

APPENDIX C

SELF-SURVIVAL SKILLS



APPENDIX C

SCBA FAMILIARIZATION AND EMERGENCY PROCEDURES WITH ROOM ORIENTATION

BACKGROUND

CASE STUDY

(The following comes from the NIOSH FF LODD investigation report F2004-04: *Career Fire Fighter Dies of Carbon Monoxide Poisoning after Becoming Lost While Searching for the Seat of a Fire in Warehouse - New York*. The full investigation report is available at the NIOSH website: <http://www.cdc.gov/niosh/fire/reports/face200404.html>).

On December 16, 2003, a 30-year-old male fire fighter (the victim) died after he became separated from his crew members while searching for the seat of a fire at a furniture warehouse. His crew exited due to worsening conditions and a missing member announcement was made. Rescue efforts were initiated and the victim, who had a working radio, was found lying face down with his face piece removed and 900 psi left in his self-contained breathing apparatus (SCBA).

At 1228 hours, an alarm was received for a fire at a commercial structure. The six-member crew of Ladder 36 (including the victim) was first on scene at 1231 hours. They reported a working fire with heavy smoke and fire at the rear of the structure. Two L-36 crew members went to the roof to begin ventilation and one member went to the rear to open the rear door. Unable to open the rear door, he then went to the roof to assist the ventilation crews. The remaining three members of L-36 prepared to enter and search for the fire origin. The B13 Chief arrived at 1233 hours and assumed Incident Command. At 1234 hours, L-36 began forcible entry on the roll-down gates to the second floor entrance and Engine 95 began stretching a 2 ½-inch line to the entrance. The irons man (forcible entry; the victim) cut the locks on the pull-down security door at the bottom of the stairs leading to the second floor. Once the door was opened, the three L-36 crew members ascended the stairs and assembled at the top. At this time, visibility was good in the stairs but poor inside the warehouse. At 1239 hours, the D7 Chief arrived and assumed Incident Command from B13. He then sent the B13 Chief to take command of the fire floor. At approximately the same time, the L-36 crew donned their face pieces and, with the officer in the lead, crawled into the warehouse. They crawled in about six feet and turned right (because this area was passable) and moved toward the rear. The officer, who was using a thermal imaging camera (TIC), reported that the camera image “whited out” when aimed at the ceiling.

At approximately 1241 hours, the L-36 officer heard the victim say something to him in a non-urgent tone which he did not understand. At 1242 hours, E-95 brought their hand line up to where the L-36 crew was located. At this time, the victim was on the side of the line opposite his crew members - toward the interior. At about 1243 hours, they were ordered to open their line to cool down the structure and began spraying the ceiling where they could hear fire crackling. At about the same time, Engine 75 brought a back-up 2 ½-inch hand line up to the land-

ing. At 1247 hours, E-75 entered the warehouse, positioned its line to the left of E-95, and began operating toward the two exposures. At approximately 1249 hours, due to high heat conditions, the L-36 officer yelled for his crew to get out. He then turned to the left and moved toward the stairwell. At approximately 1251 hours, when the L-36 officer did not see the victim in the stairwell, he sent his can man to the street to look for him and tried radioing the victim and yelling into the structure. At about the same time, E-75 withdrew its line to the stairs and the L-36 officer began checking the exiting fire fighters in an effort to locate the victim. At approximately 1253 hours, the E-95 officer and nozzle man thought they heard a scream from inside the fire building. They shut down their line and yelled into the structure for about 30 seconds and, receiving no response, began suppression operations again. At 1255 hours, the IC ordered an evacuation. At 1256 hours, the L-36 can man returned to the stairwell and reported that he could not find the victim in the street. The L-36 officer verbally informed B13 that he had a missing member. At 1257 hours, B13 transmitted a missing member message to the IC (D7) via an “Urgent” radio transmission. Shortly thereafter, the L-36 officer mistakenly identified one of the exiting engine crew members (nozzle man) as his missing member and cancelled the emergency stating that his crew member had been found. At about 1258 hours, the L-36 officer yelled into the occupancy and told the two remaining E95 members inside to leave, that he had found his missing member. B13 verified from the L-36 officer (face to face) that the missing member had been accounted for and radioed the information to the IC. By approximately 1259 hours, all remaining members had left the fire floor and by 1301 hours everyone was off the roof. At about the same time, the IC ordered a defensive operation and L46 began master stream application through the windows. At 1303 hours, after doing a second personnel accountability report (PAR) at street level, the L-36 officer realized that his irons man was still missing and probably on the fire floor. He reported this verbally to the B13 Chief and, at 1304 hours, Rescue 3 and the L-36 officer returned to the fire floor and began searching for the victim with E-75 operating a hand line to protect them. At approximately 1309 hours, the IC ordered suppression to cease and to stop all commuter trains to be stopped. *Note: Commuter trains, which passed nearby about every two minutes, were causing radio interference.*

At 1313 hours, R-3 located the victim who was about 30 feet from the stairs near the center columns. He was lying beneath a skylight, face down in a pool of water with his head in the direction of the front windows. His face piece was off and the manual shut off switch on the regulator was depressed. The victim's radio was on and his left glove was off. The victim may have removed his facepiece in an effort to radio or yell for help. He was taken by ambulance to a nearby hospital where he was pronounced dead at 1349 hours. The total time the victim was in the structure from the time he was noted to be missing to when he was found was estimated to be approximately 30 minutes.

APPENDIX C

SCBA FAMILIARIZATION AND EMERGENCY PROCEDURES WITH ROOM ORIENTATION

SKILL APPLICATION ON THE FIRE GROUND:

Fire fighters must be able to use their gloved hands to feel their surroundings in limited visibility to know their location inside a structure. Fire fighters must also be able to perform all forms of donning and doffing of the SCBA with gloved hands in limited visibility to ensure their airway is protected when working in super heated environments.

PERFORMANCE OBJECTIVE:

Given department issued equipment the fire fighter will demonstrate he/she is proficient in locating an SCBA with activated PASS device, donning the SCBA, and using the SCBA while in a zero visibility environment (blacked out mask). Fire fighter will also be required to demonstrate proficiency in rectifying an SCBA malfunction or failure. *(Note: This is an isolated skill and not a realistic progression of a Mayday.)*

EQUIPMENT NEEDED:

- Enclosed room w/furnishings
- Radio
- Fire fighter with structural fire fighting ensemble
- Hand tool
- SCBA w/blacked out mask (with wax paper)

DRILL SET-UP:

- Enclosed room with furnishings. Room should be large enough where fire fighter can come in contact with walls, doorways, and furnishings while searching for sounding PASS alarm on SCBA. Multiple rooms with connecting doorways allow fire fighters to exercise room orientation skills.
- Prior to having each student perform the drill, instructors will present the details to the group. Instructors will demonstrate each step of SCBA donning and use with vision in preparation for performing it without vision. Each fire fighter will perform each action of instructor. Several practices may be required prior to performing skill in room without vision.
- Fire fighter's SCBA prepared as per following page, and placed inside structure in a location where fire fighter must search the area. PASS device is activated. Fire fighter, with face piece blacked out, allowed to enter room to locate SCBA. Once SCBA located, fire fighter follows steps for donning using feel only.

INSTRUCTOR DUTIES:

- During group demonstration, one instructor reads instructions while other instructor performs donning.
- During drill, one instructor located at door to monitor entrance and exit of fire fighter. Second instructor positioned inside room to ensure fire fighter performing drill correctly.
- Instructors shall provide instruction to fire fighters having difficulty locating the SCBA, donning the SCBA, and orienting themselves to the room to find the exit.

INSTRUCTORS:

- Two (instructor student ratio 1:5)

STUDENTS:

- Ten (Note: Students practice donning and doffing while their turn)

TIME REQUIRED:

- One hour

INSTRUCTOR NOTES

SCBA set-up prior to locating inside room



Step 1:
Start with a standard SCBA with the cylinder closed, and regulator purge valve open.



Step 2:
Buckle the waist belt and tighten straps fully.

Step 3:
Tighten the shoulder and waist straps fully



Step 4: Place the stage-two regulator and low pressure hose through the opposite side shoulder strap

Step 5: When ready to begin place the pack on the floor with the shoulder straps facing down and activate the manual pass alarm

IMPORTANT SAFETY CONSIDERATIONS	INSTRUCTOR NOTES
<p>SAFETY POINTS:</p> <ul style="list-style-type: none">■ Full fire fighting Personal Protective equipment shall be worn.■ Fire fighter shall perform skill station in a blacked out room or with a blacked out face piece. (Fig. A)■ Ensure fire fighter performs all tasks with NFPA compliant fire fighting gloves■ Fire fighter will carry forcible entry tool■ Instructor shall have a flash light■ Ensure each SCBA is configured the exact same way for each student. ie. Chest strap secured, one shoulder strap tightened down, waist strap tight etc.	



Figure A: Blacked out mask

IMPORTANT EMERGENCY PROCEDURE CONSIDERATIONS	INSTRUCTOR NOTES
POSSIBLE MALFUNCTION POINTS: <ul style="list-style-type: none"> ■ Leaking face piece ■ Free flow of air to face piece (open purge, bypass, or inhalation valve open?) ■ Reduced or no flow (closed failure) of air to face piece – (open air bottle, frozen inhalation valve) 	

SCBA FAMILIARIZATION W/ROOM ORIENTATION AND EMERGENCY PROCEDURES	INSTRUCTOR NOTES
TEACHING POINTS: (In group setting) <ul style="list-style-type: none"> ■ The instructor will provide instruction to the group regarding SCBA orientation. Each student required to don SCBA. ORIENTATION <ul style="list-style-type: none"> ■ Cylinder between legs, bottle positioned vertically with valve on ground. Back frame positioned away from body. ■ Ensure cylinder valve is open ■ Run hand down left shoulder strap to find face piece regulator ■ Ensure purge/bypass closed ■ Insert regulator into face piece ■ Loosen all straps and check for entanglements ■ Prepare to don ■ Take overhand grip on shoulder straps shoulder width apart ■ Spread shoulder straps and swing around on to low pressure line side as in donning a jacket ■ Tighten all straps and secure waist strap 	

SCBA FAMILIARIZATION W/ROOM ORIENTATION AND EMERGENCY PROCEDURES	INSTRUCTOR NOTES
<p>TEACHING POINTS: (In group setting)</p> <ul style="list-style-type: none"> ■ Fire fighter enters room crawling with tool (provide for safety) orienting as they proceed. ■ Searches for SCBA with activated pass alarm using the sound as a guide (instructor only assists if necessary). ■ Upon finding SCBA refer to SCBA orientation skills. ■ Silences PASS alarm upon locating SCBA. ■ Instructor informs student is separated from crew. ■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure. ■ Re-activates PASS alarm (provided there's only one student in the room at a time). ■ Performs an emergency exit — one hand held high against wall (to locate windows, door handles etc.), the other carrying a tool. 	

SCBA SKILLS FAMILIARIZATION



1. Feels high on walls for egress



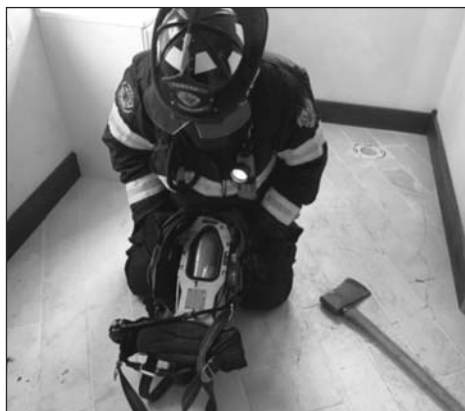
2. Feels floor and furnishings for orientation



3. Search for SCBA with active PASS alarm using sound as a guide and find SCBA.



4. Silences pass alarm upon location



5. Cylinder between legs, bottle positioned vertically with valve on ground. Back frame positioned away from body.



6. Ensure cylinder valve is open.



7. Run hand down appropriate shoulder strap to find face piece regulator.



8. Ensure purge/bypass is closed.



9. Insert regulator into facepiece



10. Finds pass on shoulder strap



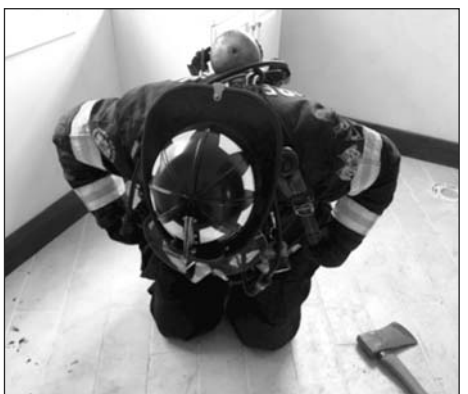
11. Loosens all straps and check for entanglements



12. Takes overhand/cross hand grip on shoulder straps.



13. Swing around on to low pressure line side donning as a jacket.



14. Tighten all straps and secure waist strap.



15. Student announces MAYDAY – who, what, where



16. Student reactivates pass alarm



17. Performs emergency exit — one hand held high against wall

APPENDIX C

SELF-SURVIVAL PROCEDURE “GRAB LIVES”

BACKGROUND

CASE STUDY

(The following comes from the NIOSH FF LODD investigation report F2001-13: Supermarket Fire Claims the Life of One Career Fire Fighter and Critically Injures Another Career Fire Fighter – Arizona.

The full investigation report is available at the NIOSH website: www.cdc.gov/niosh/fire/pdfs/face200113.pdf)

On March 14, 2001, a 40-year-old male career fire fighter/paramedic died from carbon monoxide poisoning and thermal burns after running out of air and becoming disoriented while fighting a supermarket fire. Four other fire fighters were injured, one critically, while fighting the fire or performing search and rescue for the victim. The fire started near a dumpster on the exterior of the structure and extended through openings in the loading dock area into the storage area, and then into the main shopping area of the supermarket. The fire progressed to five alarms and involved more than 100 personnel. Fire fighters removed the victim from the structure and transported him to a local hospital where he was pronounced dead.

NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments should:

- ensure that the department’s Standard Operating Procedures (SOPs) are followed and continuous refresher training is provided
- ensure that a proper size-up, using common terminology, is conducted by all fire fighters responsible for reporting interior/exterior conditions to the Incident Commander (IC)
- ensure that pre-incident plans are established and updated on mercantile occupancies in their district
- ensure that fire fighters manage their air supplies as warranted by the size of the structure involved
- instruct and train fire fighters on initiating emergency traffic (Mayday-Mayday) and on the importance of activating their personal alert safety system (PASS) device when they become lost, disoriented, or trapped
- ensure that multiple Rapid Intervention Crews (RIC) are in place when an interior attack is being performed in a large structure with multiple points of entry ■



APPENDIX C

SELF-SURVIVAL PROCEDURE “GRAB LIVES”

SKILL APPLICATION ON THE FIRE GROUND:

A fire fighter is part of a crew extending a hose line to find the seat of the fire in a “cold smoke” environment. As the crew negotiates around furniture and racks of merchandise, the fire fighter loses the hose line and is lost. Unable to re-locate the hose line or to contact crew members, the fire fighter initiates the self-survival procedure by performing the elements of “GRAB LIVES” to alert rescuers to his or her location.

PERFORMANCE OBJECTIVE:

Given department issued equipment, instruction, demonstration and practice, the fire fighter will complete a Mayday **scenario implementing GRAB LIVES**, using the steps listed below. Fire fighter will also demonstrate proficiency acting as Incident Commander when a fire fighter has called a Mayday.

EQUIPMENT NEEDED:

- Darkened room w/ furnishings to act as obstructions. Obstructions where fire fighter must move over, under, and to the side are appropriate.
- Charged hose line with at least 150 feet of hose inside room. At least one coupling inside room needed for fire fighter to feel for exit direction.
- Structural fire fighting gear with SCBA worn by fire fighter.
- Black out face piece using wax paper.
- 4 Radio's minimum (radios needed for FF in drill and FF acting in Command)
- Area outside of room to be established as Command Post. Area should be sufficient distance from fire fighter inside so radio communications are relied upon.
 - Table
 - Shelter/Shade (EZ Up okay)
 - 2 Chairs
 - Pencil and paper
 - Table top incident simulation sheets (Pre-Incident Plan and photographs of structure specific to the host department's response area)

DRILL SET-UP:

- One fire fighter is the distressed fire fighter in a room with a blacked out face piece. This fire fighter will perform the actions of GRAB LIVES to assist in his/her own rescue. Second fire fighter positioned outside of room uses radio to communicate with distressed fire fighter. Fire fighter positioned outside will act as Command and perform all duties consistent with managing the initial stages of a Mayday.

INSTRUCTORS:

- Two (instructor student ratio 1:5)

INSTRUCTOR DUTIES:

- One instructor positioned inside room with distressed fire fighter. This instructor is responsible for ensuring distressed fire fighter is performing each element of GRAB LIVES correctly. Instructor may remind fire fighter of tasks and provide tips on improving technique. Fire fighters typically are challenged with accessing their radios, forgetting to disarm their PASS devices when speaking on their radios, and have difficulty controlling their breathing. Instructor should make noise as if partner fire fighter is looking for the fire fighter calling the Mayday. Instructor shall provide reminders to the fire fighter to improve their technique.
- One instructor positioned outside with fire fighter acting in the position of Command. This instructor will act as Dispatch and all other resources assigned to a Mayday response. Instructor to provide the appropriate amount of intensity to the incident based on the fire fighter's ability.

STUDENTS:

- Ten

TIME REQUIRED:

- One hour

SELF-SURVIVAL PROCEDURE “GRAB LIVES”	INSTRUCTOR NOTES
IMPORTANT SAFETY CONSIDERATIONS	
SAFETY POINTS:	
■ Full firefighting Personal Protective equipment shall be worn.	
■ Fire fighters will be on air.	
■ Fire fighter’s face piece blacked out with wax paper – watch for signs of panic. Remind fire fighter to control breathing. This will calm the fire fighter and force them to organize his/her thoughts, and perform the actions of GRAB LIVES.	
■ Fire fighter should have a tool.	
■ Fire fighter has a radio.	
■ Instructor shall have a flash light.	



SELF-SURVIVAL PROCEDURE “GRAB LIVES”	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Fire fighter face piece is blacked out or obscured. <hr/> <ul style="list-style-type: none"> ■ Fire fighter’s cylinder should be between one quarter to one half full, with no low air alarm activating (optional – use full bottles and simulate air depletion if air refill not available). <hr/> <ul style="list-style-type: none"> ■ Fire fighter placed in center of large room after being led in circles to create a sense of disorientation (Fig. 1). <hr/> <ul style="list-style-type: none"> ■ Instruct fire fighter to assume a crawling position. Instruct the fire fighter: <ol style="list-style-type: none"> 1. You are in a large commercial structure as part of the attack team. 2. You have lost contact with the hose line. 3. You can no longer contact your crew. <hr/> <p>A. Fire fighter initiates GRAB LIVES procedure: <i>Note: Order of performance not critical. More important all actions are performed throughout the Mayday event.</i></p> <hr/> <p>GAUGE-</p> <ul style="list-style-type: none"> ■ Check air gauge <hr/> <p>RADIO FOR ASSISTANCE (Fig. 2)</p> <ul style="list-style-type: none"> ■ Activates EMERGENCY ALERT BUTTON (if equipped and if department policy allows) ■ Fire fighter notifies Command (2nd FF outside) of a MAYDAY following their own departments MAYDAY procedure. (Fig. 3, 4) <hr/> <p>ACTIVATE PASS</p> <ul style="list-style-type: none"> ■ Positions self for maximum visibility of PASS <hr/> <p>BREATHING</p> <ul style="list-style-type: none"> ■ Attempts to control breathing <hr/> <p>LOW</p> <ul style="list-style-type: none"> ■ Attempts to stay below thermal layer <hr/> <p>ILLUMINATE</p> <ul style="list-style-type: none"> ■ Turns on flashlight ■ Positions flashlight appropriately (i.e. 45 degree angle) <hr/> <p>VOLUME</p> <ul style="list-style-type: none"> ■ Makes noise with hand tool <hr/> <p>EXIT</p> <ul style="list-style-type: none"> ■ Search for an exit. Feels for doors and windows. ■ Find hoseline – feels with both hands while facing hose.(Fig. 5) ■ Maintains contact with hoseline while feeling for coupling with outstretched arms. This reduces the distance travelled on the hose line to find a coupling. (Fig. 6) ■ After feeling a coupling, the fire fighter shall determine direction of travel to locate the exit. Coupling is felt with gloved hands. (Fig. 7) ■ Straddles hoseline and faces correct direction to egress where hose enters structure. Fire fighter should encounter smooth surface of female coupling first if hoseline connected with nozzle at male end. (Fig. 8) <hr/> <p>Continued on Page 314</p>	

SELF-SURVIVAL PROCEDURE “GRAB LIVES” (CONTINUED)	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <p>SHIELD AIRWAY Depletion of Air Cylinder — any time during the exercise:</p> <p><i>Note: Later in the exercise the instructor will turn off the air cylinder of the SCBA to simulate the depletion of air.</i></p> <ul style="list-style-type: none">■ Disconnects regulator from facepiece. (Fig. 9, 10)■ Flatten body out and place regulator opening of mask as close to floor as possible (Fig 9)■ Move with facepiece opening on floor (fig 10) or use gloved hand to shield opening (fig 11, 12)■ Reports condition to Command.■ Continues to search for an exit.■ Update Command upon exit with location.	



Figure 1



Figure 2



Figure 3

SELF-SURVIVAL PROCEDURE “GRAB LIVES” (CONTINUED)

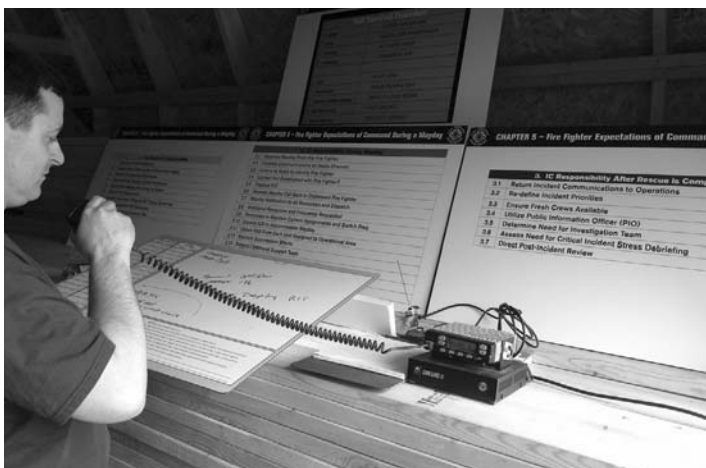


Figure 4



Figure 5



Figure 6



Figure 7



Figure 8

SELF-SURVIVAL PROCEDURE “GRAB LIVES” (CONTINUED)



Figure 9



Figure 10



Figure 11



Figure 12

APPENDIX C

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS

BACKGROUND

CASE STUDY

(The following comes from the NIOSH Fire Fighter LODD investigation report F2013-16: 4 Career Fire Fighters Killed and 16 Fire Fighters Injured at Commercial Structure Fire – Texas. The full investigation is available at the NIOSH website:

<https://www.cdc.gov/niosh/fire/reports/face201316.html>)

On May 31, 2013, a 35 year-old career captain, a 41 year-old career engineer operator, a 29 year-old career fire fighter, and a 24 year-old career fire fighter were killed when the roof of a restaurant collapsed on them during fire-fighting operations. The captain was assigned to Engine 51 (E51). The engineer/operator was assigned to Ladder 51, but was detailed to E51 and assigned to the left jumpseat (E51B). The two fire fighters were assigned to Engine 68 (E68). Upon arrival, the captain of E51 (E51A) radioed his size-up stating they had a working fire in the restaurant with heavy smoke showing plus a temperature reading from his thermal imager. E51 made an offensive attack from Side Alpha with a 2½ inch pre-connect hoseline in the restaurant. District Chief 68 (D68) arrived on scene and established “Command”. He ordered E51 out of the building because the engine operator of E51 (E51D) advised that E51 was down to a quarter tank of water. Engine 68 had arrived on scene and had laid two 4-inch supply lines from E51 to a hydrant east of the fire building on the feeder road. Once E51 had an established water supply, E51’s crew re-entered the building. En-

gine 68 (E68) was ordered to back-up E51 on the 2½ inch hoseline. Engine 82 (E82) (4th due engine company) was pulling a 1¾ inch hose line to the front doorway that E51 had entered, when the collapse occurred. The roof collapsed 12 minutes after E51 had arrived on-scene and 15 minutes and 29 seconds after the initial dispatch. The fire fighter from E51 (E51C) was at the front doorway and was pushed out of the building by the collapse. The captain from E82 called a “Mayday” and Rapid Intervention Team (RIT) operations were initiated by Engine 60. During the RIT operations, a secondary wall collapse occurred injuring several members of the rescue group. Due to the tremendous efforts of the Rescue Group, a successful RIT operation was conducted. The captain of E68 was located and removed from the structure by the Rescue Group and transported to a local hospital. The engineer operator from E51 (E51B) was removed from the structure by the Rescue Group and later died at a local hospital. A search continued for the captain of E51 and the two fire fighters from E68. Approximately 2 hours after the collapse, the body of the captain from E51 was located on top of the restaurant roof debris. The two fire fighters from E68 (E68B and E68C) were discovered underneath the restaurant roof debris. The officer and two fire fighters were pronounced dead at the scene.

Note: The captain of Engine 68 (E68A) died on March 7, 2017 from complications of the severe injuries suffered in the restaurant fire on May 31, 2013.

APPENDIX C

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS

SKILL APPLICATION ON THE FIRE GROUND:

Fire fighters are extending a hose line into a structure when the ceiling collapses behind them cutting off their exit. Not having the ability to follow the hose line outside, and windows unavailable for egress, the fire fighters must pass through breached walls to find a more tenable atmosphere.

PERFORMANCE OBJECTIVE:

Given department issued equipment, instruction, demonstration and practice, the fire fighter will be able to perform **WALL BREACH/LOW PROFILE/ REDUCED PROFILE MANEUVERS**, using the steps listed below.

EQUIPMENT NEEDED:

- Low/reduced profile prop (See specifications on following pages)
- Radio
- Fire fighter with structural fire fighting ensemble
- Hand tool

INSTRUCTORS:

- Two (instructor student ratio 1:5)

STUDENTS:

- Ten

TIME REQUIRED:

- One hour

Note: When instructing these skills, be aware of the location of the first stage regulator (reducer) of the SCBA. If its location differs from the left side adjust the maneuver to accommodate its location, remembering that the first stage regulator (reducer) is always on the side of the rotation. This is to protect the regulator and to keep it flowing air to the face piece.



WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS	INSTRUCTOR NOTES
IMPORTANT SAFETY CONSIDERATIONS SAFETY POINTS:	
<ul style="list-style-type: none"> ■ Ensure that prop is in good working order prior to conducting training. 	
<ul style="list-style-type: none"> ■ Full Firefighting Personal Protective equipment SHALL be worn. ■ Perform all skills in supine or prone position with SCBA on Fire fighters will carry a forcible entry tool. 	

NOTE: Wall breach should be considered a last resort to remove oneself from a harsh environment. Wall breaching requires the expenditure of energy which increases air consumption. Prior to wall breach, a fire fighter should search for an egress like a window or a door. If an egress cannot be found, breaching a wall and moving to another environment may be the only option.

WALL BREACH — KICKING	
TEACHING POINTS	INSTRUCTOR NOTES
<ul style="list-style-type: none"> ■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure 	
<ul style="list-style-type: none"> ■ Face wall in sitting position (Fig. 1) or kneeling for mule kick (Fig. 2) method. 	
<ul style="list-style-type: none"> ■ Kick wall at the intended breach location (low). 	
<ul style="list-style-type: none"> ■ Enlarge opening slightly with foot and check environment of room on other side by leaning down close to floor and looking through the opening. 	
<ul style="list-style-type: none"> ■ Once opening is created it can be expanded to studs with gloved hands. 	
<ul style="list-style-type: none"> ■ On firefighter's side of wall pull debris out of the opening, on the other side push or kick the material into other room. 	
<ul style="list-style-type: none"> ■ Remove any entanglement hazards. 	
<ul style="list-style-type: none"> ■ Check floor integrity in other room by reaching through opening with a tool to sound the floor. 	
<ul style="list-style-type: none"> ■ Update command with change of location. 	
WALL BREACH — WITH A TOOL	
TEACHING POINTS	INSTRUCTOR NOTES
<ul style="list-style-type: none"> ■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure 	
<ul style="list-style-type: none"> ■ Identify type of wall construction (wood, concrete, light weight metal etc.) by sounding wall. 	
<ul style="list-style-type: none"> ■ Select location to breach by hollow sound (Fig. 3). 	
<ul style="list-style-type: none"> ■ Firefighter should stay low to the floor. 	
<ul style="list-style-type: none"> ■ Penetrate tool through both sides of the wall to ensure there are no obstacles blocking the other side (Fig. 4). 	
<ul style="list-style-type: none"> ■ Enlarge opening slightly and check environment of room on other side by leaning down close to floor to look and listen through the opening (Fig. 5 and 6). 	
<ul style="list-style-type: none"> ■ Widen opening by hand or knocking stud out of the way with entry/exit tool (if necessary). 	
<ul style="list-style-type: none"> ■ Remove any entanglement hazards (Fig. 7). 	
<ul style="list-style-type: none"> ■ Check floor integrity in other room by reaching through opening with a tool and striking it on the floor (Fig. 8). 	
<ul style="list-style-type: none"> ■ Pass tool through opening. 	
<ul style="list-style-type: none"> ■ Update command with change of location. 	

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS



Figure 7



Figure 8

LOW PROFILE WITH FULL SCBA REMOVAL WITH OBSTRUCTIONS	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Loosen waist belt and unbuckle (Fig. 9). ■ Undo chest strap if so equipped. ■ Loosen shoulder straps (Fig. 10) ■ Remove right shoulder strap first (Fig. 11). ■ Remove left shoulder strap and maintain firm grasp on regulator hose (low pressure) and shoulder strap (Fig. 12). ■ Position SCBA with cylinder on legs. ■ Maintain a firm grasp on the left shoulder strap/low pressure line and get into a prone position in front of opening. ■ Lead through the opening with an arm and sound floor and then manipulate helmet and shoulders at a 45 degree angle to pass through up to the waist- continually sounding the floor ahead. THIS ALSO GIVES THE FIRE FIGHTER A FREE HAND TO MOVE ANY OBSTRUCTIONS OR OBSTACLES (Fig. 13). ■ Stop when the waist gets to the opening ensuring the SCBA does not pass through – this will enable the firefighter to make a rapid escape if the room is deemed untenable (Fig. 14). ■ Once the room is considered safe, move rest of body through opening maintaining a firm grasp on the left shoulder strap (Fig. 15). ■ Re-orient SCBA to normal position — don and adjust. 	

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS



Figure 9



Figure 10



Figure 11



Figure 12

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS



Figure 13



Figure 14



Figure 15



LOW PROFILE WITH FULL SCBA REMOVAL	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Loosen waist belt and unbuckle (Fig. 9). ■ Undo chest strap. ■ Loosen shoulder straps (Fig.10). ■ Remove right shoulder strap first (Fig. 11). ■ Remove left shoulder strap and maintain firm grasp on regulator hose and shoulder strap (Fig. 12). ■ Push SCBA through opening with the cylinder valve entering first. This prevents the low pressure line from being pulled and compromising the face piece seal (Fig. 16). ■ Manipulate helmet, shoulders and hips through on a 45 degree angle maintaining contact with left shoulder strap and regulator hose (Fig. 17). ■ Re-orient SCBA to normal position — adjust and don. 	



Figure 16



Figure 17

REDUCED PROFILE — FRONT SWIM TECHNIQUE	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Start in kneeling position 	
<ul style="list-style-type: none"> ■ Lead through opening with right arm and then helmet. 	
<ul style="list-style-type: none"> ■ Shoulders should be at a 90 degree angle and bring cylinder into contact with right wall. 	
<ul style="list-style-type: none"> ■ Swim forward with the left arm through the opening and then rotate to the left until the shoulders begin to pass through the opening (Fig. 18). 	
<ul style="list-style-type: none"> ■ Now the students will be in the hand and knee position with shoulders through the opening (Fig. 19). 	
<ul style="list-style-type: none"> ■ Continue forward until hips come in contact with sides of opening. ■ Rotate (corkscrew) to the left by dropping left shoulder towards the ground as body passes through the opening. 	



Figure 18



Figure 19

REDUCED PROFILE — BACKSTROKE TECHNIQUE	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Start in sitting (Fig. 20) position, SCBA facing opening. ■ Place SCBA cylinder into opening with cylinder valve on sole plate. ■ Once cylinder is in opening, keep cylinder to the right until it rests up against the wooden frame to allow more room. (first stage regulator is on the left side of harness) (Fig. 21). ■ Place left arm through opening (over head or to side) (Fig. 22). ■ With left arm and shoulder through the opening, manipulate the helmet into the opening while simultaneously lifting right arm up and over to the left in a swimming motion (corkscrew) (Fig. 23). ■ Continue to rotate (corkscrew) through the opening (Fig. 24). 	



Figure 20



Figure 21

WALL BREACH/LOW PROFILE/REDUCED PROFILE MANUEVUERS ON SIXTEEN INCH CENTER WALLS



Figure 22



Figure 23



Figure 24

APPENDIX C

DISENTANGLEMENT PROCEDURES

BACKGROUND

CASE STUDY

(The following comes from the Regis Towers fire incident April 11, 1994. This incident was investigated by NIOSH and the findings were included in the NIOSH publication *NIOSH Alert: Preventing Injuries and Deaths of Fire Fighters* [DHHS (NIOSH) Publication No. 94-125] and is available at the NIOSH website <http://www.cdc.gov/niosh/fire.html>)

On April 11, 1994, at 0205 hours, a possible fire was reported on the ninth floor of a high-rise apartment building. This building had been the scene of numerous false alarms in the past. An engine company and a snorkel company were the first responders and arrived at the apartment building at 0208 hours. The engine company was the first on the scene and assumed command. Five fire fighters from the two companies entered the building through the main lobby. They were aware that the annunciator board showed possible fires on the ninth and tenth floors. Lobby command radioed one fire fighter that smoke was showing from a ninth-floor window. All five fire fighters used the lobby elevator and proceeded to the ninth floor. When the doors of the elevator opened on the ninth floor, the hall was filled with thick black smoke. Four of the fire fighters stepped off the elevator. The fifth fire fighter, who was carrying the hotel pack, stayed on the elevator (which was not equipped with fire fighter control) and held the door open with his foot as he struggled to don his SCBA. His foot slipped off the elevator door, allowing the door to close and the elevator to return with him to the ground floor.

The remaining four fire fighters entered the small ninth-floor lobby directly in front of the elevator. One fire fighter stated that he was having difficulty with his SCBA and asked for the location of the stairwell. Another fire fighter said, "I've got him," and proceeded with him into the hallway, turning right. Later, one of the four fire fighters stated that he had heard air leaking from the SCBA of the fire fighter having difficulty and had heard him cough. The remaining two fire fighters entered the hallway and turned left, reporting zero visibility because of thick black smoke. Excessive heat forced them to retreat after they had gone 15 to 20 feet. They proceeded back down the hall past the elevator lobby. There they encountered a male resident, who attacked one of the fire fighters, knocking him to the floor and forcibly removing his facepiece. The two fire fighters moved with the resident through the doorway of an apartment, where they were able to subdue him. One fire fighter broke a window to provide fresh air to calm the resident. At about the same time, the low-air alarm on his SCBA sounded. The other fire fighter was unable to close the apartment door because of excessive heat from the hallway. Both fire fighters and the resident had to be rescued from the ninth-floor apartment window by a ladder truck.

Fire fighters from a second engine company arrived on the scene at 0209 hours. They observed a blown-out window on the ninth floor and proceeded up the west-end stairwell to the ninth floor carrying a hotel pack and extra SCBA cylinders. These fire fighters entered the ninth floor with a charged fire hose and crawled down the smoke-filled hall for approximately 60 feet (the hallway was 104 feet long) before extreme heat forced them to retreat. As they retreated, they crawled over something they thought was a piece of furniture. They did not remember encountering any furniture when they entered the hallway. In the dense smoke, neither fire fighter could see the exit door 6 feet away, and both became disoriented.

After the fire fighter from the first company rode the elevator to the ground floor lobby, he obtained a replacement SCBA and climbed the west-end stairs to the ninth floor. When he opened the ninth-floor exit door, he saw the two fire fighters from the second engine company in trouble. He pulled both into the stairwell.

When a rescue squad arrived at the scene at 0224 hours, lobby command could not tell them the location of the fire fighters from the first company. They proceeded up the west-end stairs to the ninth floor. The rescue squad opened the ninth-floor exit door and spotted a downed fireman approximately 9 feet from the door. He was tangled in television cable wires that had fallen to the floor as a result of the extreme heat. The downed fireman was from the first engine company; his body may have been what the fire fighters from the second engine company encountered in the hallway. He was still wearing his SCBA, but he was unresponsive. The rescue squad carried the fire fighter down the stairs to the eighth floor where advanced life support was started by other fire fighters. The rescue squad then entered the first apartment to the left of the exit door and found a second fire fighter from the first engine company kneeling in a corner and holding his mask to his face. He was unresponsive. The rescue squad carried the fire fighter down the stairs to the eighth floor where advanced life support was started.

Both fire fighters were removed within minutes and taken to a local hospital, where advanced life support was continued; but neither responded. Both victims died from smoke and carbon monoxide inhalation. Both victims wore PASS devices; but because the devices were not activated, no alarm sounded when the fire fighters became motionless.

APPENDIX C

DISENTANGLEMENT PROCEDURES

SKILL APPLICATION ON THE FIRE GROUND:
Fire fighters are extending a hose line into a structure in limited visibility where they encounter wires extending to the floor from overhead ducting that has burned through. As the crew continues searching for victims and the seat of the fire, a fire fighter gets entangled in the wire. In order to be free of the wire the fire fighter must perform the skill of disentanglement after calling a Mayday to alert incident command of the situation.

PERFORMANCE OBJECTIVE:
Given department issued NFPA compliant PPE and an optional hand tool. After instruction, demonstration, and practice, the fire fighter will be able to successfully navigate the wire entrapment prop performing **DISENTANGLEMENT PROCEDURES**, using the steps listed in the following pages.

- EQUIPMENT NEEDED:**
- Disentanglement prop (See specifications on following pages) – Note: multiple props of increasing difficulty can be built to challenge fire fighter skill.
 - Extra wire
 - Radio (for each student)
 - Fire fighter with structural fire fighting ensemble
 - Hand tool
 - Wire cutters (Each firefighter to keep in pocket. Cable cutter variety best.)

- INSTRUCTORS:**
- Two (instructor student ratio 1:5)

- STUDENTS**
- Ten

- TIME REQUIRED**
- One hour

IMPORTANT SAFETY CONSIDERATIONS
SAFETY POINTS:
■ Ensure the prop is in safe working order prior to conducting training
■ All students made aware of the “safety stop word” immediately before the start of the exercise
■ The instructor shall have a pair of wire cutters, in case of an emergency
■ Full structural fire fighting personal protective equipment equipment shall be worn including SCBA, NFPA compliant firefighting gloves and hood.
■ Fire fighter shall be on air
■ If partially or fully removing SCBA fire fighter shall maintain a firm grip on the appropriate shoulder strap protecting the low pressure hose, face piece and regulator
■ The fire fighter shall act in a systematic and controlled manner in order to overcome the entanglement problem

INTRODUCTION:

Instructor briefly discusses a LODD case study that identified the need for skills pertaining to wire disentanglement.

STUDENT INTERACTION:

Using the handout provided (“What Can Your Cutters Cut”) discuss the types of entanglement hazards commonly found in structures and solutions for disentanglement including the following:

■ Overhead A/C ducting coil

- One foot of standard residential duct (6” diameter) stretches 20 feet when released

■ Telecommunication wires

- Many companies just run new lines when they move into a structure leaving the old lines in place

■ Standard electrical supply wires

- Distribute handout and ask students if their wire cutters can cut the wires shown.

■ Drop ceiling grid

- Discuss how a partial drop ceiling collapse can cause a wall of wires to be created from the floor to the ceiling

■ Wire/Cable cutters

- Discuss:
 - Best type – one-handed cable cutters
 - Location – accessible to dominant hand

Ask students to remove their wire cutters from the normal location kept while wearing their fire gloves.

Using the handout provided (“Entanglement Hazards”) discuss entanglement points and how to identify and defeat each.

- **Helmet** — tension will be on the neck and face mask dislodgement is a safety consideration (Discuss keeping the helmet up in order to connect the brim with the SCBA)
 - Anything hard mounted to the helmet can get entangled
 - Eagle or Beaver on traditional helmets
 - Flashlights and battery packs
 - Goggle clips
 - Discuss how to remove helmet (i.e. what side of the strap is the quick release)
- **Mask Regulator** — normally forces the facemask opposite the direction of travel and face mask dislodgement is a major safety consideration
- Radio and Collar microphone — may not be detectable until the collar mic has fully extended (ask students about radio function if the collar mic has to be cut)
- **Flashlights and other equipment** — depends on location and method it is mounted
- **Turnout coat clips** — depends on location and type of clip
- **Equipment belts (axe belts)** — user must know how to release the belt
- Equipment in pockets such as screwdrivers or carabineers

WIRE CUTTERS (TYPE AND ACCESSIBILITY):

While there are varying opinions related to the type of wire cutters to use and the location to carry them, most will agree that whatever type carried, they should be capable of cutting through the most common types of wires and conduit found in residential and commercial structures.

“Cable Cutters” are recommended because they have shown to be the best combination of cutting ability and ease of use. The advantages over other types of cutters include the size and shape of the cutting blade, which is larger than most and shaped to prevent the tool from slipping off the material during a cut. Another advantage is the entire head of the tool is designed to cut which prevents the possibility of crimping wires instead of cutting that often occurs in low visibility when using side cutters.



The ideal location to carry the cutters is in a pocket accessible by either hand. In the past, the radio chest pocket found on most turnout coats was an excellent location. As radios have decreased in size, so has the radio pocket causing the arms of the cutters to be exposed when carried in it, which creates an entanglement hazard. If a chest pocket is not a viable option, the next best location is in a pocket accessible to the dominant hand. Because these pockets tend to be larger, a problem often encountered is that the cutters lie horizontally in the pocket and become buried under tools and other equipment. When the cutters are placed in the pocket, the webbing is laid over the Velcro outside the pocket. This method keeps the cutters positioned vertically in the pocket and allows immediate access to the tool without having to place a gloved hand into the pocket. Added modifications include a small spring and keeper to allow the handle to spring open and a golf ball to make the cutters easy to locate.



SCBA

- **Top of the bottle** — pulls off the front of the harness straps pushing the bottom of the harness into the body (**Fig 1.1**)
- **Bottle strap** — pulls off the front of the harness straps pushing the bottom of the harness into the body (normally requires partial/full removal of the pack to reach the wire)
- **Bottle valve/Pressure regulator** — pulls off the top of the shoulders pulling the bottom of the pack away from the body (**Fig 1.2**)

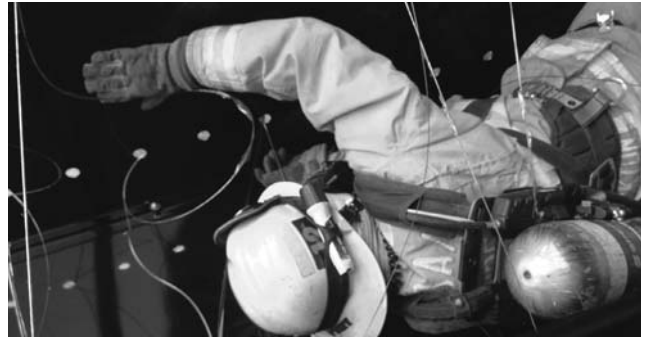


Fig. 1.1

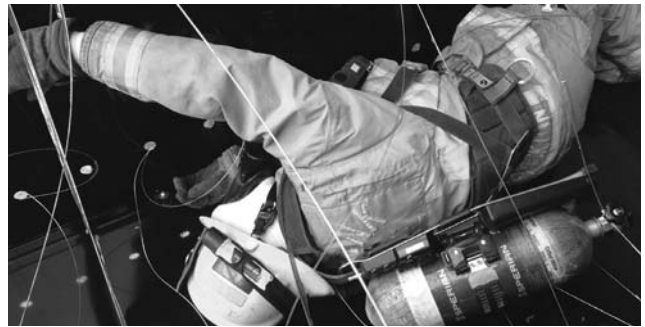


Fig. 1.2

Discuss and demonstrate proper techniques required to navigate an entanglement hazard including the following:

- **Standard upright swim**
- **Creating a defensible space**
- **Defendable space swim**
- **Using a hand tool to bridge the wires**
- **Full removal of the SCBA**
- **Using wire cutters**

NOTE:

Students should practice removal of the SCBA with a partner before entering the prop. In this skill station, the fire fighter should make at total of four passes through the training prop. The student should begin by attempting the standard swim technique while on their hands and knees. During the second pass, the fire fighter should place their SCBA in the defensible position using the “swim technique” to move in either direction. They may free themselves simply by repositioning their SCBA and subsequently removing the entanglement or they may have to perform a complete removal of the SCBA harness. The third pass should be made using a tool to bridge the wires. On the final pass, the fire fighter should be positively entangled and required to complete a pack removal, access their cutters and make a cut to release the pack.

SWIM TECHNIQUE / DEFENDABLE SPACE	FIGURE	INSTRUCTOR NOTES
TEACHING POINTS: Consider having face piece blacked out after demonstrating skill competency with vision.		
■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure		
■ Fire fighter activates PASS device (instructor directs fire fighter to silence for training purposes)		
■ Lower body and extend an arm out in front to move any potential hazards out of the way. This creates a “defendable space.” Roll over with the SCBA cylinder down towards the ground and into a corner away from the hazard and proceed on your back to exit	2.1	
■ If equipped with a tool, position the tool with the handle at a 45 degree angle towards your back next to your helmet	2.2	
■ Slowly proceed forward under/over the hazard with the entanglements sliding on the arm and/or the handle of the tool	2.1	
■ Use the arm closest to the ground to protect any entanglements on the helmet and/or the top of the SCBA	2.1	
Entanglement Removal		
■ Fire fighter updates status change via radio if necessary and reactivates PASS device (instructor directs fire fighter to silence for training purposes)		
■ Once fire fighter recognizes that they are entangled, they should maintain tension on the entanglement		
■ Fire fighter should be able to recognize type of entanglement: <ol style="list-style-type: none"> 1. Helmet 2. SCBA (top or bottom) 3. Other 	2.3	
■ Fire fighter will reach down and bring arm forward in a swimming motion until it comes into contact with wire	2.3	
■ While holding onto the entangled wire, back up while lowering body position to try to remove the problem		



Fig. 2.1



Fig. 2.2



Fig. 2.3

COMPLETE SCBA HARNESS REMOVAL AND USE OF WIRE CUTTERS	FIGURE	INSTRUCTOR NOTES
TEACHING POINTS: Consider having face piece blacked out after demonstrating skill competency with vision.		
■ Once fire fighter recognizes that they are entangled and has tried the swim technique/partial removal with no success, they will have to completely remove their SCBA to escape		
■ Undo chest strap (if equipped) and waist belt and remove shoulder strap opposite regulator	4.1	
■ Protect regulator hose and face piece by gripping shoulder strap and regulator hose	4.2	
■ Turn body towards appropriate shoulder strap and face the SCBA. While turning, slip your arm out of the shoulder strap	4.3	
■ Always maintain a firm grasp of the SCBA's shoulder strap and regulator hose to avoid problems with the face piece connection		
■ Once removed and facing the harness, work to remove any entanglement by sweeping arm around the cylinder and harness to find the hazard (keeping a grasp of the left shoulder strap)		
■ Clear entanglement hazard from the immediate area		
■ If unable to remove entanglement, remove wire cutters from pocket	4.4	
■ Identify the wire to be cut ensuring it is not a component of the SCBA		
■ Cut the wire as needed to release the entanglement	4.5	
■ Fire fighter updates status change via radio if necessary and reactivates PASS device		



Fig. 4.1



Fig. 4.2



Fig. 4.3



Fig. 4.4



Fig. 4.5

What can your cutters cut?



Entanglement Hazards

HELMET:

- Shield Mounting (Eagle or Beaver)
- Mounted Flashlight
- Face Shield or Goggles
- Chin Strap Release
- Other Equipment

FACEPIECE:

- Voice Enunciator / Amplifier
- 2nd Stage Regulator
- Heads-Up-Display
- Purge Valve
- Neck Strap
- SCBA Hose

COAT:

- Mounted Clips / Hooks
- Waist (Take-up) Straps
- Drag Rescue Device

RADIO:

- Collar Mic
- Strap / Case
- Antenna

EQUIPMENT:

- Wire Cutter Location
- Tool / Axe Belts
- Flashlight Straps
- Harnesses
- Escape Systems
- Glove Keepers
- Other Equipment

SCBA:

- Drag Rescue Strap
- Cylinder Top
- Cylinder Retention Strap
- Backpack Frame
- PASS Device
- Pressure Gauge
- Shoulder Straps (Buckles, Clips and Hooks)
- Cylinder Valve
- 1st Stage Regulator
- RIC UAC
- Waist Belt (Buckles, Clips and Hooks)
- Other Pack Components

Hand Tools:

- Axe
- Halligan
- Hooks
- TICs



APPENDIX C

SCBA CONFIDENCE MAZE

BACKGROUND

CASE STUDY

The following comes from the NIOSH Fire Fighter LODD investigation report F2007-18. Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom— South Carolina. The full investigation report is available at the NIOSH website: <https://www.cdc.gov/niosh/fire/pdfs/face200718.pdf>

On June 18, 2007, nine career fire fighters died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse. The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom.

He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the maze-like main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

The NIOSH investigators made 43 recommendations, to minimize the risk of similar occurrences, including the following:

Recommendation #10: Fire departments should ensure that the Incident Commander maintains close accountability for all personnel operating on the fire ground

Discussion: Personnel accountability on a fire ground means identifying and tracking all personnel working at the incident. A fire department should develop its own system and standardize it for all incidents. Accountability on the fire ground can be maintained by several methods: a system using individual tags assigned to each fire fighter, a riding list provided by the company officer, a SCBA tag

system, or incident command board. Modern radio systems also incorporate a means of tracking the identity of fire fighters at an incident scene.

Recommendation #12: Fire departments should ensure that crew integrity is maintained during fire suppression operations.

Discussion: Fire fighters should always work and remain in teams whenever they are operating in a hazardous environment. Team continuity means team members knowing who is on their team and who is the team leader; team members staying within visual contact at all times (if visibility is low, teams must stay within touch or voice distance of each other); team members communicating needs and observations to the team leader, and team members rotating together to rehabilitation, staging as a team, and watching out for each other (practicing a strong buddy system). Following these basic rules helps prevent serious injury or even death by providing personnel with the added safety net of fellow team members. Teams that enter a hazardous environment together should leave together to ensure that team continuity is maintained. In this incident, there were numerous instances where fire fighters were working independently, entering and exiting the structure alone, operating hose lines, pulling walls and ceiling, and other related activities. Working alone increases the risk for themselves, and possibly to others during search and rescue efforts.

Recommendation #21: Fire departments should consider using exit locators such as high intensity floodlights, flashing strobe lights, hose markings, or safety ropes to guide lost or disoriented fire fighters to the exit.

Discussion: The use of high-intensity floodlights, flashing strobe lights, or other high visibility beacons can be set up at the entry portals of burning structures as an aid to assist fire fighters in situations requiring emergency escape.³⁹ If staffing permits, a fire fighter can be stationed at the doorway to assist with flaking hose through the entrance and to assist exiting fire fighters. Hose lines can be marked with raised chevrons pointing in the direction of the pump (to the outside). Another option for locating exits is the deployment of safety rope lines as crews enter a structure. The end of the safety rope is secured outside the doorway and the rope is laid out as the crew advances inside.

During this incident, several fire fighters inside the structure became disoriented as the conditions deteriorated. Most of the fire fighters working inside the structure ran out of air. During the NIOSH interviews, fire fighters stated they had to search for a hose-line to follow outside. Other fire fighters reported hearing the sound of Engine 11 running in the parking lot and then moving toward the sound. Safety ropes were not deployed by the initial crews who entered the structure.

APPENDIX C

SCBA CONFIDENCE MAZE (CONTINUED)

Recommendation #22: Fire departments should ensure that Mayday transmissions are received and prioritized by the Incident Commander.

Discussion: The Incident Commander must monitor and prioritize every message, but only respond to those that are critical during a period of heavy communications on the fire ground. A radio transmission reporting a trapped fire fighter is the highest priority transmission that Command can receive. Mayday transmissions must always be acknowledged and immediate action must be taken. As soon as fire fighters become lost or disoriented, trapped or unsuccessful at finding their way out of the interior of a structural fire, they must initiate emergency radio transmissions. A Mayday call should receive the highest communications priority from dispatch, the IC, and all other units on-scene. In this incident, there were multiple radio transmissions of fire fighters asking for assistance in finding the exit. There was no reaction to these radio transmissions for several minutes, possibly due to the large volume of radio traffic and/or the chief officers being distracted by engaging in fire ground activities.

Recommendation # 23: Fire departments should train fire fighters on actions to take if they become trapped or disoriented inside a burning structure.

Discussion: Fire fighters must act promptly when they become lost, disoriented, injured, low on air, or trapped. First, they must transmit a distress signal while they still have the capability and sufficient air, noting their location if possible. The next step is to manually activate their PASS device. To conserve air while waiting to be rescued, fire fighters should try to stay calm, be focused on their situation and avoid unnecessary physical activity. They should survey their surroundings to get their bearings and determine potential escape routes such as windows, doors, hallways, changes in flooring surfaces, etc.; and stay in radio contact with the IC and other rescuers. Additionally, firefighters can attract attention by maximizing the sound of their PASS device (e.g. by pointing it in an

open direction); pointing their flashlight toward the ceiling or moving it around; and using a tool to make tapping noises on the floor or wall.

Recommendation #25: Fire departments should implement joint training on response protocols with mutual aid departments.

Discussion: Mutual aid companies should train together and not wait until an incident occurs to attempt to integrate the participating departments into a functional team. Differences in equipment and procedures need to be identified and resolved before an emergency occurs when lives may be at stake. Procedures and protocols that are jointly developed, and have the support of the majority of participating departments, will greatly enhance overall safety and efficiency on the fire ground. Once methods and procedures are agreed upon, training protocols must be developed and joint-training sessions conducted to relay appropriate information to all affected department members.

Recommendation #29: Fire departments should ensure that fire fighters are trained in air management techniques to ensure they receive the maximum benefit from their self-contained breathing apparatus (SCBA).

Discussion: SCBA air cylinders contain a finite volume of air, regardless of the size. Air consumption will vary with each individual's physical condition, the level of training, the task performed, and the environment. Depending on the individual's air consumption and the amount of time required to exit an immediately-dangerous-to-life-and-health (IDLH) environment, the low air alarm may not provide adequate time to exit. Working in large structures (high rise buildings, warehouses, and supermarkets) requires that fire fighters be cognizant of the distance traveled and the time required to reach the point of suppression activity from the point of entry. When conditions deteriorate and the visibility becomes limited, fire fighters may find that it takes additional time to exit when compared to the time it took to enter the structure.



APPENDIX C

SCBA CONFIDENCE MAZE

SKILL APPLICATION ON THE FIRE GROUND:

Fire fighters are extending a hose line into a structure with cold smoke when they become lost. In searching for an exit they encounter many obstacles they must negotiate over, around, under and through in order to find an exit. The fire fighters are required to keep moving while managing the physiological effects of panic and conserving their air supply.

PERFORMANCE OBJECTIVE:

Given department issued equipment, the fire fighter will perform all necessary survival skills to pass through each obstacle within the SCBA Confidence Maze successfully.

DESCRIPTION:

The SCBA Confidence Maze is performed after all FGS skills are experienced. Fire fighters will progress through a series of obstacles designed to assess skill mastery of all survival skills learned within the FGS curriculum. The maze is designed to challenge the fire fighter's skills to ensure satisfactory performance when in a survival situation. Fire fighters are required to manage their air, maintain room orientation, and suppress the feeling of panic.

CRITICAL FAILURE POINTS:

- Giving up
- Removing any component of PPE, including gloves and SCBA face piece

EQUIPMENT NEEDED:

- Enclosed room w/furnishings
- Radio
- Fire fighter with structural fire fighting ensemble
- Hand tool
- SCBA w/blacked out mask or hood on backwards

INSTRUCTOR DUTIES:

- Both instructors required to monitor the radio in case fire fighter needs assistance inside prop.
- One instructor positioned at the entrance to lead fire fighter (with face piece blacked out) inside.
- One instructor positioned near exit to notify fire fighter when drill is completed.

INSTRUCTORS:

- Two (instructor student ratio 1:5).

STUDENTS:

- Ten

TIME REQUIRED:

- One hour



SCBA CONFIDENCE MAZE	INSTRUCTOR NOTES
<p data-bbox="121 216 630 241">IMPORTANT SAFETY CONSIDERATIONS</p> <p data-bbox="121 258 337 283">SAFETY POINTS:</p> <ul data-bbox="121 338 917 905" style="list-style-type: none"><li data-bbox="121 338 917 384">■ Full firefighting personal protective equipment shall be worn.<li data-bbox="121 384 917 430">■ Fire fighters will be on air.<li data-bbox="121 430 917 514">■ Fire fighter to carry a tool (optional — dependent on department operational requirements).<li data-bbox="121 514 917 560">■ When climbing down, fire fighters must lead with their feet.<li data-bbox="121 560 917 606">■ When climbing up fire fighters must check for overhead obstructions.<li data-bbox="121 606 917 766">■ Instructor to maintain contact with fire fighters as they progress through the maze. Watch for signs of panic. This includes rapid breathing, unable to negotiate in tight spaces, and agitation. Instruct fire fighter to control their breathing (employ survival breathing technique, organize thoughts and think about the plan, and act out the plan).<li data-bbox="121 766 917 812">■ Instructor shall have a flash light	



SCBA CONFIDENCE MAZE	INSTRUCTOR NOTES
TEACHING POINTS:	
<ul style="list-style-type: none"> ■ Fire fighters start maze crawling 	
<ul style="list-style-type: none"> ■ Announce MAYDAY/Urgent/Emergency Traffic messages if conditions dictate 	
<ul style="list-style-type: none"> ■ Maintain contact with wall at all times. Search for openings. Keep hands feeling for windows and doors. Identify possible exits. 	
<ul style="list-style-type: none"> ■ Use survival skills to navigate obstacles without losing orientation. (Contact with search line maintained when available) 	
POSSIBLE OBJECTS TO ENCOUNTER	
Encountering Debris	
<ul style="list-style-type: none"> ■ Ensure debris moved is not put onto search line 	
CHANGING ELEVATIONS	
<ul style="list-style-type: none"> ■ When climbing down off an obstacle: <ul style="list-style-type: none"> Measures edge for distance With tool, reach down to find lower elevation Sound floor with tool Leading with feet, lower to floor When contact is made, sound floor Lower to knees Sound floor around area and ahead towards intended path of travel 	
<ul style="list-style-type: none"> ■ When climbing up on an obstacle: <ul style="list-style-type: none"> Check height of upper floor Measure edge for distance Slowly stand with one arm extended over head feeling for objects Raise enough to make access to upper floor Sound upper floor with hand or tool Mount upper floor and sound floor ahead towards intended path of travel 	
Circle/Triangle Opening	
A Frame	
Locked Doors	
Entanglement Collapse/Tunnel	
Reduced Profile Egress	
<ul style="list-style-type: none"> ■ Announce when fire fighter exits maze 	

APPENDIX C

UPPER FLOOR EGRESS TECHNIQUES

BACKGROUND

CASE STUDY

(The following comes from the NIOSH Fire Fighter LODD investigation report F2005-03 *Career Lieutenant and Career Fire Fighter Die and Four Career Fire Fighters are Seriously Injured during a Three Alarm Apartment Fire – New York*. The full investigation report is available at the NIOSH website

www.cdc.gov/niosh/fire/reports/face200503.html).

On January 23, 2005, a 46-year-old male career Lieutenant (Victim #1) and a 37-year-old male career fire fighter (Victim #2) died, and four career fire fighters were injured during a three alarm fire in a four story apartment building. The victims and injured fire fighters were searching for any potentially trapped occupants on the floor above the fire which started in a third floor apartment and quickly extended to the fourth floor. Fire fighters had been on the scene less than 30 minutes when they became trapped by advancing fire and were forced to exit through the fourth floor windows.

Ladder 27 (officer (victim # 1), chauffer (victim # 2), and 4 fire fighters (2 were injured)) and Rescue 3 (officer, chauffer (injured) and 5 fire fighters (one injured)) were among the crews who responded on the first alarm. The L27 crew was the third crew on-scene (the second ladder company) and advanced up a stairwell and began searching on the floor above the fire for possible trapped occupants. Rescue 3 arrived and the IC ordered them to conduct a search on the 4th floor as well. The Rescue 3 Captain and 2 fire fighters ascended the stairs to the 4th floor to assist Victim #1 and the Ladder 27 crew already searching there. Later, the Ladder 27 Chauffeur (victim #2) joined his crew on the 4th floor to assist with the searches. After Rescue 3 confirmed that Ladder 27 was operating in the apartment above the fire they began to search the adjacent 4th floor apartment. After their search in the adjacent apartment, Rescue 3 moved to the apartment above the fire.

Engine 75 advanced a 1¾-inch hoseline up the stairwell to the 4th floor to the apartment above the fire. Once in the apartment, the Engine 75 Lieutenant conferred with Victim #1 who was operating a thermal imaging camera. Victim #1 said that heat was coming from behind a bedroom door in the hallway. Victim #1 ordered the padlocked bedroom door forced open and Engine 75 radioed for the hoseline to be charged. The 3rd floor Operations Chief radioed the crews on the 4th floor and said there was a loss of water on the 3rd floor and ordered Engine 75 to take their charged line to the 3rd floor. The Engine 75 Officer told Victim #1 that he was taking the hoseline downstairs. (Note: The departure of Engine 75 from the 4th floor left the remaining six fire fighters from Ladder 27 and Rescue 3 without a charged hoseline. The engine company going up the stairs to replace Engine 75 was Engine 42, which was the same company that had water pressure problems). The Engine 46 crew took Engine 42's uncharged hand line to the 4th floor. This hand line never received water again during operations.

Victim #1 and his crew continued to search the apartment. They were also looking for the rear fire escape that they could use as a secondary means of egress. (Note: The crew was unaware of the interior partitions and floor layout).

At 0826 hours, the Rescue 3 Captain made an urgent radio transmission to command that heavy fire was present on the 4th floor and that "fire was blowing into the hallway." Heavy smoke was now pushing out of all the 4th floor windows directly above the original fire apartment. (Note: The fire department's investigative report indicated that gusty wind conditions had a dramatic effect on fire extension to the 4th floor). The IC responded that Engine 48 was bringing up a hoseline. Rapidly progressing flames trapped four Ladder 27 fire fighters (Victims #1 & #2 and injured fire fighters #1 & #2) and two Rescue 3 fire fighters (injured fire fighters #3 & #4) within the back of the 4th floor apartment in the rear bedrooms.

Upon reaching the 4th floor, the E42 officer radioed, "we have fire into the hallway on the floor above. You need a line upstairs." At 0828 hours, Victim #1 made a Mayday transmission. Victim #1 made two additional Mayday transmissions due to the intense heat and flame extending into the bedroom. (Note: At this time, neither Engine 42 nor Engine 46 had a charged hoseline on the 4th floor). The six fire fighters trapped on the 4th floor were now at the rear bedroom windows with intense heat at their backs. Victim #1 and injured fire fighters #1 & #2 were in the second bedroom crowded together at the third window which was covered by a metal child guard gate. The fire fighters could not remove it due to the intense heat. Victim #1 realized that one of his fire fighters was out of air and immediately pulled him to the window. Injured fire fighters #1 and #2 supported Victim #1 as he climbed over the child gate. The injured fire fighters believed that Victim #1 was making room for them at the window or initiating a self-rescuing maneuver. Injured fire fighters #1 and #2 were hanging on to Victim #1 just before he fell to the ground. The intense heat then forced injured fire fighters #1 and #2 to jump from the window. At the same time, Victim #2 made his way into a separate bedroom by himself and was forced to jump from the fourth window. (Note: The back yard of the apartment building is actually below grade. The distance was equivalent to a 5 story fall).

Injured fire fighter #3 became trapped in the first bedroom. He closed the bedroom door behind a wall of fire coming down the hallway. The conditions within the room were extremely high heat with zero visibility. As the transit window over the door vented, the heat within the room became intolerable. Injured fire fighter #3 sought refuge from the heat by hanging his torso out the bedroom window. With his head outside the window, he saw injured fire fighter #4 in the window of the adjacent bedroom. Injured fire fighter #3 remained calm and radioed a Mayday followed a few seconds later with "We're bailing out of here, hurry up." Injured fire fighter #4 handed fire fighter #3 the end of his personal safety rope (Note: This was accomplished from the exterior of the structure with both fire fighters hanging out of the windows. The personal safety rope, purchased independently by injured fire fighter #4, was NFPA ap-

APPENDIX C

UPPER FLOOR EGRESS TECHNIQUES (CONTINUED)

proved and 50 ft long). Fire fighter #3 wrapped the end of the rope around his wrist several times, held the rope in his hands and stepped on the rope. Fire fighter #4 wrapped the rope under his arms, held the rope together and attempted to belay to the ground. When fire fighter #3 felt the rope go slack, he attached the carabiner end to the child window guard; he wrapped the rope around his shoulder and arm and slowly descended from the window. Fire fighter #3 reported that the rope had broken and he recalled hitting the ground feet first, looking up and seeing fire coming out of the 4th floor windows. Both fire fighters had fallen to the ground and suffered severe injuries. (Note: Although Fire Fighter #3 reported that the rope had broken, the rope was still attached to the window guard, unbroken, and hanging to the ground after the incident). Both injured fire fighters were wearing a safety harness but in their haste to escape the intense heat neither was able to attach the rope to the harness.

The six fire fighters fell to the ground between 0830-0831 hours. First aid was immediately administered to the injured fire fighters. Victim #1 and Victim #2 were transported to a metropolitan trauma center where they were later pronounced dead. Injured fire fighter #1 was hospitalized with minimal injuries. Injured fire fighter #2 suffered broken legs, shoulder and internal injuries. Injured fire fighter #3 was hospitalized with two broken heels and ankles, two broken legs, broken hip, minor hand burns and severe internal injuries. Injured fire fighter #4 was hospitalized with broken ribs, shoulders and pelvis, a skull fracture, burns on the legs and neck, and severe internal injuries.

Note: Injured Fire Fighter #3 died on November 22, 2011 due to complications from the injuries he suffered on January 23, 2005.

APPENDIX C

WINDOW HANG

SKILL APPLICATION ON THE FIRE GROUND:

Fire fighters are performing search and rescue operations on an upper floor when smoke conditions worsen and the need to exit the structure is necessary to prevent injury or death. This condition may arise due to rapid fire growth caused by the burning of synthetic furnishings, or other combustible products commonly found in structures. To escape the increasing heat the fire fighters must use a window to egress the structure. If the fire fighters are not equipped with a personal escape system (PES), or if a ladder is not in place, or a hose line is not available, the fire fighters must use the window to position themselves outside the structure away from the heat.

PERFORMANCE OBJECTIVE

Given department issued equipment, instruction, demonstration and practice, the fire fighter will be able to perform a **WINDOW HANG**, using the steps listed below.

EQUIPMENT NEEDED:

- Window prop (See specifications on following pages)
- Fire fighter with structural fire fighting ensemble
- SCBA
- Fall protection or belay system if base of window sill is six feet or greater
 - Class III harness
 - (Equipment shall be compliant with NFPA 1983-Standard on Life Safety Rope and Equipment for Emergency Services.)

DRILL SET-UP:

- Fire fighters will perform the skill after instructor demonstration.
- Fire fighters will be taught to perform the skill with both sides of the body.

INSTRUCTOR DUTIES:

- Instructors share information of case study supporting the Window Hang skill
- One instructor positioned on inside of window prop to assure fire fighter exits while staying low.
- One instructor positioned outside of window to ensure fire fighter safely dismounts from window to ground.

INSTRUCTORS:

- Two (instructor student ratio 1:5)

STUDENTS:

- Ten

TIME REQUIRED:

- One hour

**FALL PROTECTION OR A BELAY SYSTEM SHOULD BE IN PLACE
IF THE BASE OF THE WINDOW IS SIX FEET TALL OR GREATER**

IMPORTANT SAFETY CONSIDERATIONS	INSTRUCTOR NOTES
<p>SAFETY POINTS:</p> <ul style="list-style-type: none"> ■ Ensure that the prop is in safe working order prior to conducting training ■ All students should be made aware of the actions to be taken if an injury occurs immediately before the start of the exercise ■ If the base of the window is taller than six feet, proper safety equipment shall be used. ■ Full Firefighting Personal Protective equipment shall be worn including SCBA, NFPA compliant firefighting gloves and hood. ■ Fire fighter shall be on air if logistically feasible ■ The fire fighter shall act in a systematic and controlled manner in order to exit the window and reach the ground. 	



WINDOW HANG	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure. <hr/> <ul style="list-style-type: none"> ■ Approach window, crawling, and use a tool to clear window of any potential entanglement or hazards including window sash. (Fig. 1) <hr/> <ul style="list-style-type: none"> ■ Remain close to the wall underneath window sill while getting to your feet. <hr/> <ul style="list-style-type: none"> ■ Using the arm farthest from the window, grasp (palm down) the inner edge of the window sill. <hr/> <ul style="list-style-type: none"> ■ Leading with the arm closest to the window, roll forward out of the window in a head first position while maintaining a firm grip with the interior arm. (Fig. 2) <hr/> <ul style="list-style-type: none"> ■ The fire fighter should attempt to roll staying as low as possible to avoid the high heat area. <hr/> <ul style="list-style-type: none"> ■ Allow upper body to completely move outside and allow outside leg to follow out the window (Fig. 3). <hr/> <ul style="list-style-type: none"> ■ Once the lower leg is clear of the sill, lock the upper leg against the inner wall keeping it as low as possible. <hr/> <ul style="list-style-type: none"> ■ Final HANG position is achieved when inside arm and leg are used to hook window sill to keep most of the body outside the window away from the heat. (Fig. 4, 5) <hr/> <ul style="list-style-type: none"> ■ Radio an update of your situation and remain in the window until rescued or conditions become untenable. <hr/> <p>If the conditions become untenable and the decision to drop to the ground is made.</p> <hr/> <ul style="list-style-type: none"> ■ Ensure top arm is still locked inside window, raise the lower arm and grasp the outer window sill. <hr/> <ul style="list-style-type: none"> ■ Drop the upper leg down and slide the inner arm out of the window and grasp the outer sill. <hr/> <ul style="list-style-type: none"> ■ Once positioned upright maintain this position until help arrives or conditions become untenable. <hr/> <ul style="list-style-type: none"> ■ Drop to the ground while keeping knees bent and roll upon impact if possible. 	

WINDOW HANG



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5

APPENDIX C

LADDER ESCAPE TECHNIQUES

SKILL APPLICATION ON THE FIRE GROUND:

Fire fighters are performing search and rescue operations on an upper floor when smoke conditions worsen and the need to exit the structure is necessary to prevent injury or death. This condition may arise due to rapid fire growth caused by the burning of synthetic furnishings, or other combustible products commonly found in structures. To escape the increasing heat the fire fighters must find a window and use the ladder positioned by fire fighters on the exterior to exit the structure quickly and safely.

PERFORMANCE OBJECTIVE:

Given department issued equipment, instruction, demonstration and practice, the fire fighter will be able to perform a **LADDER ESCAPE TECHNIQUE**, using the steps listed below.

EQUIPMENT NEEDED:

- Ladder placed at 2nd floor window sill (See specifications on following pages)
- Fire fighter with structural fire fighting ensemble
- Radio
- SCBA
- Class III harness
- Rope safety system (Equipment shall be compliant with NFPA 1983-Standard on Life Safety Rope and Equipment for Emergency Services.)

DRILL SET-UP:

- Position ladder beneath sill of 2nd floor window. Ladder properly secured to the standard of the host fire department. Safety rope system (fall protection) shall be in place to protect fire fighter performing skill. Safety rope system and harness shall be consistent with the requirements of the host fire department. Safety rope system shall be checked by responsible party of host department prior to use.

INSTRUCTOR DUTIES:

- One instructor positioned inside 2nd story room at window. This instructor is responsible for attaching safety line to fire fighter and assisting him/her during window exit.
- One instructor positioned outside on the ground monitoring technique of fire fighter performing the skill.
- Host fire department member (Skills compliant with NFPA 1006 –Technical Rescue Professional Qualifications) tending belay line.

INSTRUCTORS:

- Two (instructor student ratio 1:5)
- Host fire department member tending belay line.

STUDENTS:

- Ten

TIME REQUIRED:

- One hour

RAPID (HEAD FIRST) LADDER ESCAPE	INSTRUCTOR NOTES
<p>IMPORTANT SAFETY CONSIDERATIONS</p> <p>SAFETY POINTS:</p>	
<ul style="list-style-type: none"> ■ The angle for ladder placement for rapid ladder escape is 60 to 65 degrees. This allows for a slower, more controlled descent than the traditional working ladder angle for fire suppression. 	
<ul style="list-style-type: none"> ■ Place tip of ladder slightly below windowsill. 	
<ul style="list-style-type: none"> ■ Two fire fighters wearing PPE must be stationed on either side at base of ladder to act as spotters. 	
<ul style="list-style-type: none"> ■ Ladder must be tied off at top and bottom. Ensure that bottom tie off is tight so the bottom does not kick out due to the ladder being set at a lesser angle. 	
<ul style="list-style-type: none"> ■ Trained personnel shall set the belay system. The Lead Instructor will inspect the belay system before it is used. 	
<ul style="list-style-type: none"> ■ Fire fighter should wear climbing type helmet. The rear brim of most fire fighting helmets can interfere with the belay line and make it difficult for the fire fighter lift his/her head. 	
<ul style="list-style-type: none"> ■ Fire fighter performing rapid ladder escape must be wearing an approved Class III harness and be secured to the belay system. 	
<ul style="list-style-type: none"> ■ Fire fighters will be shown how to attach and lock a carabiner to the harness. 	
<ul style="list-style-type: none"> ■ Instructor will show belayer that carabiner is attached and locked to student's harness prior to each evolution. 	
<ul style="list-style-type: none"> ■ Fire fighter will confirm that belayer is ready before allowing fire fighter to begin. 	
<ul style="list-style-type: none"> ■ Caution should be taken when performing the head first ladder escape using wood ladders. Due to the smooth surface of the rungs, gripping the rungs is difficult, and the rate of decent is increased. 	

RAPID (HEAD FIRST) LADDER ESCAPE

Considerations: The head first ladder escape is preferred when the fire fighter encounters a narrow window. Narrow windows may not allow the fire fighter to turn in the window and thus require only a head first mount onto the ladder.

TEACHING POINTS	INSTRUCTOR NOTES
■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure.	
■ Crawling on hands and knees, approach the window with the ground ladder and use a tool to clear window of potential hazards and entanglements (frame, glass, drapes etc).	
■ Reach over windowsill and grab ladder rungs with both hands. (Do not wrap thumbs around rungs. Thumbs can get stuck in between rungs).	
■ Maintain low profile in the window while pulling body up and out onto the ladder.	
■ Pivot out of window on midsection. (Fig. 1)	
■ Use hands to reach and grab next rung. Descend using hand over hand technique. (Fig. 2)	
■ As feet exit window, hook toes onto windowsill to control transition onto the ladder. (Fig. 2)	
■ Proceed down the ladder, as feet exit window; use toes of boots to control speed by hooking feet on each rung while descending. (Fig. 3)	
■ While performing ladder escape, fire fighter <u>must</u> control speed using both hands and feet. (Fig. 4)	
■ When fire fighter reaches bottom of ladder, roll off ladder by extending one arm underneath last rung to position body on side. Roll out of path of fire fighters following behind. (Fig. 5, 6)	

RAPID (HEAD FIRST) LADDER ESCAPE



Figure 1



Figure 2



Figure 3



Figure 4

RAPID (HEAD FIRST) LADDER ESCAPE Continued



Figure 5



Figure 6

LOW PROFILE (HOOK 2, GRAB 4) LADDER ESCAPE	INSTRUCTOR NOTES
IMPORTANT SAFETY CONSIDERATIONS	
SAFETY POINTS:	
■ The ladder angle for low profile ladder escape is the same as for ladder climbing. The steeper angle allows for the fire fighter to turn on the ladder more easily.	
■ Place tip of ladder slightly below windowsill.	
■ Two fire fighters wearing PPE must be stationed on either side at base of ladder to act as spotters.	
■ Ladder must be tied off at top and bottom. Ensure that bottom tie off is tight.	
■ Properly trained shall set the belay system. The Lead Instructor before use must inspect the belay system.	
■ Fire fighter performing low profile ladder escape must be wearing an approved harness and be secured to the belay system.	
■ Fire fighters will be shown how to attach and lock a carabiner to the harness.	
■ Instructor will show belayer that carabiner is attached and locked to student's harness prior to each evolution.	
■ Fire fighter will confirm that belayer is ready before allowing fire fighter to begin.	

LOW PROFILE (HOOK 2, GRAB 4) LADDER ESCAPE	INSTRUCTOR NOTES
<p>TEACHING POINTS</p> <ul style="list-style-type: none"> ■ Fire fighter notifies Command of a MAYDAY following their own departments MAYDAY procedure ■ Crawling on hands and knees, approach the window with the ground ladder and use a tool to clear window of potential hazards and entanglements (frame, glass, drapes etc). ■ Grasp ladder beams for support ■ Lower body still inside window ■ Right arm between 1st and 2nd rungs positioned on far side of ladder (Note: Left arm can also lead out of window first) (Fig. 1) ■ Right arm goes under 2nd rung and may grasp 3rd rung- Keep palm up (Fig. 2) ■ Left arm down ladder beam- Grasp center of 4th rung with hand, palm down (If left arm leads out of window first, right arm follows down ladder beam.) (Fig. 3) ■ “Hook 2, Grab 4” ■ Move to Ladder- • Keep head down- Bend knees- Slide right thigh along beam ■ Rotate and swing body along the beam (Fig. 4) ■ Position on Ladder- Position knees and boots on beams- Body in seated position ■ Chest away from rungs- Grasp underside of beams and arms almost straight ■ Walk Down Ladder 	

LOW PROFILE (HOOK 2, GRAB 4) LADDER ESCAPE



Figure 1



Figure 2



Figure 3



Figure 4



APPENDIX C

CONDITION RECOGNITION AND RAPID EVACUATION

BACKGROUND

CASE STUDY

(The following comes from the NIOSH FF LODD investigation report F2013-14: Career Probationary Fire Fighter Runs Out of Air and Dies in Commercial Structure Fire – Michigan. The full investigation report is available at the NIOSH website:

www.cdc.gov/niosh/fire/pdfs/face201314.pdf

On May 8, 2013, a 29-year-old male career probationary fire fighter died after running out of air and being trapped by a roof collapse in a commercial strip mall fire. The fire fighter was one of three fire fighters who had stretched a 1 1/2-inch hoseline from Side A into a commercial strip mall fire. The hose team had stretched deep into the structure under high heat and heavy smoke conditions and was unsuccessful in locating the seat of the fire. The hose team decided to exit the structure. During the exit, the fire fighter became separated from the other two crew members. The incident commander saw the two members of the hose team exit on Side A and called over the radio for the fire fighter. The fire fighter acknowledged the incident commander and gave his location in the rear of the structure. The fire fighter later gave a radio transmission that he was out of air. A rapid intervention team was activated but was unable to locate him before a flashover occurred and the roof collapsed. He was later recovered and pronounced dead on the scene.

NIOSH Recommendation: Fire departments should ensure that all fire fighters and officers receive regularly scheduled, hands-on (practical) fundamental skills training and specialized training on building construction and modern fire behavior.

Discussion: Structure fires have decreased by 53% over the past 30 years, which in turn has limited the opportunities for today's fire service to gain necessary experience to understand the increasingly complex fires they are now up against [NFPA 2010c]. Many fire departments across the country are faced with challenges associated with the lack of fire fighter and officer experience in structural fire-fighting in both residential and (to a greater extent) commercial applications. With an increase demand for EMS and other service calls and the rapid retirement of experienced fire fighters and officers hired in the 60s, 70s, and 80s, fire departments can find themselves challenged to maintain experienced fire fighters and officers on the front lines. One way that fire departments can balance the lack of experience is to increase the frequency of hands-on, practical fire-fighting training. The military recognizes that practical battlefield or operational training is very important and provides consistent repetitive training such as war games for officers and fighting forces. Practical repetitive skills training on fire scenarios can help build a conditioned memory response (a slide tray of past events to draw from) for fire fighters as well as officers (much the same as the military). This type of practical training can help to overcome a natural response of underestimating an event and using a conditioned response. This can occur when fire fighters may respond to a large number of incidents but not have any experience in another area. When sizing up an incident, the natural inclination of a fire fighter or

officer is to search in their memory bank and apply a strategy or tactic used before. If there is nothing in their memory bank (from experience and training) for a specific incident, a fire fighter or officer may apply a strategy or tactic that may closely match the scenario based on their experience but that solution may be insufficient or underestimate the event. One area that fire departments need to recognize is the danger of a fire fighter or officer using a residential response (strategy and tactics) in a commercial setting. This can be overcome by training fire fighters and officers to recognize that, if they don't have anything in their "slide tray" for a large or complex incident event, they may want to reconsider their strategy and tactics.

Along with the challenges of experience faced by today's fire service, a lack of staffing is also a factor in many departments. Fire-fighting crews often have difficulty identifying hazards on the fireground simply because they are understaffed [Jakubowski and Morton 2001]. They may be busy performing multiple demanding tasks and overlook ongoing size-up. The fire fighter's natural desire to attack the immediate problem and finish the job quickly can result in critical errors such as checking voids in the ceilings, opening doors, and taking windows (creating flow paths) without charged hoselines readily available. With minimal personnel and multiple assignments, fire fighters may neglect ventilation, thus allowing built-up heat and smoke to intensify [Jakubowski and Morton 2001; NIOSH 2009a].

Identifying and predicting fire behavior can be a challenge for experienced fire fighters and officers and **even more difficult for a novice fire fighter**. Commercial structure fires may not be encountered frequently enough for fire fighters to build a "slide tray" of past events to draw from. While fire departments may have enough residential structure fire "slide tray" experience, the same tactics employed on a commercial structure fire may not yield the same results. A large issue here is when fire fighters draw on their residential experience of a quick attack with small lines in a large commercial structure fire. There are many more factors to consider with large commercial structure fires. Different styles of construction with significantly larger floor space and very high ceilings with large void areas (that conceal fire and products of combustion) make it harder to check overhead and the fire may get behind the crews stretching in. Chief Christopher Naum, SFPE (Command Institute) notes: "In most situations involving a structure fire, the probability of and anticipation for structural collapse or compromise are inevitably minimized, overlooked or at times disregarded until the catastrophic conditions present themselves with little to no time to react accordingly. The loss of situational awareness coupled with distracted attention to subtle or obvious pre-collapse building indicators and gaps in building and construction system knowledge combine to elevate operational risks to personnel on the fireground at structure fires."

As the number of fire calls is dropping nationwide, fire fighters are becoming less experienced in their main responsibility—fighting fires [Jakubowski and Morton 2001]. The number of calls for other types of service are increasing. Many departments have seen increases in emergency medical service (EMS) calls and automatic fire alarms. Fire departments that provide EMS typically answer two or three EMS calls for

APPENDIX C

CONDITION RECOGNITION AND RAPID EVACUATION

every fire call they run. In many cases, even career fire fighters who work every two or three days may go months or years before they work on a structure fire [Jakubowski and Morton 2001], and even longer before they respond on a large commercial structure fire. It is important for fire departments to understand how to overcome the experience gap by providing regularly scheduled, hands-on (practical) fundamental skills training for fire fighters and officers.

Fire departments should ensure that all fire fighters and officers receive fundamental and annual refresher training according to NFPA 1001 [NFPA 2013a] and NFPA 1021 [NFPA 2008a]. Initial and continual training provides an opportunity to ensure that all fire fighters and line officers are proficient in their knowledge and skills in recognizing and mitigating hazards. This annual training ensures that knowledge and skill retention are demonstrated and the training can be continually re-focused to address needs. Training on structural fire-fighting should include departmental standard operating procedures, fire fighter safety, building construction, and fireground tactics. NFPA 1500, Chapter 5 [NFPA 2013], requires that the fire department provide an annual skills check to verify minimum professional qualifications of its members [NFPA 2013].

Fire departments should ensure that all fire fighters and officers receive additional annual training in building construction and fire behavior. For example, there have been many advancements in training curriculum available for building construction (predictability and performance of buildings on fire) and fire behavior. Underwriters Laboratories (UL) and the National Institute for Standards and Technology (NIST) have jointly conducted research that suggests a more innovative fire attack can make the fireground safer for fire fighters and occupants [UL 2013]. A large focus of the research is on ventilation and how ventilation effects the fire growth. Two types of ventilation most commonly used in the fire service are horizontal and vertical ventilation, and they can be either forced (positive-pressure ventilation) or natural (cutting a hole in the roof or cross ventilation by openings such as doors and windows). Improper or uncoordinated ventilation can have significant effects on fire behavior in structure fires. Horizontal ventilation allows for heat, smoke, and gases to escape by means of a doorway or window but is highly influenced by the location and extent of the fire, and special caution should be taken if the fire is in the attic or above the ceiling (as in this incident) [IFSTA 2008]. Ensuring that fire fighters and officers are trained in understanding the effects of ventilation on fire behavior is critical to fire fighter safety. The effects of ventilation may not be widely understood in the fire service and the new research by UL and NIST has provided scientific foundations for better understanding.

APPENDIX C

CONDITION RECOGNITION AND RAPID EVACUATION

SKILL APPLICATION ON THE FIRE GROUND:

A fire fighter is part of a crew extending a hose line into a building. Prior to making entry, consideration must be given to exterior water application and door control to minimize fire growth, air entrainment, and preventing flashover. As firefighters enter the structure they must orient themselves to the interior of the building while extending the hose line to the fire. While moving through the building, fire fighters must identify doorways, windows, rooms and landmarks to keep track of exits, and maintain accountability of all personnel on the hose line. As the search for the source of the fire continues, personnel must be prepared to evacuate the building or find a safe location (room with a door that can be closed) if conditions deteriorate due to flashover conditions developing, or structural collapse is experienced.

PERFORMANCE OBJECTIVE:

Given department issued equipment, instruction, demonstration and practice, the fire fighter will perform in select positions on a hose line during extension into a building while maintaining situational awareness of potentially changing conditions.

EQUIPMENT NEEDED:

- Structure with at least two rooms. Rooms should be able to be darkened and include windows, and furnishings to give appearance of functional interior living space. Windows needed so fire fighters can feel for windows while extending hose line into structure.
- Charged hose line (1 ½" or 1 ¾") with nozzle.
- Structural fire fighting gear with SCBA to be worn by fire fighters.
- 2 Radios minimum (radios needed for FF's on the hose line)

DRILL SET-UP:

- Charged hose line placed near a closed exterior door of the structure. Firefighters will position themselves on the hose line in preparation to enter the structure through the door.

Firefighters will identify Exterior Flashover Signs:

- Thick/Dense Black Smoke exiting the structure under pressure
- Smoke changing from laminar to turbulent flow
- Reentry of Air/Smoke into Structure
- Ventilation limited fire

Firefighter considerations prior to entry:

- Vent & Cool Smoke
 - Go Vs. No-Go (Risk vs. Gain)
 - Small box vs. Big box building
 - Flow path identification
-
- Fire fighters will enter the structure in full PPE, on air, with simulated fire inside. Firefighters will identify Interior Flashover Conditions:
 - Roll Over
 - Lack of Visibility
 - Furniture Off Gassing
 - Acceleration downward neutral plane
 - TI temp >800 F
 - Consider E-Trigger/Mayday Evacuation
 - 1100 F Flashover

- Smoke machine can be used to simulate smoky conditions. The interior of the structure will be furnished to simulate a real living space. Firefighters will discuss Interior Firefighting Considerations:

- Smoke conditions?
- Temperature of Smoke?
- Water is for your protection, flow water to cool upper atmosphere
- Orientation of room
- Identify Egresses and safe locations
- Protect Egress
- Go Vs. No-Go (Risk vs. Gain)
- Horizontal Ventilation created may draw fire toward or away from FF or Occupants.

INSTRUCTOR DUTIES:

One instructor positioned outside door near hose line. This instructor is responsible for ensuring fire fighters are in full PPE, on air, flashlights on, and properly positioned on the hose line. Positioning on hose line: Fire fighter at nozzle, company officer, or most experienced fire fighter behind fire fighter at nozzle to provide direction, and second fire fighter maintains position at doorway to act as lookout. As more fire fighters are available to staff the hose line, the lookout bumps up to the next doorway and the new fire fighter assumes the role of lookout positioned at the exterior doorway where the hose line enters the structure. Remind fire fighters to keep head up looking for changing smoke conditions overhead.

One instructor positioned inside the structure. This instructor is responsible for providing prompts to personnel on hose line. Instructor will remind personnel to feel walls for windows, doorways, and to pulse ceiling to cool environment without disrupting thermal layer. Instructor will also inform personnel of deteriorating conditions so evacuation order can be given. Remind fire fighters to keep their head up looking for changing smoke conditions overhead.

INSTRUCTORS:

- Two (instructor student ratio 1:5)

STUDENTS:

- Ten

TIME REQUIRED:

- One hour

IMPORTANT SAFETY CONSIDERATIONS	INSTRUCTOR NOTES
<p>SAFETY POINTS:</p> <p>■ Full structure fire fighting personal protective equipment shall be worn. Fire fighter will be on air.</p> <hr/> <p>At least 2 fire fighters have a radio.</p> <hr/> <p>Instructor shall have a flash light</p> <hr/> <p>Remove furnishings with sharp edges that may cause an injury. Do not allow fire fighters to exit via windows.</p>	



ROOM ORIENTATION, CREW ACCOUNTABILITY AND EMERGENCY EVACUATION	INSTRUCTOR NOTES
<p>TEACHING POINTS:</p> <ul style="list-style-type: none"> ■ Fire fighters prepare to enter door on knees, staying low to the ground in order to evaluate interior conditions prior to making entry. Firefighters will duck walk or crawl to stay below smoke layer. Fire fighters in full PPE with flashlights on and breathing air from SCBA. ■ Company officer/team leader uses TIC to evaluate interior and view room layout. ■ Fire fighters will occasionally pulse a narrow stream (20-30 degrees) at the ceiling to check heat conditions in the thermal layer. Short bursts should be applied carefully to not disrupt the thermal balance. If cooling of the thermal layer is required, a straight or solid stream should be flowed, with care taken to maintain thermal balance. ■ Fire fighters will move throughout interior of structure feeling furniture, walls, doors, windows to stay oriented at all times. Fire fighters will monitor the overhead for smoke & heat conditions. Firefighters must remember to keep their heads up checking conditions overhead. ■ Fire fighters will maintain appropriate spacing at pinch points to prevent “bunching up” of personnel at the nozzle and to ensure hose advancement. ■ Fire fighters will position at doorways to protect egress points. ■ Company officer/crew leader will remain in physical or voice contact with crew at all times to maintain team continuity. ■ Fire fighters positioned at exterior doorways will perform as lookouts for those on the interior searching for victims and the fire. A light will be positioned so the interior fire fighters are oriented to a point of egress. ■ Fire fighters at doorways will also assist with advancing the hose line, and occasionally make noise by pounding against a wall so the interior crew is oriented to a point of egress. ■ Fire fighters will periodically check the air in their SCBA using the heads up display and/or gauge to track their air usage. ■ Upon arriving to the second room, fire fighters will be instructed to evacuate due to deteriorating interior conditions. ■ Company officer/Crew leader, or most experienced fire fighter, positioned behind fire fighter at the nozzle will give the order to “get out.” ■ Company officer/Crew Leader, will change places with the fire fighter at the nozzle to ensure the nozzle position is accounted for during the rapid egress. Company officer/Crew Leader, is positioned last on hose line as the crew follows the hose line outside. ■ All personnel straddle hose line and quickly follow it to the outside. The hose line will remain in position with the nozzle at the fire so fast evacuation of crew can be performed. 	

ROOM ORIENTATION, CREW ACCOUNTABILITY AND EMERGENCY EVACUATION	INSTRUCTOR NOTES
<p>TEACHING POINTS (Continued):</p> <ul style="list-style-type: none"> ■ Another technique is to maintain crew positioning with the fire fighter operating the nozzle during evacuation. This method may be preferred when the crew does not need to exit the building completely, but instead, only needs to back up and cool the environment using the hose stream. If fast evacuation is necessary due to imminent collapse or flashover, keep the hose line in place and follow it out. <hr/> <ul style="list-style-type: none"> ■ Fire fighters positioned at doorways ensure there is a light in the direction of evacuating fire fighters and make noise to orient exiting fire fighters to the point of egress. <hr/> <ul style="list-style-type: none"> ■ Upon exit from structure, company officer/crew leader accounts for all crew members and transmits a personnel accountability report (PAR) using the radio. <hr/> <ul style="list-style-type: none"> ■ Crew members return to the nozzle to accomplish the second technique: maintain crew positioning with the fire fighter operating the nozzle during evacuation. Member at the door guides hose (does not pull) to assist evacuation. (If fast evacuation is necessary due to imminent collapse or flashover keep the hose line in place and follow it out.) 	

CONDITION RECOGNITION AND RAPID EVACUATION



Figure 1

Firefighter checks nozzle pattern – setting spray to a 20-30 degree pattern.

Crew leader has activated TIC and is checking door for heat, preparing to make entry.



Figure 2

Firefighter on the nozzle enters with Crew leader following, scanning the room.

Additional firefighters prepare to position on hose and in doorway (pinch man).



Figure 3

Unable to find the seat of the fire immediately, firefighter performs “heat check” to assess conditions in the thermal layer.



Figure 4

Crew leader places TIC in front of firefighter to show room layout and fire location so firefighter is not advancing blindly into the structure.

CONDITION RECOGNITION AND RAPID EVACUATION



Figure 5

Firefighter at the door monitors hose line, maintaining position to help advance or extract it. Firefighter may perform door control if department policy allows and conditions warrant it

Firefighter occasionally makes noise by pounding on the door to assist with Fire Attack's orientation to exit.

Firefighter watches overhead conditions, noting any changes in smoke velocity, density or color.



Figure 6

Fire Attack team advances inside the building. Crew leader scans the interior with TIC, maintains close proximity to nozzle firefighter



Figure 7

The IC orders immediate evacuation of the building. Crew leader orders Fire Attack members to exit.



Figure 8

The hose is left in place. Crew leader follows all members out, scanning with TIC.

Once outside, Crew leaders will obtain a PAR of all team members assigned.

APPENDIX C:

CLASSROOM TEACH BACK AND CASE STUDY REVIEW

OBJECTIVE:

Given an IAFF FGS topic and NIOSH Fire Fighter Fatality Report or Near Miss Report (see IAFF FGS Train the Trainer schedule for assignments), each student will demonstrate proficiency teaching the information to peers while being evaluated by IAFF FGS Master Instructors.

ASSIGNMENT:

Students will be divided into 3 groups ON Day One. Students will remain in groups while rotating to skills, skills teach-backs, confidence course, and classroom teach-backs throughout the training program.

After students are divided into three groups, instructor will assign each group a FGS chapter and a NIOSH Fire Fighter Fatality Report or Near Miss Report. Each member of the group will be given a copy of the case study.

Students are provided case studies on Day One to allow adequate time to prepare the presentations. Instructors should encourage groups to begin preparing their presentations early. As students rotate between FGS skills they should discuss their case studies amongst the members of the group and with the FGS Master Instructors. Students should also be encouraged to meet with members of their group throughout the four day training to coordinate the work effort to prepare their presentations.

The case study assignments are selected prior to the start of the class and are relevant to the curriculum. Three reports will be sent to the class POC prior to the class and will be printed out, 10 copies each, before Day 1 of class. The attached sample outline lists three NIOSH reports that are excellent reports to study. If your department prefers other reports, work with your IAFF Lead Master Instructor before the class start date to coordinate.

EQUIPMENT:

- IAFF FGS Notebooks
- NIOSH or Near Miss report
- Laptops and Projector for PowerPoint presentation preparation
- Internet for researching information (optional)
- White/chalk board

INSTRUCTORS:

IAFF FGS Master Instructors will rotate between groups on Day Four of training while students make final preparations to presentations. Presentations must tie NIOSH or Near Miss report findings to FGS chapter assigned. Presentations may also tie in FGS topics found in chapters not assigned.

TIME REQUIRED:

2.5 hours allotted within IAFF FGS Train the Trainer schedule.

- 1 hour provided to finalize presentations. IAFF FGS Master Instructors will ensure all groups remain on task and all members of group participate in creation of presentation.
- 1.5 hour provided for group presentations. Each group given 30 minutes.

PRESENTATION EXPECTATION:

Presentations may use PowerPoint, video, white/chalk board, handouts, or a combination of all to teach the assigned topic. Presentations shall encourage student participation and reinforcement of local policy where appropriate.

TEACH-BACK FORMAT:

All students in group will stand in the front of the classroom. Each student is required to teach a section of the material they have researched. Material presented shall tie in NIOSH or Near Miss report to FGS assigned chapter. IAFF FGS Master Instructors will ask questions of student during presentation to ensure mastery of the material is achieved.



International Association of Fire Fighters

NIOSH Report Review

NIOSH REPORT ASSIGNMENT

GROUP 1 — REPORT # F2011-13

San Francisco – Double LODD

GROUP 2 — REPORT # F2009-23

New York Fatality – Building Collapse

GROUP 3 — REPORT # F2007-35

District of Columbia – Burned above the Fire Floor

Option to select other reports as well

DRILL OBJECTIVES

After this lesson the students will be able to:

1. Explain incident successes and challenges
2. Compare the actions taken to your SOP/SOG
3. Compare actions taken to FGS endorsed actions

TOPICS TO BE COVERED

1. Background of Incident
2. Incident Priorities and Progressions
3. Incident Successes (NIOSH)
4. Incident Challenges (NIOSH)
5. Contributing Factors to the MAYDAY
6. Relationship to your Policies and Procedures
7. Relationship to the FGS Curriculum

EQUIPMENT NEEDED

1. NIOSH Report
2. Computer
3. Projector
4. Video Footage
5. Audio Capability
6. Building pictures, diagrams, layout

DRILL VARIATIONS

1. Power Point
2. Round Table Discussion
3. Building Walk Through

REFERENCE / SOURCES

- NIOSH Website
- UL Website
- Google Search
- FGS Manual
- Near Miss Website
- You Tube
- Truss Manufacturer
- NIST Website
- Close Calls Website

NIOSH Assignment

Each team member will present a portion of the report as described within the topics to be covered. If more than 6 team members, discuss further the relationship to each department SOP/SOG.

APPENDIX C:

FGS SKILLS TEACH BACK LESSON PLAN

OBJECTIVE:

Given an IAFF FGS skill, each student will demonstrate proficiency teaching the information to peers while being evaluated by IAFF FGS Master Instructors.

EQUIPMENT:

- Students in full PPE's with SCBA's available
- Radios with lapel mics
- Tools – axe, haligan, etc.
- IAFF FGS Notebooks
- IAFF FGS Props and appropriate safety systems
- IAFF FGS skill poster boards

INSTRUCTORS:

Two IAFF FGS Master Instructors assigned to each group. IAFF FGS Master Instructors to rotate to each skill and confidence course with group. IAFF FGS Master Instructor shall rate student performance using the IAFF FGS Skills Teach-Back Check Off form. Forms are included within each students FGS Notebook, Appendix F.

TIME REQUIRED:

30 minutes allotted for each skill. All students required to teach a section during 30 minute timeframe. A full class of 30 students will give each student only 3 minutes to demonstrate their ability to teach the skill.

TEACH-BACK FORMAT:

All students gathered around the prop/room. IAFF Master Instructor to assign one student to start. Each student provided with at least 3 minutes to teach the area of the skill being discussed.

The information instructed by students shall follow this format:

- Describe the practical application of the skill on the fire ground.
- Tie in the case study to the skill.
- Explain the design of the prop and safety concerns.
- Explain how to perform skill.
- Explain how to improve performance of skill.

IAFF FGS Master Instructor will manage time of student instruction. Students will rotate from teach-back instructor to student so all members of group have the opportunity to teach and be taught.

APPENDIX D:

Requirements for Performing IAFF Fire Ground Survival Skills

The IAFF Fire Ground Survival (FGS) program includes instructional materials to train fire fighters how to perform skills necessary to survive a MAYDAY. The training delivered within this program places fire fighters in simulated MAYDAY events that duplicate the stressors of survival on the fire ground. Many of the skills will require fire fighters to perform at or near maximal efforts for extended periods of time. To ensure the highest degree of safety for fire fighters during FGS training, fire departments shall, at minimum, provide the following minimum training facilities and equipment and FGS Training Instructors follow the following procedures.

FIRE DEPARTMENT INSTRUCTIONS:

Adhere to FGS use requirements as per licensing agreement.

- All fire department instructors teaching the IAFF Fire Ground Survival Program, must have successfully completed the IAFF's FGS Train-the-Trainer Program.
- Students participating in Fire Ground Survival hands-on training exercises, must have successfully completed the on-line Fire Ground Survival Awareness Training Program.
- Ensure fire fighters are appropriately trained in the use of all fire fighting personal protective equipment (PPE), and be able to perform basic fire fighting skills.
- Ensure fire fighters are medically and physically capable of performing at or near maximal effort for extended periods of time.
- Provide immediate access to BLS and ALS care (standby preferred).
- Provide a dedicated medical/rehabilitation area with proper hydration, cooling/warming measures, and ability to provide emergency medical attention by licensed/certified personnel.
- Ensure ropes and equipment used for safety belay system within upper floor egress skills are at minimum, consistent with NFPA 2500 *Standards for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services*.
- Ensure upper floor egress belay systems are set-up and tended by personnel who are at minimum, Level I Technical Rescuer trained as per NFPA 1006 – *Technical Rescue Professional Qualifications*.
- Ensure personnel performing upper floor egress skills wear a Class 3 harness, helmet and appropriate safety equipment as dictated within the skill instructions contained within the FGS program.

FACILITIES:

Facilities used to conduct IAFF FGS skills training shall meet the following requirements:

- Training Classroom:
 - Enough tables and chairs to seat 30 participants
 - Projector and speakers
 - Electrical cord
 - Projection Screen
 - Two (2) easels and easel pads or dry-erase boards with markers
- Training Structure Facility (e.g., Training Building, Training Tower):
 - Three or more floors with windows on each floor where ladders can be positioned.
 - Three or more rooms no less than 10 feet x 10 feet. Rooms shall have movable furnishings that can be moved from room to room. Rooms shall be able to be darkened.
 - Anchoring points must be available on each floor for securing belay systems.
 - Two or more entrances /exits to structure.
 - Electrical sources must be available.
- Training Grounds:
 - Flat surface around training structure to accommodate ground ladder placement.
 - Large area where multiple skills can occur without interfering with each other. An area of 100 feet x 100 feet or more is recommended. Three smaller areas of less than 100 feet x 100 feet are allowable.
 - At least one working hydrant.
- Training Equipment:
 - 600 feet of initial attack 1 ¼" or 1 ½" hoseline.
 - SCBA and mask facepiece for each student.
 - One extra SCBA cylinder for each student.
 - SCBA cylinder refill capabilities.
 - Radios (minimum of 10) with at least two channels/frequencies that can be used dedicated for training exercises.
 - Two 24 foot extension ladders.
 - Rope to secure ladders in position for Upper Floor Egress skills.
 - NFPA 2500 approved belay equipment for Upper Floor Egress skills.
 - (4) Flashlights
 - Hand tools - (6) axes, (6) haligan tools.
 - Portable sound system to play CD or digital music file.
 - Extension cord.
 - Pre-Incident Plan and photographs (all four sides and roof view if possible) of a structure specific to the Host Department's response area.
 - Copy machine.

■ Personal Protective Clothing and Equipment:

- Structural fire fighting ensemble meeting the requirements contained in NFPA 1500, Standard on Fire Department Occupational Safety, Health and Wellness Program and include: helmet, coat, trousers, boots, hood and gloves.
- Personal equipment normally carried by jurisdiction's fire fighters (i.e. flashlight, wire cutters, axe, etc.)

■ Medical and Logistical Facilities and Equipment

- Area out of direct sunlight that can be used for rehabilitation, with cooling and warming capability.
- Medical kit (As a minimum, kit must contain essentials needed to provide basic life support care including airways, dressings, and a variety of first aid equipment.)
- (4) Radios for instructors with two dedicated frequencies/channels. One frequency/channel will be used by students in performing radio communications skills required during simulated MAYDAYS. The second frequency/channel will be used by instructors to communicate with medical personnel if a fire fighter is injured.
- Water.
- Cooling and warming capabilities.
- Restrooms.

