply line from the hydrant at 11000 Joyceton Drive and positioned on side Delta. A two hundred and fifty foot, one and a half inch attack line was advanced to side Charlie and the officer reported to Command “fire showing on side Charlie”. Command requested them to check the basement level. The line is advanced through an exterior basement door. The officer reported light smoke conditions and no fire in the basement. He directs the line to be advanced to the first floor. The line is used to suppress fire on the first floor and later is advanced to the second floor to extinguish extension there.

The fourth due engine picked up the supply line of the third due engine and was instructed by Command to run another attack line to side Charlie.

The first arriving truck was directed by Command to assist on Division 1 with “opening up” and ventilation.

In the intervening time, the officer of the rescue squad and the interior fire fighter from the rescue squad encountered an unstaffed hose line in the area of their search. The officer directed the fire fighter from his crew to operate the hose line to support the search and the officer continued his search. The Division 1 supervisor met the two members of the rescue squad, on the interior, as this occurred.

Both the officer of the rescue squad and the Division 1 supervisor reported hearing the sound of a PASS device. The Division 1 supervisor searched the immediate area thinking the alarm was inadvertent and the result of a member not resetting their PASS. The officer of the rescue squad followed the sound of the PASS device and located the injured fire fighter in quadrant D near a window on side Delta. The fire fighter was found unresponsive with his

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helmet, SCBA facepiece, hood and gloves removed. The officer cleared the remaining glass from the window and made face-to-face contact with the driver of the rescue squad who was on a ladder at the window. The officer of the rescue squad informed the driver of the downed fire fighter and instructed him to radio a MAYDAY to Command.

Command acknowledged the MAYDAY, which was transmitted over non-repeated mode and never heard by the PSC dispatcher. Command initiated the MAYDAY procedure, and repeated the information from the rescue squad driver. PSC acknowledged Command's MAYDAY and mistakenly sounded the evacuation tone instead of the MAYDAY tone. In addition, PSC repeated information about the MAYDAY, which was inaccurate and gave the wrong location.

Partial transcript of fire ground audio:

02:13:26 Command says to an unknown unit: "I copy the Mayday can you remove the fire fighter?"

02:13:34-02:13:50 Command gives the following message. "Command to communications and units on the fire ground, Mayday, Mayday, Mayday, Division 1 quadrant D fire fighter down, reported by SQ833 being removed at this time". Command to TK805 did you copy?

02:13:58 Command asks PSC did you copy the Mayday?

02:14:00 PSC dispatcher advised he copied the message and gave out the evacuation tones and announced "attention units operating 87 Herrington Dr the Mayday has been sounded quadrant A Division 1 Squad 33 member."

02:14:31 Command asked SQ833 for a LUNAR report

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02:15:26 E833 advises command the fire fighter is coming out the window and to send EMS.

02:15:48 Command advised that MD846 was pulling up now and to report to side Delta.

02:16:14 TK826 arrives on the scene to assist the downed fire fighter and to assume RIC

The injured fire fighter is removed, by way of the window on side Delta, and down a ground ladder. He is reported to be unconscious during his removal but regained an altered level of consciousness once on the ground. The EMS units dispatched on the working fire dispatch, along with the EMS supervisor arrived on the scene as the fire fighter was removed. EMS care was started immediately followed with rapid transport to the Washington Hospital Burn Center.

The second due truck arrived on the scene as the fire fighter was removed down the ground ladder. Command directed them to assist with the injured fire fighter and to assume the rapid intervention (RIC) group.

While the fire fighter was being removed, the driver of the first due engine reported to command that he was out of water and needed his supply line charged. Command requested the second due engine to charge the line as soon as possible.

Command completed a personnel accountability report (PAR) of the units and the MAYDAY was cleared. Units were redeployed to finish extinguishment.

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Overview of Injuries

This incident resulted in injuries to three members of the first due engine company. The most seriously injured member was a career fire fighter who received significant first and second degree burns to the entire face and neck area accompanied by respiratory burns extending down the bronchus to the lung tissue. He also received small burns to both hands. The extent of his injuries was life threatening and required an extended stay at the Washington Hospital Burn Center along with extended rehabilitative care.

The two other members, one career and one volunteer fire fighter, both received first and second degree burns to their ears. Their burns were of a much smaller scale than of the other injured fire fighter. Those members were both treated and released with follow-up burn care at the Washington Hospital Burn Center.

How the injuries occurred

All three of the injuries were received while operating the first attack hose line in the kitchen area, on the first floor of the home. The crew from the first engine encountered a rapidly extending fire, zero visibility, and extreme heat. Through careful examination of the area it is believed that the fire reached what is commonly referred to as “impending flashover” or “roll-over”.

The charring at the ceiling level indicates that the carbon laden products of combustion ignited at the ceiling level. This produced an extreme fire condition in the area the fire fighters were operating. The extreme condition was exacerbated by the incomplete products of combustion from the burning auto and limited ventilation of the fire structure during the initial phase of operations.

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The most seriously injured fire fighter was struck by an object, which is believed to be a ceiling fan, and became disoriented in the high heat and zero visibility. By his own account, he stood completely upright and attempted to find the exit. It is most likely that this is the point he received the burns to his face, neck and to some degree his respiratory track.

The injured fire fighter abandoned contact with the hose line and remembers verbally informing a crew member behind him, who he believed was fire fighter 2, that it was time to get out. In searching for the exit, the injured and disoriented fire fighter enters a small hallway that leads past the interior steps to the basement and into a family room in quadrant(s) C/D (see figure 12). The door to the basement steps is in an open position which partially blocks entry into the family room. The door is an exterior style door with a full panel of glass and is misidentified as the exterior door on side Alpha (see figure 11). Once he enters the family room, immediately to his right is a brick fireplace which he believes is the outside wall. Believing he is outside on the front porch, he proceeded to remove his helmet, mask and hood.

Hand prints and sweep marks on the walls suggest the fire fighter searched frantically for an exit along the fireplace surface and along the walls on sides Alpha and Delta. Marks on the walls indicate that the fire fighter was within one foot of the window that he was eventually rescued from. He was found unresponsive in this room with mask, helmet, hood and gloves removed.

The other two injured members reported operating in extreme heat and received burns to the ears while operating the hose line. Damage noted to the SCBA units in use by these two fire fighters is consistent with damage often seen in flashover or rollover conditions. One of the injured fire fighter is an adjunct instructor for the department's flashover simulation training and reported that the conditions mirrored those seen using the simulator.

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Analysis

Response Route

The response route of the first due engine was left on Campus Way South, a right on Central Avenue, a right on Kettering Drive, right on Joyceton Drive to the intersection of Herrington Drive. It was reported that this running route was commonly utilized due to the speed bumps on Joyceton Drive. The response route chosen required crossing two of these speed bumps. The closest option required crossing a total of five speed bumps. The Prince George's County Fire Department uses an estimate of fifteen seconds per speed bump when calculating response times.

Using common online mapping software the chosen response route is calculated as 2.2 miles with an estimated six minute arrival time (See Figure 1.). The shortest route is calculated as .8 miles with an estimated arrival time of two minutes (See Figure 2.) (Google, 2009).



Figure 1. Response route of the First Due Engine Company calculated as 2.2 miles with an estimated travel time of 6 minutes.



Figure 2. Closest available response route for the First Due Engine Company is .8 miles with an estimated travel time of 2 minutes.

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Using the estimate of fifteen seconds per speed bump, the estimated response time for the chosen response route would be six minutes and thirty seconds while the shortest and recommended route would be three minutes and fifteen seconds. The response route of the first due engine increased the amount of time from dispatch to arrival allowing the fire to grow in intensity.

Water Supply

The first due engine officer chose to split lay from the intersection of Herrington Drive and Joyceton Drive. This was a distance of about seventy-five feet and the driver of the first due engine actually “hand-jacked”

the supply line to the intersection after positioning the engine rather than stopping to layout. The closest available hydrant was three hundred and fifty feet away at 11000 Joyceton Drive. This hydrant was later utilized by the third due engine company. A hydrant located at 11201 Joyceton Drive was within four hundred feet but not listed on the map page. The first due engine went past this hydrant on their running route.

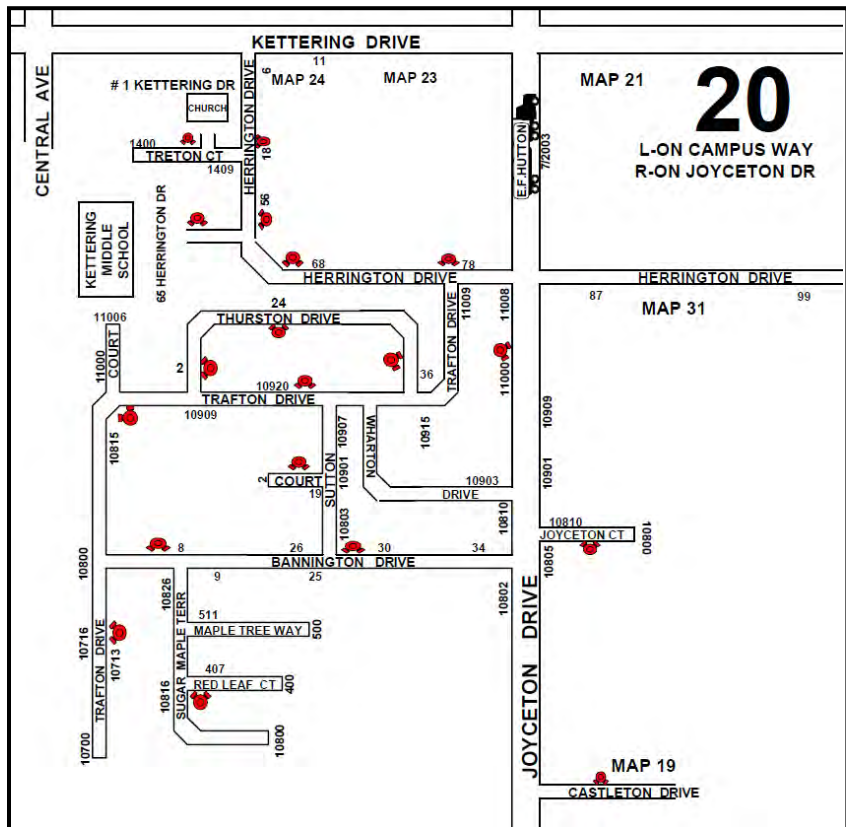


Figure 3: Map page #20 showing street configuration and hydrant location for 87 Herrington Drive. Note the running route listed under the page number. Hydrant at 11201 Joyceton Drive, 400 feet from the intersection, is not listed on this map.

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The running route of the second due engine was south on Herrington drive from Kettering Drive to the intersection of Joyceton Drive. The closest available hydrant listed on the map page was at 78 Herrington Drive, which they had to pass to get to the split lay at the intersection. This necessitated turning the apparatus around in the intersection, connecting the split lay and completing the lay to the hydrant approximately three hundred feet away. The driver of the second due engine made the connection to the hydrant and charged the supply line when water was called for.

It is reported that a significant time delay occurred in completing the water supply for the first due engine. Two attack lines were operated by the first due engine company for the initial operations utilizing only the booster tank supply. The booster tank of the first due engine was depleted at nearly the same time as the MAYDAY was declared. Had the removal of the injured fire fighter been complicated, this loss of water could have been a critical factor. The supply line for the first due engine was charged after Command made the request and the fire extinguishment proceeded accordingly. Water supply to the third due engine was completed without incident.

- The first due engine should have utilized a straight lay from the closest appropriate hydrant. General Order 06-01 *Fireground Standard Operating Procedure for Structural Fires*, identifies that it is the responsibility of the first due engine to take steps to establish a continuous water supply. “*This will normally be accomplished by use of a forward or straight lay from the closest appropriate hydrant or water supply point*”.
- It was a poor decision to supply two initial attack lines without a continuous water supply established. *NFPA 1410 Standard on Training for Initial Emergency Scene Operations*,

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Chapter 6.3.3 recommends when apparatus water tank supply is utilized for initial attack operations, additional lines shall not be charged until the required water supply is established.

- It was also reported that the driver of the second due engine did not charge the supply line until an order to do so was received. When a known working fire exists the supply should be charged immediately. It should be the responsibility of the driver of the engine on the scene to utilize a hose clamp to prevent charging of the hose bed.

Size-up

General Order 06-01 Fireground Standard Operations Procedure for Structural Fires states that the unit officer for the first due engine shall complete an initial size-up and provide a brief radio return to include:

- *Announce correct address*
- *Announce number of floors*
- *Announce type of construction*
- *Announce type of occupancy*
- *Announce conditions found, other pertinent information, and indicate necessary level of response, in accordance with General Order 06-05, Emergency Vehicle Fire/Rescue Operations Level of Response.*
- *Establish or Pass Command per General order 06-22, Incident Management System.*
- *If establishing, identify the "COMMAND" by name.*
- *If establishing, announce location of Incident Command Post (ICP).*
- *If the Unit OIC must remain with the crew to ensure the safe and effective operation of the crew, he/she shall pass Command. When Command has been passed, the 2nd due engine OIC*

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shall assume the role of IC until relieved by a command officer who has arrived on the scene. If passing, announce "Passing Command". (PGCF/EMSD, 2009)

The radio transmission provided by the officer of the first due engine was *"Split laying at the intersection Joyceton and Herrington, ah side, (break) side alpha, (break) single family, got a car on the carport, (break) holding all units, establishing Herrington command (break) actually passing"*.

The officer of the first due engine did not provide the correct address, number of floors or type of construction which is required by the general order. In addition, a clear description of the conditions found was not communicated.

The officer of the third due engine reported to side Charlie as directed with an attack line. He reported *"fire showing from side Charlie"*. What he did not indicate is the number of floors and the location of the fire as required by the general order.

The size-up report from the first fire department unit on the scene sets the stage for the outcome of the incident. A proper size-up report provides the command officer and the other units responding with critical information from which tactical decisions can be made.

"The preliminary size-up report must have a definite structure to be of any use to responding personnel". (Avillo, 2002) The requirements set forth in the general order provide the frame work for a structured preliminary size-up report, from the first and third due engine officers, resulting in a mental picture of at least two sides of the building. In addition to informing other responding units, the content of the initial size-up report provides a method for officers to formulate an action plan based upon conditions found.

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At no time did Command receive an interior size-up from any of the units other than the third due engine reporting conditions in the basement. Some of the critical information which was never communicated to Command included:

- Interior crews encountered heavy fire conditions, extreme heat and zero visibility; indicating potential flashover conditions
- A crew member from the first attack line became separated from the crew, disoriented and lost.
- The first due engine officer encountered two members of his crew that were burned and instructed them to exit on their own while he operated the attack line.
- The officer from the rescue squad and the division 1 supervisor encountered an unstaffed hose line and they went to investigate the sounding PASS alarm without communicating to command.

Interior size-up is just as important as exterior size-up. Since the IC is staged at the command post (outside), the interior conditions should be communicated as soon as possible to the IC. Interior conditions could change the IC's strategy or tactics. For example, if heavy smoke is emitting from the exterior roof system, but fire fighters cannot find any fire in the interior, it is a good possibility that the fire is above them in the roof system. It is important for the Incident Commander to immediately obtain this type of information to help make the proper decisions (NIOSH, 2009).

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Company Level Supervision & Decision Making:

The initial actions of the first due engine company were to advance one attack line to the interior of the house and a second attack line to the burning auto in the carport. The crew of six personnel was split to accomplish these tasks simultaneously. The intent of splitting the crew, and deploying two attack lines, was to quickly extinguish the main body of fire in the attached carport and to control extension from the burning auto on the inside of the home. What the interior crew encountered however, was a well advanced fire on the first floor rapidly approaching flashover conditions. The officer's decision to deploy both lines, and to operate the exterior line attacking the carport, resulted in the loss of effective company supervision for the operating members in the most dangerous position on the interior. At the moment when the most seriously injured fire fighter began to get into trouble, the officer was not close enough, or in a position to provide any corrective intervention.

Other company officers operating on the scene also failed to maintain supervision of crews or worked independently. During the course of the investigation it was learned that:

- The officer of the second due engine abandoned the companies responsibilities by freelancing into the rescue effort. The remaining members of the crew were left unsupervised with an uncharged attack line.
- The officer of the rescue squad was operating alone when he found the unconscious fire fighter.
- The officer of the third due engine left his crew engaged in fire suppression and proceeded alone to assist in the rescue of the fire fighter.
- A member of the rescue squad completed his outside duties and entered the structure alone.

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Individual Decision Making

The most seriously injured fire fighter failed to follow or implement basic fire fighter survival skills and techniques. When he realized he was in trouble and the situation was deteriorating, he abandoned contact with crew members and the hose line he was operating. He did not alert crew members that he was in trouble, nor did he attempt to notify his officer or command. Although he was radio equipped, at no time did he attempt to radio for assistance or call a MAYDAY. In his anxious search for an exit, he failed to stay low and out of the high heat environment, and retreated in a fully standing position. In a confused and agitated state he removed his respiratory protection while he was still in a high heat and smoke filled environment. He reported verbally calling for help once he recognized the danger he was in. He never manually activated his PASS device and continued a frantic search for an exit.

Members operating in the vicinity of the fire fighter in distress reported hearing the PASS alarm and initially disregarded it. Some members did attempt to locate the alarm but report that it was to “reset” the device and not with the urgency as if someone was in trouble. It was only after the sound persisted that one of the members investigated it fully and located the now unconscious fire fighter.

Ventilation

The initial actions of the first due engine company were limited to deploying the two attack lines. The driver of the first due engine did raise a fourteen foot roof ladder to the porch roof on side Alpha. This ladder was placed to provide a second means of egress from the second floor by way of the windows accessible to the porch roof. The structure had limited window openings on the first floor in quadrants A and B where the majority of fire involvement was.

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There was a large bay window located on side Alpha to the left of the front door. On side Charlie, there was a small window located above the kitchen sink and a French style patio door, both in quadrant B.

Exterior ventilation was not reported to have been started prior to the arrival of the rescue squad. The exterior team from the rescue squad, consisting of the driver and one other fire fighter raised portable ladders and ventilated windows on sides Delta and Charlie. This action did provide horizontal ventilation but in areas that were remote from the main body of fire. Pictures and statements do suggest that some of the glass was removed from the bay window on side Alpha but it was not „cleared out” until after the MAYDAY event occurred. The only ventilation opening to support the first attack line, that can be verified, is the entry into the door on side Alpha when the line was advanced.

The interior attack line was operating on the fire in the kitchen area when the glass patio door on side Charlie self ventilated². Wind direction and speed for the date and time of the incident was recorded as 5-10 miles-per-hour from the west-south-west (Weather Underground, 2009). This allowed fresh air, driven by a mild wind, to provide oxygen to the fire and lead to a rapid fire event. This interior hose crew, consisting of the three injured fire fighters, was located directly between the only ventilation opening, the front door, and the main body of fire being accelerated by the wind.

Complicating ventilation and adding to the extreme fire condition was the products of combustion and added fuel load of the burning auto. The burning auto was a Chevrolet Corvette® with a predominately fiberglass body. The burning fiberglass, along with rubber tires

² Heat from the fire caused the glass in the door to shatter and fail, quite possibly when hit by water from the first hose line. The officer from the third due engine was the first to reach side Charlie and reported fire showing from this opening when he arrived.

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and associated plastic components provided an additional fuel load in the smoke produced and entering into the structure.

Communications

This incident clearly illustrated many weaknesses in effective emergency scene communications. Several radio transmissions needed to be repeated because of bad reception. Units entering the structure, especially in the basement area, were told to go to “talk-around” mode³ to be heard. The MAYDAY information was transmitted to Command by a unit on “talk-around” mode. The significant drawback to this type of radio operation is that it only provides radio coverage in a very limited area, such as one city block. This also negates the ability of dispatchers to remotely monitor the channel for messages from units which may be missed by Command or units operating on the scene.

The staffing at PSC did not allow for a dedicated dispatcher for the incident channel. The supervisor for the shift at PSC was monitoring the channel and acting as the dispatcher in addition to his duties as the supervisor. At the time the MAYDAY was transmitted, the PSC supervisor was on a landline telephone requesting assistance from the utility companies and alerting Fire Investigations to the incident. This resulted in the evacuation tone being sounded by mistake instead of the correct MAYDAY tones. In addition, the incorrect information was broadcast including the wrong location for the victim.

³ This mode of communication allows for simple communications from one radio to another, circumventing the repeater system.

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Conclusions

Despite the catastrophic and potentially fatal injuries that occurred, this incident is very much a typical fire operation for the PGCF/EMSD. The factors which created the chain-of-events resulting in the injuries are related to basic firefighting skills and supervisory functions. Standard Operating Procedures were ignored and fire fighter safety and survival skills were disregarded.

This incident is the latest in a series of similar incidents where personnel involved in fire suppression operations have received smoke inhalation and burns involving the respiratory system.

- On January 12th, 1992 a volunteer fire fighter was killed battling a single family dwelling fire at 3807 Walls Lane. His death was attributed to the heat induced failure of the SCBA facepiece (Poole, 1992).
- On June 12th, 1998 a volunteer fire fighter received respiratory burns battling a house fire at 2205 Calvert Street (Poole, Calvert Street Report, 1998).
- On February 22, 2004 a career lieutenant received career ending injuries the result of respiratory burns while battling a house fire at 5014 Roseld Court (PGCF/EMSD, 2004).
- On December 12th 2004, a volunteer captain received smoke inhalation and respiratory burns after depleting his air supply battling a house fire at 205 Sixty Ninth Street (PGCF/EMSD, 2004).
- In the spring of 2007, a career fire fighter was hospitalized with respiratory burns and smoke inhalation received at a multi-family dwelling fire on Donnel Place.

It is important to note just how quickly this incident deteriorated and the injuries occurred. From the arrival of the first due engine to the time a MAYDAY was declared was a

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mere eight minutes. The command officer was on the scene for only five and one half minutes before the MAYDAY was sounded. The emergency was declared, and the fire fighter removed prior to all of the units on the box alarm arriving.

Notwithstanding the outcome, many aspects of the incident deserve recognition as positive actions. Personnel did respond to the PASS and the fire fighter was found because of it. Once the fire fighter was found, and the MAYDAY declared, the removal of the fire fighter was quick and efficient. Command responded to the MAYDAY in an outstanding manner, and the procedure was implemented skillfully. It is evident that the command officer had prepared himself for this event and performed extraordinarily well. The EMS units arrived as the fire fighter was being removed and provided advance life support measures immediately. The rapid treatment and transport of the injured fire fighter was significant to his favorable outcome.

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Illustrations and Diagrams



Figure 4: Side Alpha of the structure during daylight.



Figure 5: Side Bravo with car in the carport.



Figure 6: Side Bravo door leading from carport to interior of the structure.

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Figure 7: Side Charlie showing the french door leading to the dining room/kitchen area.

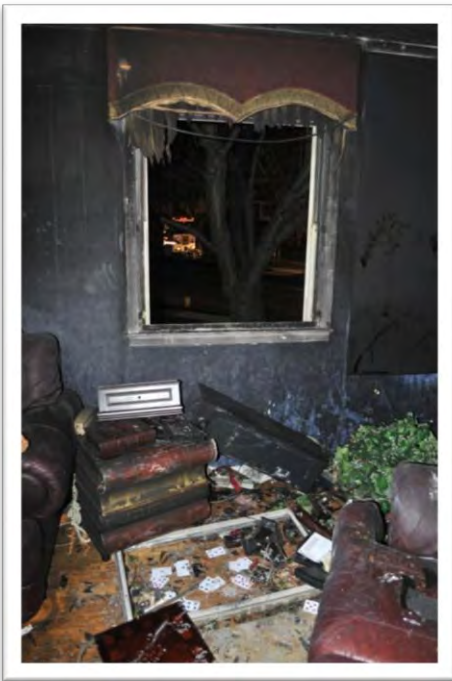


Figure 8: Side Delta showing the window, and the ladder placement where the fire fighter was removed.

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**Figure 9: Kitchen area where injured fire fighters received burns.
Note the hanging wire from the ceiling fan.**



**Figure 10: Interior view of window
fire fighter was removed from.**



**Figure 11: Door to the basement steps that were
misidentified as the front door by the injured fire
fighter.**

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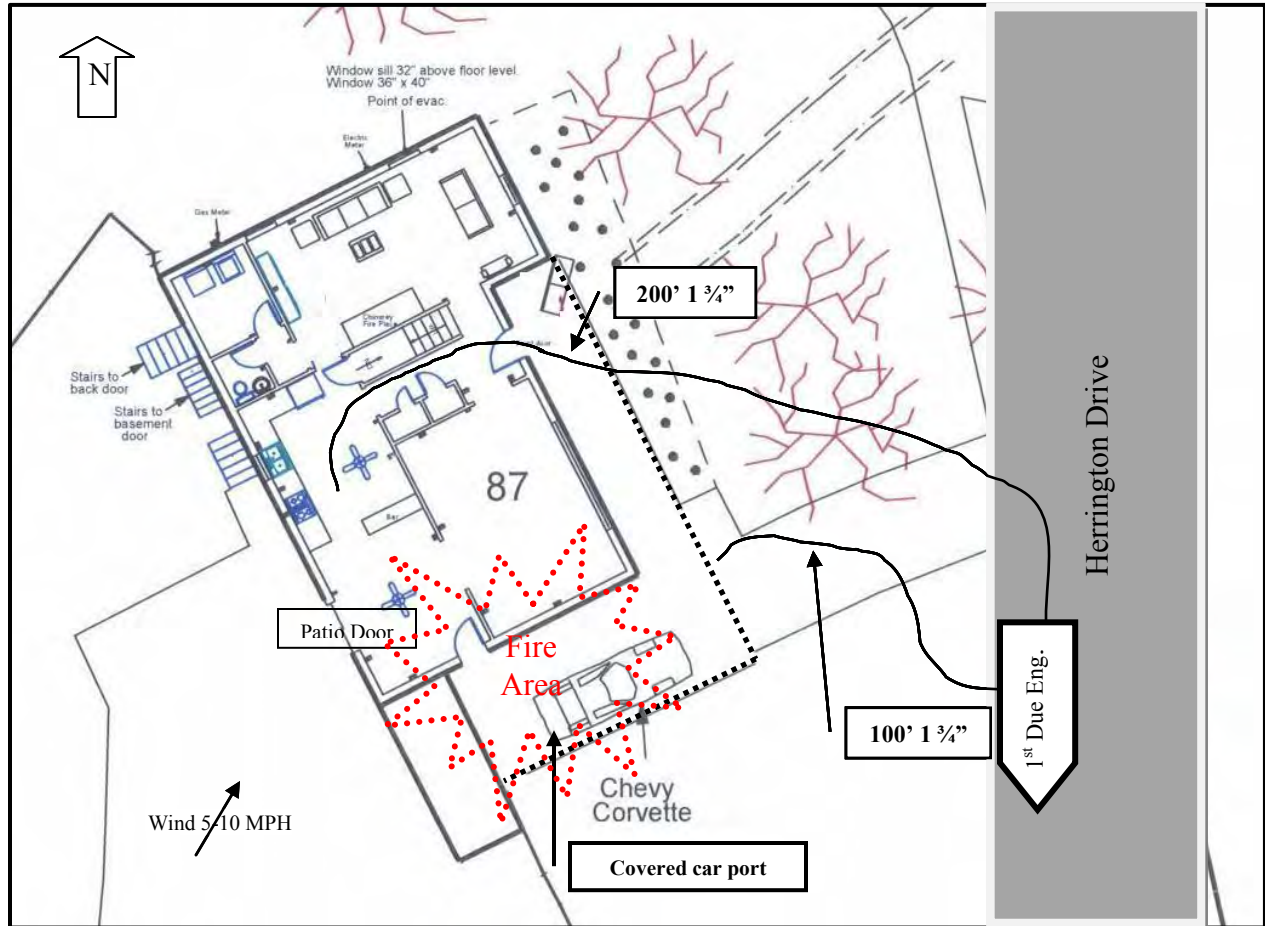


Figure 12: Layout of first floor with initial hose line placement.

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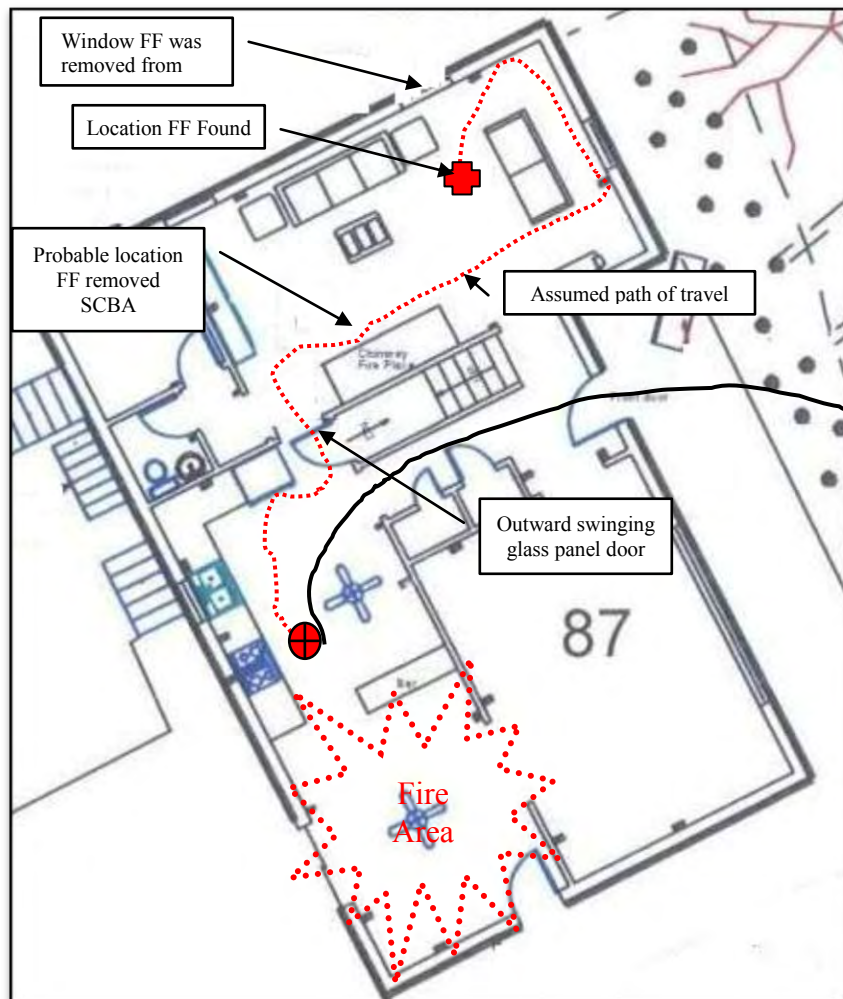


Figure 13: Layout of interior with assumed path of the most seriously injured fire fighter.

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Recommendations

Primary Recommendations

The following recommendations are considered to be “primary recommendations” because they relate directly to actions, inactions or factors that contributed in a direct way to the resulting injuries.

- **The fire department should provide meaningful practical skills training, on a continual basis, to ensure fire fighters are prepared to apply fire fighter safety and survival skills.**

When fire fighters get into trouble; lost, injured, disoriented, or trapped, they need to be able to act promptly and proficiently to ensure survival (Dunn, 1992). During thermal events such as; flashover, flameover, rollover or smoke explosions, fire fighters need to stay low, keep personal protective equipment in place and protect the weakest components, which is usually the SCBA mask. Fire fighters must transmit a distress signal to alert the IC and other companies to the problem. Properly transmitting a MAYDAY while they still have the capability and sufficient air will allow the Rapid Intervention Team (RIT) the greatest chance of success (Miles J., 2004). Fire fighters in trouble should manually activate their PASS device to alert others in the vicinity. Fire fighters must instinctively know to protect their airway and never remove the SCBA while in an IDLH.

In this incident, the most seriously injured fire fighter abandoned contact with the attack line and stood up to exit during the thermal event, that forced other members to the floor. He did not alert crew members that he was in trouble, nor did he attempt to notify his officer or command. Despite being radio equipped, he never attempted to radio for assistance or call a

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MAYDAY. When he removed his SCBA facepiece, protective hood and helmet while still inside the IDLH environment, he could not remedy the situation before losing consciousness.

In life threatening situations, fire fighters need to rely on their training so that they instinctively take the correct personal safety actions. Repetitive skills training can instill knowledge necessary to provide a more self-controlled, composed response to a potentially life-threatening situation. Proficiency in applying survival skills comes from structured and consistent training applied at regular intervals.

Compliance with the Respiratory Protection Program for The PGCF/EMSD requires annual completion of a PowerPoint® training program administered at the station level. A sign-off sheet is completed by the employee's supervisor and the employee reports to the Apparatus Maintenance Division for their annual fit test. Supervision and oversight of this program is sporadic at best with it being relatively common to have no actual training take place. These critical elements should not be conducted by field level personnel where subjectivity or complacency may jeopardize proficiency.

The fact that this is an annual requirement mandated by the Occupation Safety and Health Administration Respiratory Protection Standard should precipitate a more significant approach to this training. Had this incident resulted in a death, it is quite likely that the department would have faced citations (Sirocchi, 2007). Departments should institute a continual skills competency evaluation for fire fighters to ensure an acceptable level of proficiency is maintained. (NFPA 1404 Standard for Fire Service Respiratory Protection Training, 6.12 Training Conditions)

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- **The fire department should implement effective company officer training in subjects such as size-up, accountability, communications, hazard recognition, and emergency scene supervision.**

The development of skill and knowledge for fire officers, especially in regards to emergency scene supervision, is really dependent on the individual. Many officers, both career and volunteer are highly motivated, skilled and proficient in their positions. However, the level of proficiency is mostly a product of the aspiring individual's motivation and diligence. The lack of training in emergency scene functions specific to PGCF/EMSD, results in the skill level of fire officers being highly inconsistent.

The career development plan currently in use by the PGCF/EMSD requires certification to the Fire Officer II (FOII) standard prior to being allowed to take the promotional test for company officer (Lieutenant). The department no longer conducts an Officers Candidate School for perspective career company level officers. Volunteer Fire Officers are mandated to comply with the FOI and FOII certifications as required by Council Bill 82-1994 in a similar fashion. Fire Officer Certifications for members of the department generally are accomplished through attendance to Maryland Fire and Rescue Institute's Fire Officer I and II curriculum. Other methods of obtaining the required certifications may include completion from regional academies or neighboring states. The process of certification to the FOII level does not provide any guarantee that an officer has proven proficiency in applying the standard operating guidelines or policies specific to the PGCF/EMSD. Because company officers receive training and certification from a wide array of sources, the department lacks standardization of officer proficiency.

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In this incident, fire fighters from the first due engine operated unsupervised in an environment that presented extreme risks. When the most seriously injured fire fighter started to get into distress, the officer was not close enough or in a position to provide any corrective intervention. Close supervision from a company officer could have provided simple survival interventions to include, keeping low and out of the high heat, retreating to a safer location and staying in contact with crew members and the attack line.

A proper and more complete size-up of the incident scene could have revealed a more accurate assessment of the situation. The presence of heavy, dark and turbulent smoke, as reported, indicated that a well advanced interior fire condition existed.

- **The fire department should require officers to complete continuing education and refresher training for emergency scene supervisory skills.**

Training should be a continual process held at regular intervals. It should be conducted to allow members to maintain proficiency, meet certification requirements, learn new procedures, and keep up with emerging technology (NIOSH, 2009). NFPA 1500 *Standard for a Fire Department Occupational Safety and Health Program*, Chapter 5, requires that the fire department provide an annual skills check to verify minimum professional qualifications of its members.

Departmental General Orders are changed and updated on a regular basis. Generally, these updates and changes are implemented without any training component and merely placed in print and distributed. Some of the recent changes have significantly changed the responsibilities and expectations of company level officers for emergency operations. Once a

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person is promoted to a company level officer in the department, other than annual refresher requirements such as CPR, fit-test and infectious control, no additional training is required.

The department should develop and implement an officer refresher training program that requires annual training and a skills proficiency test. The training should include, but not be limited to, departmental standard operating procedures, fire fighter safety, size-up, critical-decision making and fireground tactics.

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- **The fire department should ensure that every fire fighter is radio equipped, trained in its use and able to effectively call a MAYDAY.**

Effective radio communications is imperative for the IC to be able to command and control the incident. Fire fighters on the interior of a structure are unable to see all areas affected by fire and have a limited visual perspective as to structural stability and changing fire conditions. The portable radio is an essential safety item for every interior fire fighter. Having radio communications enhances fire fighter safety by providing a means to communicate hazards, conditions and emergent information to other crew members or the IC. Fire fighters must transmit a call for help as soon as an emergency situation is recognized. Transmitting a MAYDAY distress signal for themselves or a partner quickly and while they still have the capability provides the greatest chance for survival.

Proper training on the operation of portable radios and the department's standard operating procedures is crucial for fire fighter safety. Effective radio communications during firefighting operations while utilizing SCBA and full protective clothing is a skill that needs to be learned and practiced for proficiency. Utilization of the emergency identifier (EI) feature and knowledge on when, how and why to initiate a MAYDAY call are other examples of training required of members operating in IDLH environments.

Skills associated with fireground communications must be a part of the recruit training program. As the department upgraded its portable radio capabilities, providing the two Motorola® HT1000 radios for each suppression apparatus, no additional training was provided to personnel. The department needs to develop a Communications Manual to coincide with the radios currently in use and the procedures in place.

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- **The department should ensure that company level crew integrity and accountability are maintained, along with company level supervision, during operations within IDLH atmospheres.**

Operating in hazardous environments require that suppression crews work and remain in teams for safety. Maintaining crew integrity means team members know who is on their team and who the team leader is (NIOSH, 2009). Providing personnel with the added safety net of fellow team members helps prevent serious injury or even death. Team members communicating needs and observations to the team leader and watching out for each other enhances safety and survival. Teams that enter a hazardous environment together should also leave together to ensure that team continuity is maintained (Dunn, 1992).

In this incident, fire fighters from the first engine were split during the initial operations. The fire fighters operating on the interior became split up and operated independently. When the seriously injured fire fighter lost contact with the line and crew members, no intervention occurred and nothing was communicated indicating there was a problem. Additionally, there were numerous instances where fire fighters and officers were working independently and entering and exiting the structure alone.

The most common staffing configuration for the PGCF/EMSD is to assign an officer with three other personnel to a station. Together the four personnel “cross-staff” an EMS transport unit along with one or more suppression units in a station. Very often this results in the suppression unit responding with only the driver and the officer when the EMS unit is committed to another call. In many of the stations this has become the rule rather than the exception. The frequency of personnel being separated during the shift is so common that crews begin to operate

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more as separate two-person teams rather than a single four- person unit. It is common for ambulance crews to respond to suppression calls to “make-up-staffing” on the fire apparatus. This often results in personnel having to search the emergency scene for their officers and makes crew accountability and supervision challenging.

In 2004, TriData Corporation of Arlington, Virginia was commissioned to provide an Organization and Management Study for the PGCF/EMSD. The report discussed extensively the concept of “cross-staffing” units as opposed to providing dedicated staffing for available apparatus. The report concludes that “the use of cross-staffed units is efficient as long as the severity of calls does not require multiple types of units simultaneously” (TriData, 2004). The report also acknowledges that the system is often used, and best suited for, smaller communities where incident demand is relatively low. The system is not efficient where simultaneous calls and serious incidents are a routine, daily, occurrence as they are for the PGCF/EMSD.

Officers of the PGCF/EMSD have adapted to the system of “cross-staffing” of units and are presupposed to responding understaffed and operating more as a fire fighter than an officer. This reoccurring tendency conditions officers so they are unaccustomed to supervising subordinates in suppression activities when the situation arises. Officers in the habit of being a worker rather than a leader, fail to adapt when staffing is adequate or during stressful emergency situations. Effective supervision is not practiced a majority of the time due to the absence of subordinates.

The staffing profile adversely affects company level training functions; as whenever an EMS call is received, two fire fighters respond on the call leaving only the officer and driver back. The interruption of company level training by the constant stream of EMS calls can result in frustration and even apathy which permeates to all members of the crew. Apathy results in

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poor company moral and an impression that training is unimportant and the department is unsupportive of company level effectiveness. Consistent, dedicated staffing levels and uninterrupted training periods would allow officers to develop and foster company level proficiency. Simply put, officers cannot be expected to provide company level leadership unless they have a company to lead.

Ancillary Recommendations

The following recommendations are considered to be “ancillary recommendations” because they were discovered in the course of the investigation, and identified as issue’s, but did not contribute directly to the resulting injuries.

- **The fire department should explore the use of available technology to replace station level hand drawn maps for navigation and water supply.**

The PGCF/EMSD relies upon a system where each company completes hand drawn or computer aided maps of the first due area. These maps are carried in three ring binders in the front of each fire apparatus. There is no established standard for the drawing of these maps and each company’s are unique. Hydrant locations and addresses are included to assist in water supply operations. For this particular area the map was a computer generated map which was drawn in 2003 (see figure 3). The map did not show all of the available hydrants for 87 Herrington Drive, including the one approximately four hundred feet away at 11201 Joyceton Drive, which the first due engine passed on the way to the scene.

The use of Global Positioning System (GPS) is widely recognized. The Prince George’s County Government in cooperation with Maryland-National Capital Park & Planning Commission maintains a Geographical Information System which includes detailed maps and

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overlays. This system could easily be adopted and used for fire department use. Ideally a computer display mounted in each apparatus should automatically show the location of the dispatched call, appropriate running route and location of hydrants or static water sources. This could also be expanded for premise history and pre-incident planning.

- **The department should implement a process which allows for a quick and accurate method of determining training levels and compliance for all operating members.**

Training records for the PGCF/EMSD are maintained in a host of locations. The Fire Commission maintains the records for all volunteer members. The Fire Training Academy maintains the records for both career and volunteer members. Fit-test records are also maintained at the Apparatus Maintenance Division. The retrieval of this information is time consuming and the accuracy most often has to be verified. It is not uncommon for the information to be less than accurate and require research to resolve.

Not having a method to instantly retrieve training records to determine compliance with mandated training or certification levels leads to potential liability for the department and its members.

- **The department should review, update and simplify Departmental General Orders and written procedures.**

The massive amount of departmental information contained in the multitude of documents has convoluted the ability to effectively operate. The constant state of change that has occurred over the past several years has left much of the written regulations of the department obsolete. When revisions or additions are made, there is seldom a method of notification or

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training which reaches all segments of the department. In too many cases the new procedure actually conflicts with older documents.

In order for the rules and regulations of the department to work they must be relevant, simple and clear. The review of departmental policies must be an ongoing process to keep the information current and effective.

- **The department should develop, or adopt, a Uniform Training Manual that illustrates and explains current and accepted practices for all emergency operations.**

One of the momentous problems facing the department is the lack of standardization. Individual companies adopt different hose loads, nozzles and special tools. Pump pressures and hydraulic calculations are interpreted differently and fostered by many officers.

Applying standard and relevant procedures to common scenarios builds effective and efficient operations. Having a departmental manual to illustrate the accepted practices for engine and truck company operations, ventilation, water supply or laddering, to name a few, will provide a reference for effective training and fostering a standardized approach to emergency operations.

Ideally, a Uniform Training Manual should describe and illustrate the accepted practice of the PGCF/EMSD and in support of the Standard Operational Guideline(s). Both of these documents should build on each other to provide a consistent and practical approach to emergency operations.

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Responsibilities

The recommendations developed by the SIT illustrate a pattern of failures of basic responsibility. Leaders failed to lead, managers failed to manage, supervisors failed to supervise and employees failed to complete individual responsibilities. These failures have been manifested through a generally complacent attitude and lackadaisical atmosphere prevalent within the PGCF/EMSD.

True change in any organization must come from a commitment at all levels. Each and every department member bears some responsibility in enacting the needed changes for the PCF/EMSD. The ultimate responsibility to make needed change rests with the highest levels of leadership who must embrace and commit to action the recommendations provided. The actions required for change cross the working boundaries of the separate commands and functional areas of the departments organization. To a large degree the recommendations represent adaptive challenges facing the department. In their book, *Leadership on the Line*, Ronald Hiefetz and Marty Linsky articulate that adaptive challenges require experiments, new discoveries, and adjustments from numerous places in the organization or community. Positive change in the department can only be realized if cooperation and teamwork is fostered within all segments of the department.

This final segment of this report outlines the responsibilities for each of the Departments Commands and offices in implementing change in response to the recommendations developed by the SIT.

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Office of the Fire Chief

- The office of the Fire Chief is responsible to provide the vision, direction and oversight of the organizational change needed. This will include:
 - Establishing goals which are attainable, relevant, measurable and time bound.
 - Monitoring progress and evaluating out comes.
 - Providing the needed support in funding and resources to support initiatives.

Prince George's County Fire Commission

- Identify funding sources to support the initiatives related to implementing changes
- Work with the Special Operations Command and the Fire/EMS Training Academy to establish a single repository for training records. This system should allow for immediate retrieval of records to verify compliance with mandated training levels.

Administrative Services Command

- Develop a plan to budget for initiatives supporting the listed recommendations.
- Apparatus Maintenance will research and plan for the utilization of GPS™ technology in all emergency vehicles.
- The office of Information Management along with the office of Research and Planning will be responsible for implementing a process to replace hand drawn response maps with an electronic system using GIS or GPS technology.
- Provide support for all segments of the department in acquiring need materials and supplies to accomplish initiatives supporting the recommendations.
- Support other Commands and Offices in initiatives related to the recommendations.

Special Operations Command

- The office of Administrative Compliance will be responsible for reviewing, updating and simplifying Departmental General Orders and written procedures. This office will lead a standing committee represented by all segments of the department for this task.
- The Fire/EMS Training Academy, with the support of the Emergency Operations Command will implement a number of training initiatives in support of the recommendations including:
 - Annual fire fighter safety and survival skills
 - Fire officer training and refresher training
 - Fire ground communications
- The Fire/EMS Training Academy, with the support of the Emergency Operations Command shall be responsible for developing and producing a uniform training manual which illustrates the accepted practice of the PGCF/EMSD and is in support of the Standard Operational Guideline(s).
- Support other Commands and Offices in initiatives related to the recommendations.

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Emergency Operations Command

- Research and explore staffing configurations which will provide consistent and adequate staffing levels for fire and emergency medical units.
- Prepare a strategic plan to implement a staffing configuration which will provide consistent and adequate staffing levels for fire and emergency medical units.
- Support other Commands and Offices in initiatives related to the recommendations.

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Appendices

(Appendices available in full report only)

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