



## **Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland**

---

### **Executive Summary**

On April 24, 2013, a 24-year-old male volunteer fire fighter sustained injuries at a residential structure fire and died eight days later at a metropolitan trauma center. At 0109 hours, Special Unit 418 (SU418) responded with two fire fighters from the first-due volunteer fire station. SU418 was the first unit on scene receiving reports of occupants trapped in the building from police and occupants screaming that a man was trapped on the second floor. The two fire fighters donned their personal protective equipment and made entry. Engine 56 (E56) arrived with a captain and 3 fire fighters. The captain assumed command, conducted a size-up, and struck a 2<sup>nd</sup> alarm due to heavy fire in the rear of the structure. Truck 404 arrived and was instructed to start rescue and ventilation operations.

E56's crew stretched a 1 3/4-inch hoseline to the front door and met one of the fire fighters (the victim) from SU418. The SU418 fire fighter stated that there was an occupant trapped somewhere on the second floor. E56's nozzleman noticed the 1<sup>st</sup> floor hallway access was severely limited, due to the hoarding of objects along the walls and on the floor, so they took the stairs to the second floor landing where it was very hot and smokey. When E56 and SU418 reached the 2<sup>nd</sup> floor, the nozzleman opened the nozzle in short bursts (penciling) to cool down the 2<sup>nd</sup> floor. The nozzleman radioed Command to get the 2<sup>nd</sup> floor ventilated. Hearing a personal alert safety system (PASS) alarm, the nozzleman called out to the SU418 crew with no response, and then called a "Mayday." E56's backup man went around the nozzleman towards the sound of the PASS alarm. After pushing the door open to a bedroom located on the "B/C" corner of the house, he crawled into the bedroom and found a fire fighter standing and pointing to a second fire fighter on the floor behind the door. The downed fire fighter was found with his gloves, helmet, hood, and facepiece removed. With the help of the nozzleman, they got the unresponsive fire fighter down the stairs and onto the front porch. The downed fire fighter was put on a backboard and taken to Medic 56. Paramedics were able to re-establish a pulse and respiration. The fire fighter was transported to a local hospital and then transferred to a metropolitan trauma center. Unfortunately, the fire fighter passed away from his injuries eight days later.



**Residential Structure**  
*(NIOSH Photo)*

## **Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland**

---

### **Contributing Factors**

- *Civilian at risk in the structure*
- *Blocked access/egress due to hoarding that added to the fuel load*
- *Multiple stairways*
- *Uncoordinated response to an emergency scene*
- *Facepiece removed in immediately dangerous to life or health (IDLH) environment*
- *SU418 crew left the portable radio in the special unit*
- *Loss of crew integrity*
- *Lack of size-up and situational awareness by initial crew*
- *Lack of ventilation.*

### **Key Recommendations**

- *Ensure that emergency response deployment protocols are developed to prevent uncoordinated responses to an emergency scene*
- *Ensure that crew integrity is properly maintained by voice or radio contact when operating in an immediately dangerous to life and health (IDLH) atmosphere*
- *Ensure that fire fighters are trained in size-up, risk management, and situational awareness*
- *Ensure that all responding apparatus are staffed with a properly trained and qualified officer*
- *Ensure all fire fighter riding positions are provided radios and fire fighters are trained on their proper use*
- *Ensure fire fighters are trained in self-contained breathing apparatus (SCBA) emergencies*
- *Ensure that fire fighters are properly trained in air management*
- *Ensure that fireground operations are coordinated with consideration given to the effect of ventilation.*

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1998, Congress appropriated funds to NIOSH to conduct a fire fighter initiative that resulted in the NIOSH "Fire Fighter Fatality Investigation and Prevention Program" which examines line-of-duty-deaths or on duty deaths of fire fighters to assist fire departments, fire fighters, the fire service and others to prevent similar fire fighter deaths in the future. The agency does not enforce compliance with State or Federal occupational safety and health standards and does not determine fault or assign blame. Participation of fire departments and individuals in NIOSH investigations is voluntary. Under its program, NIOSH investigators interview persons with knowledge of the incident who agree to be interviewed and review available records to develop a description of the conditions and circumstances leading to the death(s). Interviewees are not asked to sign sworn statements and interviews are not recorded. The agency's reports do not name the victim, the fire department or those interviewed. The NIOSH report's summary of the conditions and circumstances surrounding the fatality is intended to provide context to the agency's recommendations and is not intended to be definitive for purposes of determining any claim or benefit.

For further information, visit the program website at [www.cdc.gov/niosh/fire](http://www.cdc.gov/niosh/fire) or call toll free 1-800-CDC-INFO (1-800-232-4636).



## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

### **Introduction**

On April 24, 2013, a 24-year-old male volunteer fire fighter sustained injuries at a residential structure fire and died eight days later in a metropolitan trauma center. On May 2, 2013, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On May 12-16, 2013, a general engineer and an investigator from the NIOSH Fire Fighter Fatality Investigation and Prevention Program traveled to Maryland to investigate this incident. The NIOSH investigators met with members of the career fire department, with members of the volunteer fire department, the county fire investigator, and the County Dispatch Center Director. The NIOSH investigators visited the site and took photographs. The NIOSH investigators interviewed officers, fire fighters, and emergency medical services personnel on scene at the time of the incident. The investigators reviewed fire department standard operating procedures, training records, dispatch records, witness statements, and the medical examiner's report.

### **Fire Department**

This combination department consists of 1,050 career members and approximately 2,000 volunteers. The department operates out of 25 career stations and 33 exclusively volunteer stations within the county. The volunteer companies function as independent fire departments, which operate under the county deployment plan. The stations serve a population of more than 800,000 people in a geographic area of approximately 612 square miles of land and 28 square miles of waterways.

### **Career Fire Department**

The 25 career fire stations operate under three battalions, which include 28 engine companies, 7 truck companies, 28 advanced life support (ALS) medic units, and 23 brush units. The department also operates a hazardous materials response and support unit, a decontamination unit, and an advanced tactical rescue (ATR) team specially trained for unusually difficult, complex rescues, such as building collapses, water rescues, trench rescues, high-rise rescues, and other special operations procedures.

The career department uniformed personnel consists of staff administrative offices, an operations division, a fire training academy, and a fire marshal's office. The county police department operates an arson squad and determines the fire cause and origin in conjunction with the fire officers and incident commander. The operations division shift schedule consists of a 10-hour shift and a 14-hour shift each day. Four shifts work two 10-hour shifts (0700–1700), two 14-hour shifts (1700–0700), and are off for four days. There are three battalion commanders on duty 24 hours per day; one of which is also the Division Chief and shift commander. Off duty battalion chiefs are on call.

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

### **Volunteer Fire Department**

The volunteer fire companies include 61 engine companies, 6 truck companies, 17 ALS medic units, 6 tenders (tankers), 9 heavy rescue (squad) units, plus brush and support units. More than 2,000 citizens volunteer in the fire service as active responders, fundraisers, and support personnel. Though volunteer companies are independent, private non-profit corporations, the county operates a combination fire service with career and volunteer fire fighters working together to form a county fire and emergency medical services (EMS) organization.

The affected volunteer fire department operates 2 engines (Engine 412 and Engine 413), 1 heavy rescue (Squad 414, 1 Medic Unit (Medic 415), 1 light rescue/brush truck (Special Unit 418) and 1 utility vehicle (Utility 419). The volunteer fire department has approximately 80 active members including a fire chief and administrative staff, serving a population of approximately 30,000 in a 6 square mile area. Active volunteer members are defined as personnel who respond to 10 or more incidents in a calendar year. The fire structure was 0.32 miles from the first due volunteer fire station.

### **Staffing and Response**

The minimum staffing on each engine and truck for the career fire department is four fire fighters, including an officer. If the officer is on leave or detailed to another position or function, another officer (Captain or Lieutenant) is detailed to fill the vacancy. The career fire department does not utilize fire fighters as acting officers at the company level. For working fire incidents, additional command and control resources are dispatched, along with a rapid intervention team (RIT), medic unit (if not already dispatched), a rehab unit, and an air unit. The division chief and safety officer are dispatched to an incident after a second alarm is requested. All of the department officers are trained and capable of filling the safety officer position if assigned. On a box alarm assignment, if an assigned volunteer company does not have proper staffing for the apparatus, the next closest unit is dispatched.

### **Training and Experience**

The state of Maryland requires training for volunteer fire fighters that consists of NFPA 1001, *Standard on Fire Fighter Professional Qualifications*, Fire Fighter I, Hazardous Materials Awareness, Hazardous Materials Operations, and First Responder. The process requires annual recertification. The career fire department involved in this incident has a recruit school, which is 18 weeks in length and consists of NFPA 1001, *Standard on Fire Fighter Professional Qualifications*, *Fire Fighter I*, *Fire Fighter II*, Hazardous Materials Awareness, Hazardous Materials Operations, and First Responder.

In the state of Maryland training hours are as follows:

Firefighter I is 108 hours

Firefighter II is 60 hours

First Responder is 45 hours

Hazardous Materials Operations is 24 hours

Hazardous Materials Awareness is 12 hours.

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

In the county fire department and EMS organization, a volunteer fire fighter may work in an immediately-dangerous-to-life and-health (IDLH) environment if they meet the following requirements:

NFPA 1001, Fire Fighter I  
Hazardous Materials Operations  
CPR  
OSHA 1910.1080 Bloodborne Pathogens certification  
Completed medical surveillance  
SCBA fit test.

For career officers, the training requirements are as follows:

Lieutenant - NFPA 1021, *Standard for Fire Officer Professional Qualifications, Fire Officer I*;  
Captain - NFPA 1021, *Standard for Fire Officer Professional Qualifications, Fire Officer II*;  
Battalion Chief - NFPA 1021, *Standard for Fire Officer Professional Qualifications, Fire Officer III*;  
Division Chief and above - NFPA 1021, *Standard for Fire Officer Professional Qualifications, Fire Officer IV*

The SU418 fire fighter (victim) had been a volunteer fire fighter for more than 8 years and had received training on topics that included: NFPA 1001, *Standard on Fire Fighter Professional Qualifications Firefighter I*; Hazardous Materials Operations; Hazardous Materials Awareness; Emergency Medical Technician- Basic; Rescue Site Operations; and Vehicle and Machinery Rescue.

The captain who was the initial incident commander had more than 28 years of experience and received training on topics such as: NFPA 1001, *Standard on Fire Fighter Professional Qualifications, Fire Fighter III*; NFPA 1002, *Standard on Professional Qualifications for Driver/Operator*; NFPA 1031, *Standard on Professional Qualifications for Fire Inspector, Fire Inspector I*; NFPA 1033, *Standard on Professional Qualifications, Fire Investigator I*; NFPA 1041, *Professional Qualifications for Fire Service Instructor, Fire Instructor II*; and NFPA 1021, *Standard on Professional Qualifications for Fire Officer, Fire Officer III*.

The Battalion Chief had more than 27 years of experience and had completed training on topics such as: NFPA 1001, *Standard on Fire Fighter Professional Qualifications, Fire Fighter III*; NFPA 1041, *Professional Qualifications for Fire Service Instructor, Fire Instructor III*; NFPA 1021, *Standard on Professional Qualifications for Fire Officer III*; and Hazardous Materials Operations.

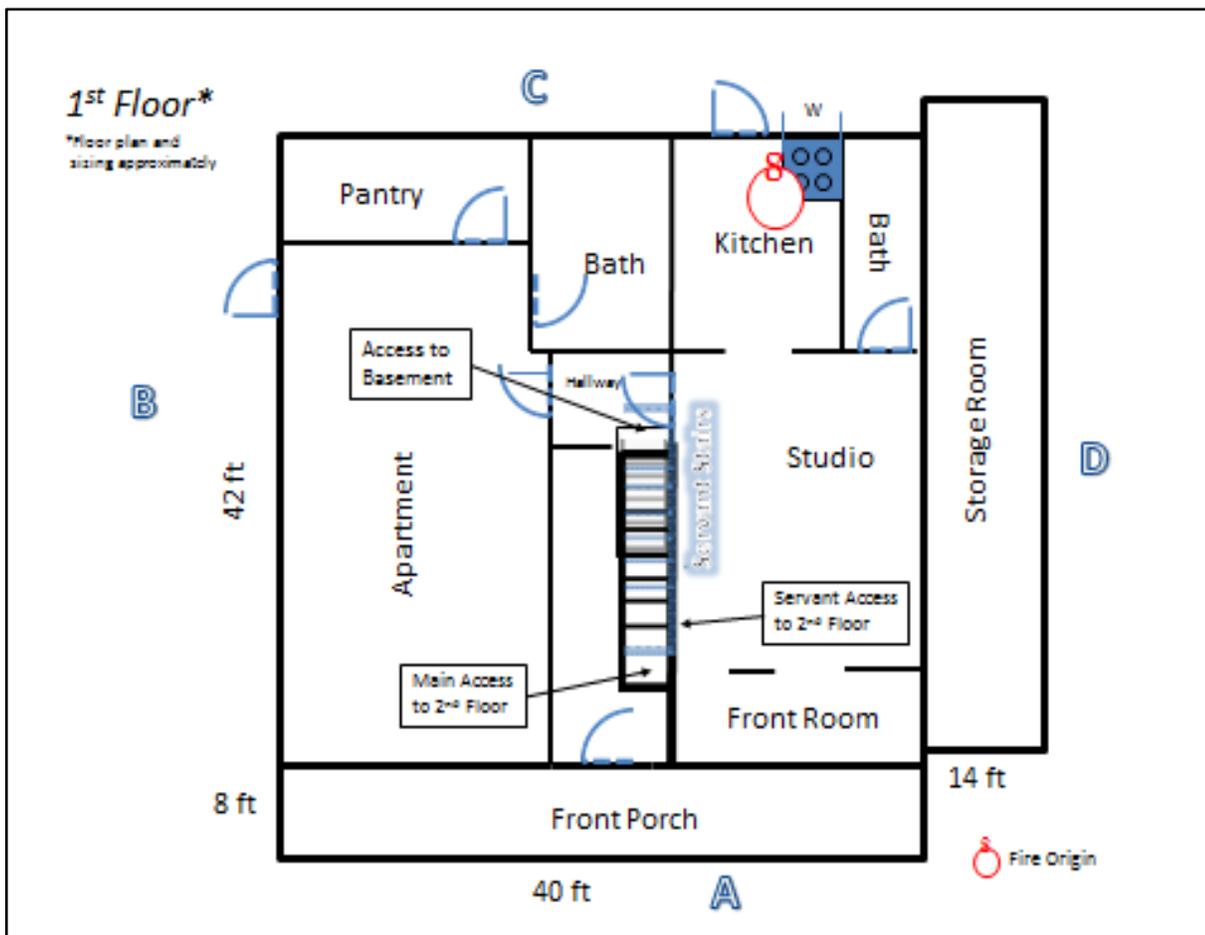
### **Personnel Accountability System**

Each member of both the career and volunteer departments are assigned two personnel accountability tags. Each tag consists of a picture, an identification number, and a barcode. One tag is given to the officer at the beginning of the shift (career personnel) or when the apparatus is responding (volunteer personnel) to an incident. One tag stays on the apparatus and the other tag goes to “Command” or a “division/group supervisor.” The tags are white for fire operations and blue for EMS personnel.

## Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland

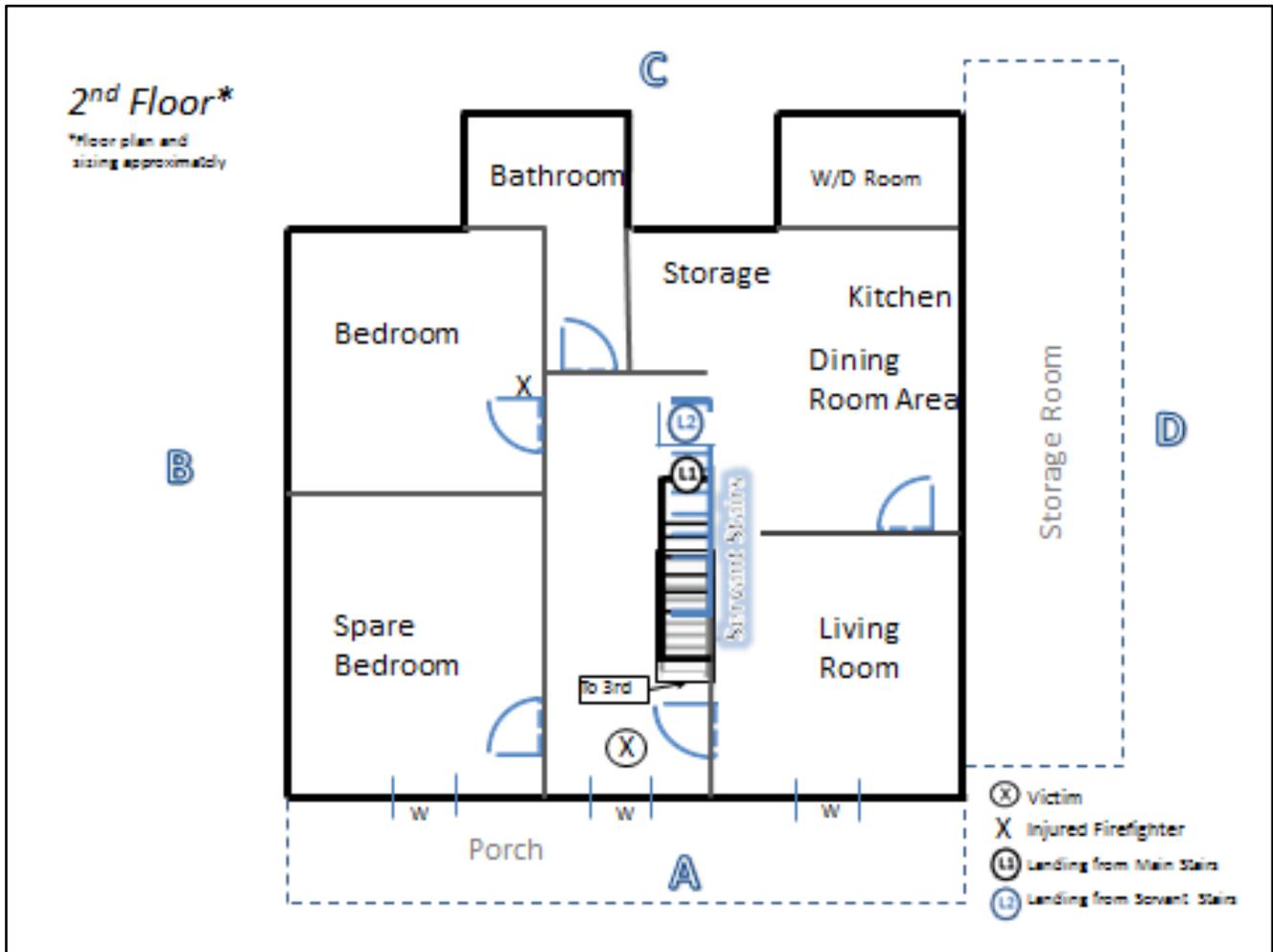
### Structure

The residential structure was a three story brick and wood exterior Victorian style home built in the late 1800's with a pitched roof consisting of wooden rafters and metal sheeting over wooden lath boards. The structure was approximately 3100 square feet that comprised 3 floors plus a partial basement (see **Diagram 1**, **Diagram 2**, and **Diagram 3**). The structure had a staircase just inside the main entry door to the 2<sup>nd</sup> floor. The house was built with a second staircase, referred to as a servant's staircase, off the 1<sup>st</sup> floor studio (original dining room) which went to the 2<sup>nd</sup> floor just adjacent to the main staircase. This was a multi-family structure with the 1<sup>st</sup> and 2<sup>nd</sup> floors set-up to be individual apartments. The 3<sup>rd</sup> floor consisted of a large bedroom and storage area. The structure had a basement with access on the 1<sup>st</sup> floor underneath the main stairway. The basement was used primarily for storage. The utilities were both natural gas and electric.



**Diagram 1. Fire structure's 1<sup>st</sup> floor layout and approximate location of fire origin. Servant stairway is in light blue and are partially underneath main first floor stairway to 2<sup>nd</sup> floor. The servant stairway accesses the 2<sup>nd</sup> floor just several feet from the main stairs. Note: All areas were extremely cluttered (hoarding condition) to the point of limited access. (Courtesy of the Fire Department)**

## Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland

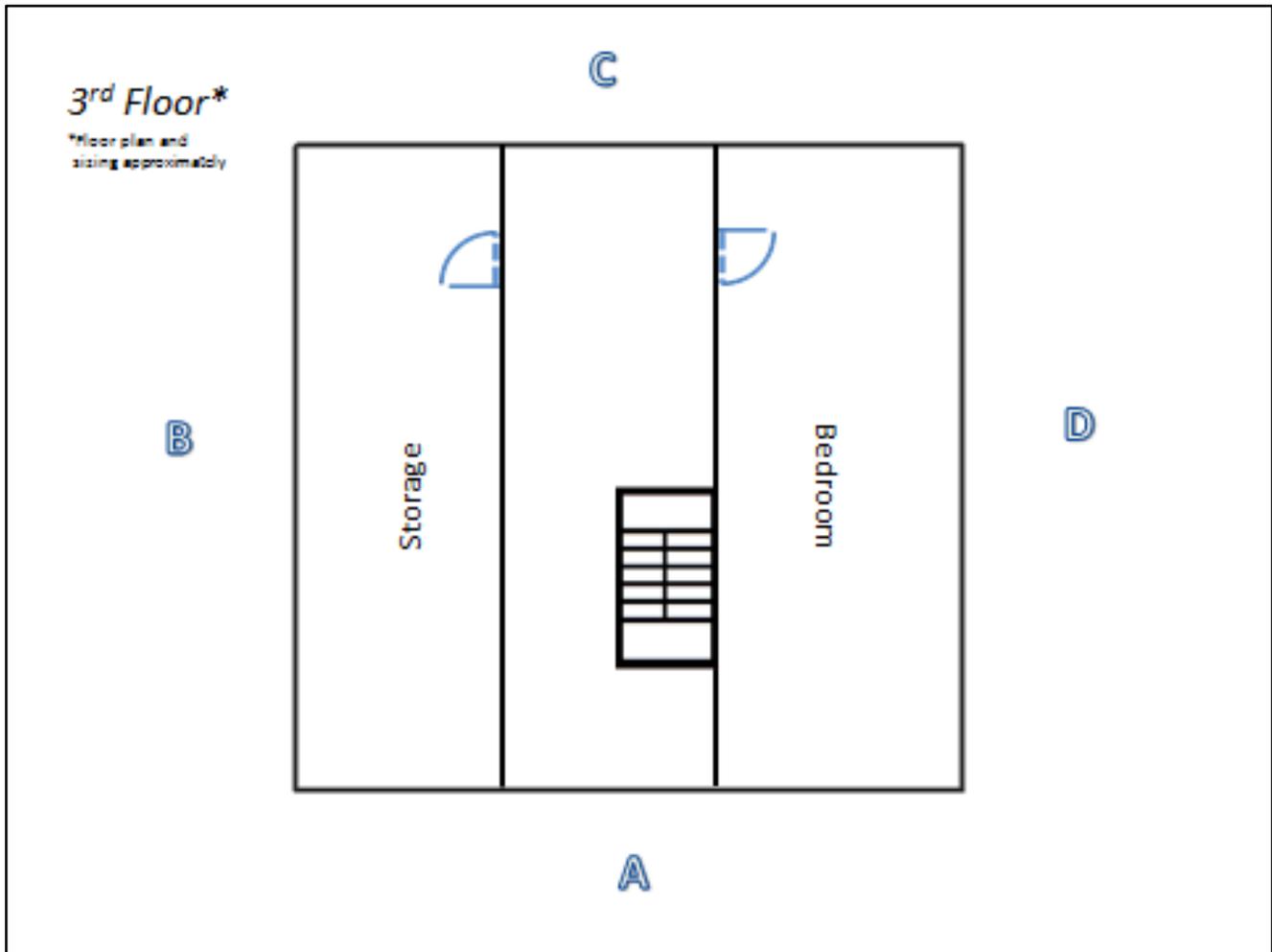


**Diagram 2. Fire structure’s 2<sup>nd</sup> floor layout. Approximate location of injured fire fighter and civilian victim marked with an “X”.**

*Note: All areas were extremely cluttered (hoarding condition) to the point of limited access. A fire fighter from E56 stated he could not advance down the hallway on the 2<sup>nd</sup> floor due to furniture and other clutter.*

*(Courtesy of the Fire Department)*

## Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland



**Diagram 3. Fire structure’s 3<sup>rd</sup> floor layout and the bedroom where the civilian victim was prior to the fire.**

*Note: All areas were extremely cluttered (hoarding condition) to the point of limited access.  
(Courtesy of the Fire Department)*

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

### **Equipment and Personnel**

On April 24, 2013, at 0109 hours, the county dispatch center transmitted a box alarm assignment for Box 41-20. The units assigned were a battalion chief, four engines, one truck, two squads, an emergency medical service supervisor, and an ALS medic unit to a residential structure fire with people trapped.

**Table 1** identifies the apparatus and staff dispatched on the first alarm assignment, along with their approximate dispatch time and on-scene arrival times rounded to the nearest minute.

On the notification of a “working fire,” a RIT Task Force is dispatched, which consists of an additional engine, truck, and ALS medic unit.

**Table 1. First-alarm Equipment and Personnel Dispatched**

<b>Resource Designation</b>	<b>Staffing</b>	<b>Dispatched (rounded to minute)</b>	<b>On-Scene (rounded to minute)</b>
<b>Battalion Chief 22 (IC)</b>	Battalion Chief	0109 hrs	0124 hrs
<b>Engine 412 (E412)</b>	Officer and 3 fire fighters	0109 hrs	0115 hrs
<b>Engine 401 (E401)</b>	Officer and 3 fire fighters	0109 hrs	0127 hrs
<b>Engine 56 (E56)</b>	Captain and 3 fire fighter	0109 hrs	0116 hrs 1 <sup>st</sup> engine on scene; Called “arrived” late to make sure of location.
<b>Engine 312 (E312)</b>	Officer and 3 fire fighters	0109 hrs	0117 hrs
<b>Truck 404 (T404)</b>	Volunteer fire chief, driver/operator, and 3 fire fighters	0109 hrs	0117 hrs

## **Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland**

<b>Resource Designation</b>	<b>Staffing</b>	<b>Dispatched</b>	<b>Resource Designation</b>
<b>Squad 414 (SQ414)</b>	Fire fighter	0109 hrs	0123 hrs
<b>Medic 56 (M56)</b>	2 Paramedics	0109 hrs	0115 hrs
<b>Emergency Medic Supervisor Unit 5 (EMS5)</b>	Lieutenant	0109 hrs	0117 hrs
<b>Squad 322 (SQ322)</b>	3 Fire fighters	0109 hrs	0127 hrs
<b>Special Unit 418 (SU418)</b>	Fire fighter (victim) and another fire fighter	Special Unit 418 self-dispatched prior to Engine 412 and Squad 414 obtaining a full crew at 0113 hours	0114 hrs
<b>Engine 19 (E19)</b>	Captain and 3 fire fighter	0113 hrs	0122 hrs
<b>Medic (M19)</b>	2 Paramedics	0113 hrs	0122 hrs
<b>Truck 18 (T18)</b>	Captain and 3 fire fighter	0113 hrs	0127 hrs

### **Timeline**

An approximate timeline summarizing the significant events of the incident is listed below. The times are approximate and were obtained by studying available dispatch records, photos, run sheets, witness statements, and fire department records. The times are rounded to the nearest minute. The timeline is not intended, nor should it be used, as a formal record of events.

- 0109 Hours**  
 BC22, E412, E401, E56, E312, T404, SQ414, M56, EMS5, and SQ322 were dispatched to a residential fire with people trapped;
- 0113 Hours**  
 SU418 self-dispatched; E19, T18, and M19 dispatched as RIT Task Force;

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

- **0114 Hours**  
SU418 arrived on scene; Smoke showing from the rear of the structure; Police on scene; Occupants were screaming a person was trapped on an upper floor;
- **0115 Hours**  
E412 and M56 arrived on scene;
- **0116 Hours**  
E56 arrived on scene; SU418 believed to have entered structure;
- **0117 Hours**  
E312, T404, and EMS5 arrived on scene;
- **0122 Hours**  
E19 arrives as the rapid intervention team;
- **0123 Hours**  
SQ414 arrived on scene; E56 enters structure with SU418 fire fighter, who re-enters ahead of them;
- **0124 Hours**  
BC22 arrived on scene; E56 at top of stairs on 2<sup>nd</sup> floor, encountered heavy smoke and heat and requested ventilation;
- **0125 Hours**  
E56 heard PASS alarm and called a “Mayday”; E19 was doing a 360 degree size-up at this time;
- **0127 Hours**  
BC22 assumed command and re-affirmed the Mayday; SQ322 arrived on scene; E56 located the fire fighter and were bringing him out; E19’s RIT met E56 inside the door to help bring out the fire fighter;
- **0130 Hours**  
The IC requested the 2<sup>nd</sup> floor windows be ventilated;
- **0131 Hours**  
E312 battled heavy fire on 1<sup>st</sup> and 2<sup>nd</sup> floors of Side C;
- **0134 Hours**  
EMS5 enroute to the hospital with the fire fighter;

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

- **0137 Hours**  
SQ322 located civilian victim on 2<sup>nd</sup> floor and removing him through Side A window;
- **0147 Hours**  
Fire knocked down.

### **Personal Protective Equipment**

The victim was wearing structural fire-fighting coat and pants, gloves, hood, boots, structural fire-fighting helmet with eye protection, and self-contained breathing apparatus (SCBA) with an integrated personal alert safety system (PASS). It was reported that the SCBA cylinder valve was in the off position when the victim was brought outside and assumed to have air in the cylinder. At the time of the investigation, the PPE was in the custody of the police department and NIOSH was unable to evaluate it. The SCBA passed its last annual flow test in August 2012. The fire fighter had passed his respirator fit test in April 2013.

The fire department had an external contractor evaluate the SCBA. The initial evaluation by the contractor revealed that the facepiece was missing the external exhalation valve on the left side. An external exhalation valve was recovered by the police investigators the next day in the bedroom. When the SCBA was tested by the external contractor with the external exhalation valve reinstalled the SCBA passed all tests except for the high pressure leakage. The positive pressure system worked properly.

### **Weather Conditions**

According to data from the U.S Department of Commerce, National Oceanic and Atmospheric Administration, the sky conditions were "clear" with 8 mile visibility. The temperature was 45 degrees F (7.2 degrees C); dew point was 42 degrees F (5.6 degrees C); relative humidity was 89%; and the wind speed was 0 mph. Barometric pressure was 29.94.<sup>1</sup>

### **Investigation**

At 0109 hours, county dispatch responded to the call of a residential structure fire with occupants trapped and dispatched Battalion Chief 22, four engines (E412, E401, E56, and E312), one truck (T404), two squads (SQ414 and SQ322), an emergency medical service officer (EMS5), and a medic unit (M56). Special Unit 418 (SU418), as the first-due volunteer station, self-dispatched with two fire fighters to the incident. SU418 was the first on scene and conferred with police and occupants. The occupants were screaming that a man was trapped on the second floor. The two fire fighters donned their turnout gear and SCBA and made entry into the structure. SU418 was equipped with a portable radio, but neither fire fighter took the radio with them. Engine 56 (E56) arrived with a captain, who assumed command and conferred with police. While pulling up on scene, E56's Operator stated he saw the SU418 crew don their turnout gear and SCBA. The E56 operator assisted the two fire fighters from E56 with stretching a 1¾-inch hoseline from E56. The E56 captain, initial Incident Commander (IC), entered the front yard to get a view of the residence which set back off the road and was obscured by trees and shrubbery. The IC went down Side B via the driveway, to conduct a size-up. He encountered vehicles, piles of firewood, and numerous other large items that limited access around the

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

residence. On Side C, the IC encountered numerous other obstacles, several vehicles including an RV and piles of miscellaneous items, in the backyard. He observed heavy fire from the ground floor windows extending towards the second floor. At this point, “Command” requested a 2<sup>nd</sup> alarm for Box 41-20.

At approximately 0117 hours, the E56 operator started pulling a second hoseline off the engine as E412, EMS5, and Truck 404 arrived (**see Diagram 4**). The IC instructed the T404 Officer in Charge (OIC) to get the structure laddered, start ventilation, and assist with the interior search. Two E56 fire fighters had stretched a charged 1¾-inch hoseline to the front door and met one of the SU418 fire fighters (the victim) on the front porch. The SU418 fire fighter stated that there was an occupant trapped somewhere on the second floor and they had heavy smoke and heat on the 2<sup>nd</sup> floor. The fire fighter re-entered the structure ahead of the E56 attack crew. The E56 nozzleman noticed the 1<sup>st</sup> floor hallway access was severely limited, due to accumulation of furniture, art supplies, etc., along the walls and on the floor, so they took the stairs to the second floor landing where they encountered heavy heat and zero visibility. When E56 reached the top of the stairs at the 2<sup>nd</sup> floor, the nozzleman opened the nozzle in short bursts (pencil) to cool down the 2<sup>nd</sup> floor. The servant’s stairwell provided a means for the heat and smoke to rise right in front of the fire fighters at the top of the stairs (**see Photo 1, Diagram 1, and Diagram 2**). An unknown fire fighter went past the crew towards the stairs. The nozzleman felt his arms getting hot and radioed “Command” to get the 2<sup>nd</sup> floor ventilated. The T404 OIC and a fire fighter were on Side C, threw an 18-foot ground ladder, and took out the 2<sup>nd</sup> floor window above the 1<sup>st</sup> floor bathroom. Two other T404 fire fighters threw 20-foot and 16-foot ground ladders to the porch roof but never vented the 2<sup>nd</sup> floor windows on Side A.

At 0124 hours, BC22 arrived on scene, went to the front of the fire structure, and had a face-to-face with the IC. At this time, the E56 attack crew, hindered by clutter within the structure, tried to advance down the 2<sup>nd</sup> floor hallway and heard a PASS alarm. The E56 crew called out to the SU418 crew with no response. The nozzleman tried contacting the SU418 crew via radio with no response. At this point, he called a “Mayday.”

At 0127 hours, BC22 assumed command and re-affirmed the Mayday with the county dispatch center and activated the RIT. The E56 backup man went around the nozzleman towards the sound of the PASS. After pushing the door open to a bedroom located on the B/C corner of the house, he crawled into the bedroom and found/felt a fire fighter who was standing up. This fire fighter, from SU418, was pointing to a fire fighter on the floor behind the door (**see Photo 2 and diagram 2**). The fire fighter was face down with no helmet, hood, facepiece, or gloves. These items were later recovered from the bedroom. The E56 fire fighter reached around and pulled the unconscious fire fighter up and yelled to the nozzleman that he had the downed fire fighter. With the help of the fire fighter from SU418, the E56 crew got the unresponsive fire fighter down the stairs. They were met just inside the door by the E19 RIT, who then helped get the fire fighter to the porch. The RIT captain removed the fire fighter’s SCBA and noticed the cylinder valve was in the closed position. At approximately 0129 hours, the victim was put on a backboard and taken to Medic 56 that was staged at a commercial building just south of the fire structure. Paramedics were able to re-establish a pulse and respiration. At approximately 0134 hours, the fire fighter was transported to a local hospital and then transferred to a metropolitan trauma center. Unfortunately, he passed away from his injuries eight days later.



## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---



**Photo 1. The servant's stairwell, off the dining, near the origin of the fire in the kitchen which provided a chimney effect for the heat and smoke to the 2<sup>nd</sup> floor where the fire fighters were conducting their search.**

*(NIOSH Photo)*

## **Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland**

---



**Photo 2. The bedroom where the downed fire fighter was found behind the door.  
This post-incident photo is absent of the clutter that existed.  
(NIOSH Photo)**

### **Fire Behavior**

According to the investigating Detective from the County Police Department, the fire originated in the rear of structure in the kitchen area on the 1<sup>st</sup> floor.

#### **Indicators of significant fire behavior**

- Smoke and fire on Side C upon arrival
- Heat and heavy black smoke on 2<sup>nd</sup> floor
- Heavy fire on Side C both 1<sup>st</sup> and 2<sup>nd</sup> floors
- Servant's stairway provided direct access for heat and smoke to rise to 2<sup>nd</sup> floor (see **Photo 1**)

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

- Vented 2<sup>nd</sup> floor windows on Side C
- Fire under control 32 minutes after arrival.

### **Contributing Factors**

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident that led to the fatalities:

- Civilian at risk in the structure
- Blocked access/egress due to hoarding that added to the fuel load
- Multiple stairways
- Uncoordinated response to an emergency scene
- Facepiece removed in immediately dangerous to life or health (IDLH) environment
- SU418 crew left the portable radio in the special unit
- Loss of crew integrity
- Lack of size-up and situational awareness by initial crew
- Lack of ventilation.

### **Cause of Death**

According to the death certificate, the medical examiner listed the victim's cause of death as smoke inhalation and thermal injuries with complications. Upon arrival to the emergency room the fire fighter's carboxyhemoglobin was 47.3 percent and he had burns on his left hand and forehead.

### **Recommendations**

***Recommendation #1: Fire departments should ensure that emergency response deployment protocols are developed to prevent uncoordinated responses to an emergency scene.***

Discussion: The International Association of Fire Chiefs and the National Volunteer Fire Council discourage the practice of self-dispatch among emergency response personnel to emergency incidents without notification or request. They have issued a joint policy statement stating that, "Uncontrolled and uncoordinated arrival of resources at emergencies cause significant accountability issues as a result of personnel freelancing and creating additional safety risks to firefighters, civilians and others who are operating within the parameters of the incident action plan. Chaos at the scene occurs, creating additional safety risks because these companies or individuals are not aware of the overall strategic plan. Further, unrequested emergency units and emergency personnel at incidents disrupt the accountability and incident management system. An incident management system requires that a formal structure is utilized to determine the needs of an incident. The needs of the incident are in most cases directly related to personnel and equipment. When resources show up that have not been requested, the incident management system fails. Unplanned resources in many cases block roads, create traffic jams, restrict access and ultimately affect the safety of those fire fighters who are

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

operating at the scene by denying them needed resources. Freelancing of personnel and fire companies adversely impact incident management systems and require that the Incident Commander assign more personnel to control and coordinate these resources that were not requested.”<sup>2</sup>

In this incident, SU418 self-dispatched while E412 was waiting for a full crew. The initial Incident Commander noticed the presence of SU418 vehicle at the scene but was unaware where or what the SU418 crew was doing.

***Recommendation #2: Fire departments should ensure that crew integrity is properly maintained by voice or radio contact when operating in an immediately dangerous to life and health (IDLH) atmosphere.***

Discussion: When a crew enters a structure, the members must remain in contact by visual (eye-to-eye contact), verbal (by radio or by person-to-person), or direct (by touch) contact. NFPA 1500 *Standard on Fire Department Occupational Safety and Health Program*, states in Paragraph 8.5.5, "Crew members operating in a hazardous area shall be in communication with each other through visual, audible, or physical means or safety guide rope, in order to coordinate their activities."<sup>3</sup> Additionally, NFPA 1500 Paragraph 8.5.6 states, "Crew members shall be in proximity to each other to provide assistance in case of an emergency."<sup>3</sup>

The International Association of Fire Chiefs, Safety, Health, and Survival Section has redefined the *Rules of Engagement for Structural Fire-Fighting*. One of the objectives is to ensure that fire fighters always enter a burning building as a team of two or more members and no fire fighter is allowed to be alone at any time while entering, operating in, or exiting a building. A critical element for fire fighter survival is crew integrity. Crew integrity means fire fighters stay together as a team of two or more. They must enter a structure together and remain together at all times while in the interior, and all members come out together. Crew integrity starts with the company officer ensuring that all members of the company understand their riding assignment, having the proper personal protective equipment, and having the proper tools and equipment. Upon arrival at the incident, the company is given a task to perform by the Incident Commander. The company officer communicates to the members of the company what their assignment is and how they will accomplish their assignment. As the members of a company enter a hazardous environment together, they should leave together to ensure that crew integrity is maintained. If one member has to leave, the whole company leaves together.<sup>4</sup>

It is the responsibility of every fire fighter to stay in communications with crew members at all times. All fire fighters must maintain the unity of command by operating under the direction of the Incident Commander, division/group supervisor, or their company officer at all times. The ultimate responsibility for crew integrity and ensuring no members get separated or lost rests with the company officer. They must maintain constant contact with their assigned members by visual observation, voice, or touch while operating in a hazard zone. They must ensure they stay together as a company or crew. If any of these elements are not adhered to, crew integrity is lost and fire fighters are placed at great risk. If a fire fighter becomes separated and cannot re-connect with his/her crew immediately, the fire fighter must attempt to communicate via portable radio with the company officer. If reconnection is not accomplished after three radio attempts or reconnection does not take place within one minute, a

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

Mayday should be declared. If conditions are rapidly deteriorating the Mayday must be declared immediately. As part of a Mayday declaration, the fire fighter must next activate the radio's emergency alert button (where provided) followed by manually turning on the PASS alarm. Similarly, if the company officer or the fire fighter's partner recognizes they have a separated member, they must immediately attempt to locate the member by using their radio or by voice. If contact is not established after three attempts or within one minute a Mayday must be declared immediately.<sup>4</sup>

In this incident, the crew from SU418 rushed to rescue the civilian trapped on the second floor and left their radio in the special unit. After being driven back down the stairs by heat and smoke, the victim spoke to the E56 engine crew with a hoseline on the porch and re-entered with the engine crew behind him. At some point the victim and his partner became separated. When his PASS alarm went off his partner re-located him just prior to the engine crew.

***Recommendation #3: Fire departments should ensure fire fighters are trained in effective size-up, operational risk management, and situational awareness.***

Discussion: Size-up is a systematic process which consists of a swift gathering of information based upon critical incident factors which leads to the development of a strategy and Incident Action Plan. This process leads to making efficient, effective, and safe decisions on the fireground. The fireground is a very dynamic and rapidly changing environment. The initial size-up cannot be delayed or overlooked nor can it be a time-consuming process. The size-up has to be methodical, concise, and ensure all the necessary information is gathered and then communicated to the dispatch center and other responding units. This is done in conjunction with the assuming command of the incident.<sup>5</sup>

The size-up consists of specifics such as but not limited to:

- type of building and construction,
- occupancy type,
- location and volume of fire,
- life safety issues,
- exposure problems,
- building access and egress,
- water supply,
- available staffing
- offensive fire attack versus defensive operations.<sup>6</sup>

The first arriving officer has to conduct a 360° walk-around of the structure, if possible, to gather this information. Once the information gathering has been completed, the officer can develop a strategy and Incident Action Plan for the particular incident.

In addition, the officer needs to provide a brief initial status report to the dispatch center and to responding units. The initial status report should include:

- building and occupancy type,
- description of conditions,

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

- instructions to others,
- requests for additional resources.<sup>5</sup>

The initial status report is a necessary element of incident management as this ensures that everyone who is responding to or is on scene at the incident has a clear picture of what is occurring.

Operational risk management needs to be integrated into this process by the first arriving officer or member. The risk to fire department members is the most important factor to be considered by the first arriving officer/Incident Commander in determining the strategy and Incident Action Plan that will be applied in each situation. The concept of risk management should be utilized on the basis of the following principles:

- activities that present a significant risk to the safety of members shall be limited to situations where there is a potential to save endangered lives;
- activities that are routinely employed to protect property shall be recognized as inherent risks to the safety of members, and actions shall be taken to reduce or avoid those risks;
- no risk to the safety of members shall be acceptable when there is no possibility to save lives or property;
- in situations where the risk to fire department members is excessive, activities shall be limited to defensive operations.<sup>3</sup>

All fire fighters operating at an incident should maintain situational awareness and conduct a continuous risk assessment throughout the incident, reporting unsafe or changing conditions to the Incident Commander. Fire fighters need to understand the importance of situational awareness and personal safety on the fire ground. The fire ground dangers and hazards can and do change as the incident becomes larger and the event duration increases. Situational awareness is defined as recognition of the immediate surroundings. On the fireground, every fire fighter should be trained to be constantly alert for changing and unsafe conditions related to their immediate surroundings. This applies not only to the conditions found within a burning structure, but to the exterior fire ground as well.<sup>7</sup>

The opposite of situational awareness is tunnel vision where the fire fighters become so focused on fire-fighting operations, rescue, or other operational assignments that they fail to sense changes in their environment. Fire fighters can maintain their situational awareness by looking up, down, and around as well as listening for new or unusual sounds and feeling vibrations or movement. Fire fighters and officers should communicate any changes in their environment to other members as well as to the Incident Commander.

The International Association of Fire Chiefs, Safety, Health and Survival Section developed the Rules of Engagement for Structural Fire-Fighting. These rules of engagement have been developed to assist fire fighters, fire officers, and the Incident Commander in risk assessment and “Go” or “No-Go” decisions. The fireground creates significant risks to fire fighters. The goal is to reduce fire fighters from the exposure to unsafe conditions and stop unsafe practices.<sup>4</sup>

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

The Rules of Engagement for Structural Fire-Fighting can assist the Incident Commander, company officers, and fire fighters in assessing their situational awareness. One principle applied in the Rules of Engagement for Structural Fire-Fighting is that fire fighters and company officers are the members most at risk for injury or death and should be the first to identify unsafe conditions and practices. The rules integrate the fire fighter into the risk assessment decision making process. Where it is not safe to proceed, the rules allow a process for that decision to be made while still maintaining command unity and discipline.

### Rules of Engagement for Fire-Fighter Survival:

- Size-up your tactical area of operation. (Pause for a moment, look over the area of operation, evaluate individual risk exposure, and determine a safe approach to completing your tactical objectives.)
- Determine the occupant survival profile. (Consider occupant survival as part of your individual risk assessment and action plan.)
- Do not risk your life for lives or property that cannot be saved. (Do not risk your life when fire conditions prevent occupant survival and when significant or total destruction of the building is inevitable.)
- Extend limited risk to protect savable property. (When trying to save a building, limit risk exposure to a reasonable, cautious, and conservative level.)
- Extend vigilant and measured risk to protect and rescue savable lives. (During high-risk primary search-and-rescue operations where lives can be saved, manage search-and-rescue operations in a calculated, controlled, and safe manner while remaining alert to changing conditions.)
- Go in together, stay together, and come out together, when two or more fire fighters are operating as a team/crew.
- Maintain continuous awareness of your air supply, situation, location, and fire conditions. (Maintain situational awareness by knowing where you are in the building and what is happening around you and elsewhere that can affect risk and safety.)
- Constantly monitor fire ground communications for critical radio reports.
- Report unsafe conditions or practices that can harm you. Stop, evaluate, and decide. (Officers should prevent exposure to unsafe conditions or practices by allowing any member to raise an alert about a safety concern without penalty and by mandating supervisors address safety questions to ensure safe operations.)
- Abandon your position and retreat before deteriorating conditions can harm you. (Be aware and exit early to a safe area when you are exposed to deteriorating conditions, unacceptable risk, and a life-threatening situation.)
- Declare a Mayday as soon as you think you are in danger. (Officers should ensure fire fighters are comfortable with declaring a Mayday as soon as they think they are in trouble.)<sup>4</sup>

At this incident, the two SU418 fire fighters arrived on scene in a utility vehicle without the benefit of proper staffing on the fireground. Focused on rescuing the civilian, they left the portable radio in the fire department vehicle; did not have the protection of a hoseline; did not realize the fuel load created

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

by hoarding and its impact on ingress/egress issues; did not maintain situational awareness; and became separated.

In a scenario of arriving first on-scene, when occupants are screaming and shouting about a trapped occupant, the situation can easily dictate a focus on the rescue of the occupant and at the expense of conducting a proper size-up. The size-up should be conducted along with the incorporation of risk management plus maintaining situation awareness. These are all critical elements essential to fire fighter safety which should not be overlooked.

***Recommendation #4: Fire departments should ensure that all responding apparatus are staffed with a properly trained and qualified officer.***

Discussion: The importance of having a properly trained and qualified officer assigned to an apparatus is crucial to the success of the company or response unit from both a management perspective as well as fire fighter safety. A company officer is given the responsibility to effectively and efficiently manage the company or response unit and ensure for the assigned member(s). NFPA 1720: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* requires that members responding to an emergency incident shall be organized into companies or response units and shall have the required apparatus and equipment. A company officer shall at all times be aware of the identity, location, and activity of each member assigned to the company.<sup>8</sup> Also, NFPA 1201, *Standard on Developing Fire Protection Services for the Public* states in Chapter 9 – “Organization for Fire Protection”, Paragraph 9.4.1, “A company officer or qualified acting officer shall be assigned to be in charge of each company at all times. An assistant officer also shall be assigned in the case of volunteer companies”.<sup>9</sup>

A company officer has the knowledge, skills, abilities, and competencies to function as the leader of a company or crew. The company officer functions in both an administrative and operational capacity. The focus of this recommendation is the operational component, which is vital to the successful outcome of any emergency incident. Many times, the initial Incident Commander is a company officer. The first arriving officer is the person who can directly evaluate conditions and use visible information to develop the on-scene decisions which can produce rapid, efficient action. The first arriving officer is responsible for initiating the incident management process at the very beginning of the event. If this window of opportunity is missed, there will not be another opportunity. If this assumption of command is missed, the impact can affect the remainder of the incident and the members responding to the incident.<sup>5</sup>

The first arriving resource is responsible for initiating the incident management system which includes performing a scene size-up which includes a thorough risk assessment. The first arriving resource then provides a brief initial status report which confirms the assumption of command of the incident. Command is developing a strategy and Incident Action Plan as well.

There are three levels that function on the fireground – strategic, tactical, and task levels. The first arriving resource assuming Command insures that initial management functions and incident action

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

occur in a coordinated and integrated way. This prevents uncoordinated operations (freelancing) from occurring and having to overcome the obstacles when Command is finally established. The three operational levels are clearly defined and established.

In this incident, two fire fighters responded in SU418 without an officer. Their response time was about one minute and they were the first to arrive on scene. When they arrived on scene, there was no size-up given, no initial status briefing, no assumption of command, no accountability, no hoseline available, and no rapid intervention team established at that time. Neither fire fighter had a portable radio which was left in the cab of SU418. The actions of the two fire fighters were affected by the fact that occupants were screaming that a person was trapped inside the building. The two fire fighters immediately went into the structure and to the 2<sup>nd</sup> floor. Due to the high heat and smoky conditions, they retreated back to the front porch and met the crew from E56. The two crews went to the 2<sup>nd</sup> floor where the SU418 fire fighter may have experienced an SCBA emergency eventually being found.

There are many functions of incident management that have to occur in a very brief period of time at the beginning of an incident. Fire fighters operate primarily on the task level and situations such as those encountered during this incident may cause them to overlook the tactical and strategic levels. An officer is responsible for ensuring all three operational levels are properly coordinated from the beginning of an incident.

***Recommendation # 5: Fire departments should ensure all fire fighter riding positions are provided radios and fire fighters are trained on their proper use.***

Discussion: The National Fire Protection Association (NFPA) 1561, *Standard on Emergency Services Incident Management System*, Section 6.3 Emergency Traffic, states in section 6.3.1: “To enable responders to be notified of an emergency condition or situation when they are assigned to an area designated as immediately dangerous to life or health (IDLH), at least one responder on each crew or company shall be equipped with a portable radio and each responder on the crew or company shall be equipped with either a portable radio or another means of electronic communication.”<sup>10</sup> The joint U.S. Fire Administration (USFA) and International Association of Fire Fighters (IAFF) report, *Voice Radio Communications Guide for the Fire Service*,<sup>11</sup> provides an overview of radio communication issues involving the fire service. Effective fireground radio communication is an important tool to ensure fireground command and control as well as helping to enhance fire fighter safety and health. Every fire fighter on the fireground should be provided with their own radio in case they become lost or separated from their crew.

Receiving interior/exterior status updates is critical to the safety of fire fighters on the incident, rescue/recovery efforts, and overall control of the incident. The fireground is very dynamic, and conditions can either improve or deteriorate based on fire suppression activities, and available resources, and most importantly assessments/size-ups of the incident are necessary to detect a change on the fireground.

It is every fire fighter’s and company officer’s responsibility to ensure radios are properly used. Ensuring appropriate radio use involves both taking personal responsibility (to have your radio, having it on, and on the correct channel) and a crew based responsibility to ensure that the other members of

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

your crew are doing so as well. Radios should be designed and positioned to allow the fire fighter to monitor and transmit a clear message. These radios should be well maintained and inspected by qualified personnel on a regular basis.

The fire department involved in this incident typically issues three radios per fire apparatus. The company officer and the driver carry a radio. On engine companies, the hydrant fire fighter is assigned a radio. On truck companies, the fire fighter responsible for forcible entry at the rear carries a radio. During this incident, SU418 had a portable in the vehicle but neither fire fighter grabbed it prior to leaving the vehicle. Both the International Association of Fire Chiefs (IAFC)<sup>12</sup> and the International Association of Fire Fighters (IAFF)<sup>11</sup> recommend that all fire fighters be assigned a radio. In 1999, the U.S. Fire Administration technical report *Improving Firefighter Communications* identified a number of radio communication issues, including the need for all fire fighters to have portable radios. The report stated “Ideally, every firefighter working in a hostile environment should have a portable radio with emergency distress feature.”<sup>13</sup> The IAFF *Fireground Survival Program* contains training on radio communication procedures in emergency operations including how to call a Mayday.<sup>14</sup>

***Recommendation #6: Fire departments should ensure fire fighters are trained in self-contained breathing apparatus (SCBA) emergencies.***

Discussion: Repetitive skills training with SCBA is vital for fire fighters working inside an IDLH atmosphere. SCBA skills training is an ongoing process that should be performed regularly to ensure that fire fighters "know their SCBA." The benefits of repetitive skill training with SCBA are an increased comfort and competency level, decreased anxiety, lower air consumption, increased awareness of the user's air level, noticing and using the heads-up display (HUD), and an automatic muscle memory response of the vital function controls, such as the don/doff buttons, main air valve, emergency bypass operating valve, rapid intervention crew/universal air connection (RIC/UAC) and the buddy breather connection. Repetitive skills training can also provide the user with an increased ability to operate these functions and controls in a high-anxiety moment or an emergency. Many times these skills will be necessary with gloved hands, limited vision, and reduced ability to hear commands from others. Performed in conditions that are non-IDLH, repetitive skills training helps build the fire fighters' muscle memory skills so their hands will be able to activate the controls with gloves on and the operation will be a conditioned or second-nature response. Fire fighters have died in IDLH conditions because they did not react properly to a malfunctioning SCBA or out-of-air emergency.<sup>15</sup>

Fire fighters should never remove their facepiece in an IDLH atmosphere. Self-contained breathing apparatus may experience partial or total malfunctions. For example, if a regulator malfunctions a fire fighter can often open the emergency bypass valve to purge the exhalation valve or get air. If the pressure-reducer malfunctions, airflow can be controlled by partially closing the cylinder valve to get some flow of air. The key to most situations is to not panic and concentrate on skills training. Most procedures recommend calling for help and/or activating your PASS device, and attempting to exit the structure. An emergency training protocol should be established for each type of SCBA in an emergency situation and utilize programs compliant with NFPA 1404 *Standard for Fire Service Respiratory Protection Training*.

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

*Note: In 2012, NIOSH NPPTL lifted the prohibition on Emergency Buddy Breathing Safety System (EBBSS) for structural fire fighting only. The NFPA technical committee revised the language to include performance criteria for an EBBSS connection, in the 2013 edition of NFPA 1981.<sup>16</sup>*

In this incident, the victim apparently experienced an SCBA emergency and went into a near-by room to try and fix the issue by removing his facepiece without the knowledge of his partner. It is assumed this is where they became separated. The victim was overcome by the toxic conditions and his PASS device was heard by the engine crew at the top of the stairwell. The victim's external exhalation valve was later recovered in the bedroom.

***Recommendation #7: Fire departments should ensure that fire fighters are properly trained in air management.***

Discussion: Chief Bobby Halton, retired chief and Editor in Chief of Fire Engineering notes, "If you run out of air in a working fire today, you are in mortal danger. There is no good air at the floor anymore, no effective filtering methods, no matter what others may say to the contrary." The only protection for fire fighters in the toxic smoke environments in today's fires is the air that they carry on their backs. Like SCUBA divers, fire fighters must manage their air effectively and leave enough reserve air to escape in case of unforeseen occurrences while inside a structure fire. Fire fighters must manage their air so that they leave the immediately dangerous to life or health (IDLH) atmosphere before the low-air alarm activates. This leaves an emergency air reserve and removes the noise of the low-air alarm from the fireground.<sup>17</sup> Air management is a program that the fire service can use to ensure that fire fighters have enough breathing air to complete their primary mission and to escape an unforeseen emergency. Fire departments and fire fighters need to recognize that the smoke in modern construction is an IDLH atmosphere and manage their air along with their work periods so the fire fighters exit the IDLH atmosphere with their reserve air intact. NFPA 1404 *Standard for Fire Service Respiratory Protection Training* states that fire fighters should exit from an IDLH atmosphere before the consumption of reserve air supply begins; a low-air alarm is notification that the individual is consuming the reserve air supply and that the activation of the reserve air alarm is an immediate action item for the individual and the fire-fighting team.<sup>18</sup>

The vast majority of the structure fires responded to are single or multi-family residential occupancies. For some fire departments, a typical strategy is an aggressive offensive fire fight to achieve the tactical priorities. Generally, fire crews are able to search these structures quickly, put out the fire, and exit the hazard zone without having to give much thought to air management.

There are usually multiple points of egress close by should a rapid retreat to the exterior become necessary. It's critical to insure firefighters exit the hazard zone with an emergency reserve of air.

According to NFPA 1404, all members utilizing an SCBA in the hazard zone of an incident shall monitor the amount of air in their SCBA cylinder as well as their rate of air consumption in order to exit the hazard zone prior to the low air alarm activation of the SCBA.<sup>18</sup> Just as ocean divers are trained to surface with an emergency reserve of air, firefighters shall exit the hazard zone of an incident with an emergency reserve of air. It is critical that firefighters understand that the initial 67%

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

of the air supply is the "working and exiting air".<sup>16</sup> This includes air utilized for gaining access, working toward the tactical objectives, and exiting the hazard zone.

Company officers shall frequently assess their crew's air consumption rates and decide the crew's exit time based on the individual with the greatest assumed air consumption rate. It is the individual firefighter's responsibility to continually assess and report his/her air consumption to his/her company officer.

In this incident, the two SU418 fire fighters entered the building with their SCBA and facepieces reportedly on. They tried to get to the 2<sup>nd</sup> floor without the protection of a hoseline, but were unable due to the high heat and smoky conditions. They retreated to the front porch of the structure where they met E56. Both crews entered the structure and went to the 2<sup>nd</sup> floor. The victim apparently had an SCBA emergency and went into the bedroom and closed the door. Perhaps in a self-survival mode he did not have the mental acuity or focus to attempt exiting the structure. The crew from E56 heard a PASS Alarm sounding and found the victim on the floor not wearing his helmet, facepiece, or gloves and unresponsive. The other fire fighter from SU418 and E56 moved the victim down the stairs and were met just inside the door by the E19 RIT, who then helped get the fire fighter to the front porch.

***Recommendation #8: Fire departments should ensure that fireground operations are coordinated with consideration given to the effect of ventilation.***

Discussion: NFPA 1021, Standard for Fire Officer Professional Qualifications, section 4.6.1 and A.4.6.1(A), requires that all fireground operations conducted are based upon the overall strategy and incident action plan (IAP) developed by the IC. The essential element is to ensure that fireground operations (strategy, tactics and tasks) are coordinated and communicated so that everyone understands the plan. Strategy is the overall goal or goals of managing the incident. Tactics are selected and based on strategic goals and employed through tried and true fireground objectives — such as rescue, exposures, confinement and extinguishment of the fire, overhaul, ventilation and salvage. Based on size-up findings, the IC needs to prioritize the delivery of these tactics to put out the fire, ensure it stays out and conserves as much property as the complexity and fire size allows. The IC must train and prepare to develop a strategy and IAP based upon information acquired and factors observed for every incident. This practice provides the basis for a standard incident management approach to every incident. Decisions made and the actions they produce can be no better than the information on which they are based. The IC must develop the habit of using the critical factors in their order of importance as the basis for making the specific assignments that make up the IAP.<sup>19</sup> This standard approach becomes a huge help when it is hard to decide where to start.

The IC must create a standard information system and use effective techniques to keep informed at the incident. Information is continually received and processed so that new decisions can be made and old decisions revised based on new data and information received. The IC can never assume action-oriented responders engaged in operational activities will just naturally stop what they are doing so they can feed the IC a continuous supply of top-grade objective information. It is important that if the

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

IC or Supervisor requests a progress report from a company with no response they should continue to make contact until they get a satisfactory report.

During most critical incident situations, the IC many times must develop an IAP based only on the critical factor evaluation information available at the beginning stage of operations. Many times, that information is incomplete. Even though the IC will continue to improve the IAP's quality, the IC will seldom function during the fast, active periods of the event with complete or totally accurate information on all factors. This is most evident during confused, time-compressed initial operations. This continual improvement in the accuracy and timeliness of incident information becomes a major IC function.<sup>20,21</sup>

An essential tactic of any IAP is if and when to ventilate. An IC will have the option of deciding if natural, mechanical, horizontal, vertical, or hydraulic ventilation may work best for each type of fire structure and situation. Generally, in two-story residential structures with fires on the first floor, utilize windows closest to the seat of the fire. Consider ventilating the second floor as soon as possible. When the fire is on the second floor, ventilate this floor first. If possible, start by ventilating the outside windows of the room of origin first and coordinate the movement of air within the structure. Keep the doors to rooms closed once searched and especially control the doors to rooms where windows have been taken out. Control the flow of air from the inside to the outside if possible.<sup>22</sup>

With the amount of plastics and hydrocarbon-based products found in homes today and coupled with engineered building products, the increased intensity of fire growth and heat paths can have a significant impact on interior crews and their safety.<sup>23</sup> Interior crews can face significant heat when searching for the seat of the fire, especially in an environment where minimal ventilation causes the retention of heat.<sup>24</sup> This then poses the danger of a flashover when adequate ventilation occurs. In this incident the engine crew mentioned the extreme amount of heat and black smoke that was at the top of the stairwell which was in close proximity to where the victim was found. The engine crew requested ventilation.

At this incident, the fire structure was built in the late 1800's and had a servant's staircase, off the dining area near the fire's origin, which the fire department was unaware of initially. In addition, the structure contained a large amount of combustible and hydrocarbon-based products due to hoarding which produced a heavy black smoke. The servant's staircase provided a means for the smoke and heat to travel to the second floor very quickly causing visibility on the 2<sup>nd</sup> floor to be near zero. Ventilation was called for early in the incident but was not completed until after the victim was rescued.

## **References**

1. National Oceanic and Atmospheric Administration, <http://www.ncdc.noaa.gov/cdo-web/results>
2. The International Association of Fire Chiefs (IAFC) and the National Volunteer Fire Council (NVFC) Discourage the practice of self-dispatch among emergency response personnel to emergency incidents without notification or request;

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

[http://www.iafc.org/files/downloads/ABOUT/POLICY\\_STATES/IAFCpol\\_SelfDispatchAmongPersonnel.pdf](http://www.iafc.org/files/downloads/ABOUT/POLICY_STATES/IAFCpol_SelfDispatchAmongPersonnel.pdf)

3. NFPA [2013]. NFPA 1500 standard on fire department occupational safety and health program. 2013 ed. Quincy, MA: National Fire Protection Association.
4. IAFC [2012]. Rules of engagement for structural firefighting. Fairfax VA: International Association of Fire Chiefs, Safety, Health and Survival Section  
[\[http://www.iafcsafety.org/downloads/Rules\\_of\\_Engagement\\_short\\_v10\\_2.12.pdf\]](http://www.iafcsafety.org/downloads/Rules_of_Engagement_short_v10_2.12.pdf).
5. Brunacini, AV [2002]. Fire Command, 2<sup>nd</sup> Edition. National Fire Protection Association. Quincy, MA. 2002.
6. NIOSH [2010]. NIOSH alert: preventing deaths and injuries of fire fighters using risk management principles at structure fires. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No.2010-153  
[\[http://www.cdc.gov/niosh/docs/2010-153/\]](http://www.cdc.gov/niosh/docs/2010-153/).Date accessed: November 2013.
7. IFSTA [2008]. Essentials of fire fighting, 5th ed. Oklahoma State University. Stillwater, OK: Fire Protection Publications, International Fire Service Training Association.
8. NFPA [2010]. NFPA 1720: *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments*. 2010 ed. Quincy, MA: National Fire Protection Association.
9. NFPA [2010]. NFPA 1201: *Standard on Developing Fire Protection Services for the Public*. 2010 ed. Quincy, MA: National Fire Protection Association
10. NFPA 1561[2008]. NFPA 1561: *Standard on Emergency Services Incident Management System*, 2008 Edition. Quincy, MA: National Fire Protection Association.
11. USFA / IAFF [2008]. [Voice Radio Communications Guide for the Fire Service](#). Joint publication by cooperative agreement with the International Association of Fire Fighters (IAFF) and the U.S. Fire Administration (USFA). October 2008.  
<http://www.iaff.org/08News/PDF/RadioCommunications.pdf>. Date accessed: April 1, 2014.
12. IAFC [2011]. [Position Statement: Assignment of Portable Radios/Two-Way Communications Devices to Every Firefighter on the Fireground](#), dated April 1, 2014. International Association of Fire Chiefs. Fairfax, VA.  
[http://www.iafc.org/associations/4685/files/IAFCposition\\_Daniels\\_PortableRadiosPositionStatement.pdf](http://www.iafc.org/associations/4685/files/IAFCposition_Daniels_PortableRadiosPositionStatement.pdf). Date accessed: April 1, 2014.

## **Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland**

---

13. USFA [1999]. *Special Report: Improving Firefighter Communications*. U.S. Fire Administration / Technical Report Series: USFA-TR-099/January 1999. Department of Homeland Security, Emmitsburg, MD.
14. IAFF [2010]. [IAFF Fire Ground Survival Program](http://www.iaff.org/HS/FGS/FGSIndex.htm). International Association of Fire Fighters. <http://www.iaff.org/HS/FGS/FGSIndex.htm>. Date accessed: April 1, 2014.
15. NIOSH [2011]. Career fire fighter dies while conducting a search in a residential house fire—Kansas. Morgantown, WV: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Fatality Assessment and Control Evaluation (FACE) Report F2010-13 <http://www.cdc.gov/niosh/fire/reports/face201013.html>.
16. NFPA [2013]. NFPA 1981 Standard on open-circuit self-contained breathing apparatus for emergency services. 2013 ed. Quincy, MA: National Fire Protection Association.
17. Gagliano M, Phillips C, Jose P, Bernocco S [2008]. Air management for the Fire Service. Tulsa, OK: Penn Well Corporation, Fire Engineering.
18. NFPA [2013]. NFPA 1404, *Standard for fire service respiratory protection training*. 2013 ed. Quincy, MA: National Fire Protection Association.
19. NFPA [2014]. NFPA 1021 Standard for Fire Officer Professional Qualifications. 2014 ed. Quincy, MA: National Fire Protection Association.
20. FEMA [1996]. Risk Management Practices in the Fire Service, 1996. Washington, DC: Federal Emergency Management Agency.
21. Brunacini AV and Brunacini N [2004]. Command Safety. Across the Street Publications.
22. Lee, M [2008]. Ventilation Basics by Structure Type. <http://www.firerescue1.com/fire-products/ventilation/articles/403097-Ventilation-Basics-by-Structure-Type/>. Date accessed: November 2013.
23. Lee, M [2008]. Fireground Tactics Priorities – RECEO VS. FireRecruit.com. <http://www.firerecruit.com/articles/426027-Fireground-Tactical-Priorities-RECEO-VS>. Date accessed: April 1, 2014.
24. Lee, M [2007]. Be Alert to Basement Fire Hazards. FireRescue1. Com. <http://www.firerescue1.com/fire-attack/articles/291024>. Date accessed: April 1, 2014.

## ***Volunteer Fire Fighter Found Unresponsive With His Facepiece Off Dies Eight Days Later – Maryland***

---

### **Investigator Information**

This incident was investigated by Matt E. Bowyer, General Engineer, and Murrey Loflin, Investigator, with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. An expert technical review was provided by Richard D. Riley, Operations Chief, Clearwater, Fire and Rescue. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

### **Disclaimer**

Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to Web sites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these Web sites.