Commack Fire Department

CFD Probationary Firefighter Basic Lesson Plan

Topic: **Emergency Escape System**

Class # 9

- **Level of Instruction**
  - Probationary Firefighter
- **Equipment Needed**
  - Emergency Escape System per trainee including Belt
  - Training escape systems
  - 30’ piece of webbing per student for harness safety
  - Landing pad
  - Safety belay system
  - 6’ hook
  - Irons
  - SCBA per student
- **Resources Needed**
  - CFD Probationary manual
  - CFD SOG’s
  - Ipad or Computer
- **Terminal Objective**
  - Firefighter’s will demonstrate proficiency in anchoring off, making a controlled exit out of the window and descending down to the landing pad for all evolution types.
- **Enabling Objectives**
  - Firefighter will explain what type of each part of the system is called and how it functions
  - Firefighters will demonstrate how to remotely anchor
  - Firefighters will demonstrate how to anchor at the window
  - Firefighters will demonstrate a MAYDAY
- **Lesson Outline:**
  - Black Sunday Video
    - https://youtu.be/EvxtBC2gQ1g
  - Why the Emergency Escape System?
    - Scientific factors
      - Changes in fire behavior
      - Greater fuel loads
      - Dynamic effects on lightweight and engineered structures
      - Rapid pre-flashover conditions from heat and smoke
    - Cultural factors
      - Department staffing and response time of mutual aid companies
      - Training and experience
      - Air management
      - Attitude and complacency

        - Changes in the philosophy of the bailout rope and kit
- Bailout system
    - Yates Truckman belt
        -
    - F4 Descender
        -
    - FireTech2 40’ rope
        -
    - Crosby hook
        -
    - Autolocking Carabiner
        -
    - Extender
        -
- How it is properly secured on gear
- When is it time to go? Considerations prior to the bailout
    - Assessment of fire conditions
    - How is my air?
    - Do I know where I am?
    - Locate the room or area of refuge and control the door
        - Identify windows
        - Identify anchor points *
            - Crosby hook allows for fast anchoring but need to be under constant tension
            - Remote anchoring is safer if time allows
            - Can always utilize a combination of tools, surfaces and fixed objects to remote anchor
    - ***Primary objective is to get below the window***
    - Consider multiple firefighters having to rapidly exit
- Components of the bailout
    - Call the MAYDAY
    - Clean out the window
    - Deploy the kit from the pocket
    - Anchor
    - Move to the window (if not there already)
    - Set the device over the sill/ ***Plumb point***
    - Roll out the window
    - Orientate to the building
    - Descend
- Evolutions
    - ***Instructor will demonstrate all details including the MAYDAY prior to the students performing each individual evolution***.

      1- Trainees will utilize eyebolt anchor and move across the full length of the room towards the window. Trainees will then perform a controlled exit out of the window and descend down to the landing pad. ***(NO SCBA)***

2- Trainees will utilize the Crosby hook at the window then perform a controlled exit out and descend down to the landing pad. ***(NO SCBA)***
3- Trainees will utilize a remote anchor of their choice, move to the window and then perform a controlled exit out and descend down to the landing pad ***(WITH SCBA NO AIR***)
4- Trainees will utilize the Crosby hook at the window then perform a controlled exit out and descend down to the landing pad. ***(WITH SCBA NO AIR)***
5- Trainees will utilize the Crosby hook at the window then perform a controlled exit out and descend down to the landing pad ***(WITH SCBA ON AIR)***

- Care and maintenance (monthly EES logs)
  - Check rope for chaffing, abrasions, discoloration, glazing and melting
  - Check devices for proper action, discoloration, cracking, burs, and foreign objects
  - Check hook and carabiners
  - Repack and stow
  - When in doubt take it OOS
- Retraining
  - Once a year on company level

- **<u>Summary</u>**
  - Keep in mind that if you ever have to deploy this system ***<u>the urgency is getting out of that environment that you are in</u>***. Even if you don't make it to the ground, making it under that window and out of that room is your first goal. With proper radio communication, command can get you a ladder or someone to pull you into a window below if you cannot safely reach the ground. Challenge yourself to deploy this system after completing a drill when you might be fatigued and see how it is bailing out (do this out of a first floor window to avoid injury).


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TRAINING DIVISION

Emergency Escape Systems

It's one of the few pieces of equipment that we hope we never have to deploy. Every interior Firefighter is required to be equipped with a person emergency escape system (E.E.S.). Currently we are using a system from Sterling Rope Co. called the ***F4 escape system with the Crosby hook***. Additionally we are using a Kevlar escape belt from Yates. All the components including the belt, hardware and rope is certified by UL to meet NFPA 1983. It's important to note that all of these components are ***rated to Technical use, in other terms this is for a single person use***. Unlike our life saving rope gear on Rescue 9 that is rated for General use, or two-person use. ***Never substitute your own personal equipment, as it may not be properly rated.***

Why the Emergency Escape System?

- ***Scientific factors***
  - Changes in fire behavior
  - Greater fuel loads
  - Dynamic effects on lightweight and engineered structures
  - Rapid pre-flashover conditions from heat and smoke
- ***Cultural factors***
  - Department staffing and response time of mutual aid companies
  - Training and experience
  - Air management
  - Attitude and complacency
  - Changes in the philosophy of the bailout rope and kit

Every Interior Class A firefighter is required to have an EES system on their gear, any firefighter who does not comply will be classified as a class B exterior firefighter

The System: *F4 Escape system with Crosby Hook pictured to the right*

- ***Yates truck man Escape belt:*** Kevlar personal escape belt. Rated sewn-in Black D-ring (center line) for escape systems hookup.
- ***Sterling tech extension lanyard:*** 7" extension lanyard is used to help extend the rappel device away from the harness. Allowing the device to be fully stored in our pocket and out of the elements where it can get hung up.
- ***Sterling F4 ascender:*** Designed to allow easy horizontal movement, auto-locking feature allows for a hands-free exit from the structure. Versatile for right or left-handed users. F4 system works with rope 7.5mm- 8mm in diameter.
- ***Crosby hook:*** Forged alloy steel hook facilitates anchoring at the window or point of egress. A high strength rating ensures the

hook will not deform even when fully loaded at the tip, or when exposed to extreme heat. The geometry of the Crosby hook offers the most security for placement on any surface.

- ***Sterling SafeTech escape rope:*** 40' of 8mm diameter rope. Currently the Tan rope is in service and the green and or orange rope is our training rope. This has a *5-year shelf life from the time it is manufactured not put into service*. 1 time use, if ever used rope will be taken OOS and used as training rope.
- ***Sterling auto-locking Carabiner:*** Auto-locking technical use which connects the F4 to the extension lanyard. Auto-locking reduces the potential of the carabiner opening during movement. The removable captive eye pin keeps the system in a straight line and avoids side loading the carabiner.
- ***Storage bag:*** Optional if using pocket on turnout gear

Storage: For the way our gear is designed, the system itself is going to be stored inside your left pant pocket. As you can see from the picture to the right, the flap on our gear closes from left to right. You can also see how the black D-ring of the belt lines up in the center of the body, this makes it much more manageable when bailing out and descending. With the belt situated this way it does not interfere with closing the bunker pants and the snaps are also properly placed to hold the belt in place. The addition of the extension lanyard allows for the system to stay tucked away in your pocket to minimize the system from getting snagged on something. The lanyard is girth hitched around the sewn in black D-Ring and accepts the system on the other side.*(it's important to note that the sewn-in black D-ring is the only D-ring this system should be attached to, the floating D-rings on the belt are not intended for bailouts)* The system itself is prebuilt and attached to the extension lanyard at using an auto-locking carabiner. Make sure when the system is built that the handle to the F4 is up, it will work the other way, but you risk it getting pinched on the wall when deploying. As you can see from the picture, all of the excess rope is neatly packed into the pocket allowing the F4 to sit tightly from the pocket to the belt. The Crosby hook is hooked over the pocket in order to identify and deploy with a gloved hand. It's important that all the equipment is checked monthly. Make sure that all the knots are tight and that there is no damage to the rope or components.

When is it time to go? Considerations prior to the bailout:

- Assessment of fire conditions:
  - What are the fire conditions?
  - Can I isolate myself by closing a door?
  - Did fire conditions deteriorate so much that it blocked my means of egress?
  - Am I really trapped?
- How is my air?
  - Am I considering a bailout because I am on vibra alert and I know that I cannot make it out?
- Do I know where I am?
  - MAYDAY

        - Can command get a ladder or aerial device to me
- Can I Locate a room or area of refuge and control the door?
    - Identify windows
    - Identify anchor points *
        - Crosby hook allows for fast anchoring but need to be under constant tension
        - Remote anchoring is safer if time allows but exposes rope to conditions that you are trying to leave behind
        - Can always utilize a combination of tools, surfaces and fixed objects to remote anchor
- ***Primary objective is to get below the window***
- ***Consider multiple firefighters having to rapidly exit***

Deploying: Remember that bailing out of a window or off of a roof ***is not a common practice***. This is to be used only when conditions warrant. Be sure to give a MAYDAY to command with the best location possible. The Crosby hook is designed to hook onto many surfaces/objects especially window surroundings, this is to allow fast deployment. If your system is rigged like picture above then your hook and rope will already have a plumb point that will generally get the job done for most structures. If needed quickly adjust and bailout.

Components of the bailout:

- Call the MAYDAY
- Clean out the window
- Deploy the kit from the pocket
- Anchor
- Move to the window ***(if not there already)***
- Set the device over the sill ***(remember your Plumb point)***
- Roll out the window
- Orientate to the building
- Descend

Always remember that the primary objective is to get your head below the window sill however consideration needs to be given to that area if multiple firefighting are attempting to rapidly exit together.

Care and maintenance (monthly EES logs)

- Check rope for chaffing, abrasions, discoloration, glazing and melting
- Check devices for proper action, discoloration, cracking, burs, and foreign objects
- Check hook and carabiners
- Repack and stow
- Rope has a 5-year life span from manufacture date. When in doubt take it OOS
- In the event that an EES system is used in an actual emergency they system will be take OOS and replaced

Retraining

- Once a year on company level

Summary: Keep in mind that if you ever have to deploy this system ***the urgency is getting out of that environment that you are in***. Even if you don't make it to the ground, making it under that window and out of that room is your first goal. With proper radio communication, command can get you a ladder or someone to pull you into a window below if you cannot safely reach the ground. Challenge yourself to deploy this system after completing a drill when you might be fatigued and see how it is bailing out (do this out of a first floor window to avoid injury).

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Full NIOSH Report


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F2005 03
NIOSH Fire Fighter Fatality Investigation and Prevention Program

Death in the line of duty...

A summary of a NIOSH fire fighter fatality investigation December 6, 2006

This report was revised on January 5, 2007.

Career Lieutenant and Career Fire Fighter Die and Four Career Fire Fighters are Seriously Injured during a Three Alarm Apartment Fire – New York

SUMMARY

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. The fire 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. The six fire fighters were transported to metropolitan hospitals where the two victims were later pronounced dead.

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

- ***review and follow existing standard operating procedures (SOPs) for structural fire fighting to ensure that fire fighters operating in hazardous areas have charged hoselines***
- ***ensure that fire fighters are trained on the hazards of operating on the floor above the fire without a charged hoseline and follow associated standard operating procedures (SOPs)***
- ***ensure that fire fighters conducting interior operations provide the incident commander with progress reports***
- ***ensure that team continuity is maintained during interior operations***
- ***review and follow existing standard operating procedures (SOPs) for incident commanders to divide up functions during complex incidents***

- ***ensure that Mayday transmissions are prioritized and fire fighters are trained on initiating Mayday radio transmissions immediately when they become trapped inside a structure***

- ***develop standard operating procedures (SOPs) for fire fighting operations during high wind conditions***

- ***provide fire fighters with the appropriate safety equipment, such as escape ropes, and associated training in jurisdictions where high-rise fires are likely***

Additionally,

- ***Building owners should follow current building codes for the safety of occupants and fire fighters***

INTRODUCTION

On January 23, 2005, a 46-year-old male career Lieutenant (Victim #1) and a 37-year-old male career fire fighter (Victim #2) were fatally injured during a three alarm fire in a four story apartment building. Four career fire fighters were also injured in the incident. The victims and injured fire fighters were searching for any potentially trapped occupants on the floor above the fire. The fire fighters became trapped by advancing fire and were forced to exit through the 4th floor windows. On January 25, 2005, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On March 21-24, 2005, four safety and occupational health specialists from the NIOSH Fire Fighter Fatality Investigation and Prevention Program investigated this incident. The NIOSH team met with the officials of the fire department, representatives from the Uniformed Fire Officers Association (UFOA) and the Uniformed Firefighters Association (UFA) which is affiliated with the International Association of Fire Fighters (IAFF). The team interviewed fire fighters and officers involved in the incident, examined photographs of the fireground, and reviewed other pertinent documents including the fire department's investigative report. Two of the injured fire fighters were interviewed at the rehabilitation centers where they were still recovering from their injuries.

Fire Department

The fire department involved in this incident serves a metropolitan population of over eight million residents, in a geographic area of about 322 square miles. In 2004, the fire department consisted of 11,098 uniformed fire fighters and fire officers; 2,756 emergency medical technicians, paramedics and emergency medical services officers; 253 fire inspectors, 182 dispatchers, 100 fire marshals, and 989 administrative support personnel that served the community from over 300 fire stations and buildings. The fire department has extensive written standard operating procedures.

In 2004, the fire department responded to 27,718 structural fires, 22,437 non-structural fires, 180,047 non-fire emergencies, 189,162 medical emergencies, and 37,332 malicious false alarms. Included in

the responses were 3,164 serious incidents: 2,908 first alarm, 204 second alarm, 32 third alarm, 15 fourth alarm, and 5 fifth alarm or greater incidents.

Typical engine company staffing is four fire fighters plus one officer (some engine companies have five fire fighters plus one officer); typical ladder and rescue company staffing is five fire fighters plus one officer. Each Chief Officer is assigned a firefighter to serve as an aide/driver. Fire fighters work the following shift: Day 1-2: 9:00 a.m. to 6:00 p.m.; Day 3: off; Day 4-5: 6:00 p.m. to 9:00 a.m.; Day 6-8: off.

Training and Experience

The State of New York requires that fire departments train career fire fighters to a level equivalent to National Fire Protection Association (NFPA) Level II. The state also requires 100 hours of annual in-service training.

The fire department requires all fire fighters to complete a 13-week training program at the department's fire academy.[1] Recruit fire fighters are instructed in the basics of fire suppression systems and fire fighting tactics. After graduating from the fire academy, the recruit fire fighters are certified fire fighter NFPA level II, and then go through a one year probationary period. Apparatus driver/operators (chauffeurs) are required to undergo an additional two-week training course after completing the probationary period. Refresher training is provided on each shift and multi-unit drills are routinely conducted to maintain proficiency.

Both victims had extensive training and fire fighting experience during their careers. Victim #1 was an officer with over 15 years of experience and victim #2 had over 10 years of fire fighting experience. Both of the victims' training exceeded the minimum state training requirements.

Equipment and Personnel

There were 11 apparatus and 72 fire fighters on scene during the 1st alarm response prior to the fatalities. Additional units were dispatched in 2nd and 3rd alarms; however, only those units directly involved in operations preceding the fatal events are discussed in the investigation section of this report. The initial dispatch was at 0759 hours. Response listed in order of arrival included:

Engine 42 (officer and 5 fire fighters)

Ladder 33 (officer and 5 fire fighters)

Ladder 27 (officer/victim #1, victim #2, injured fire fighters #1 & #2, and 2 fire fighters)

Engine 46 (officer and 5 fire fighters)

Engine 75 (officer and 5 fire fighters)

Battalion Chief 19 and battalion fire fighter via battalion car, initial Incident Commander (IC) &

Chief of Operations 3rd Floor

Rescue 3 (officer, injured fire fighters #3 & #4, and 4 fire fighters)

Division Chief 07 and division fire fighter via division car, Incident Commander

Squad 41 (officer and 5 fire fighters)

Engine 48 (officer and 5 fire fighters)

Ladder 56 (officer and 5 fire fighters)

Engine 43 (officer and 5 fire fighters)

Ladder 59 (officer and 5 fire fighters) as Rapid Intervention Team (RIT)

Battalion Chief 17 and battalion fire fighter via battalion car, Chief of Operations 4th Floor

Due to the adverse weather conditions, the department had increased the staffing to five firefighters and an Officer in all Engines normally staffed by four firefighters and an Officer, and to six firefighters and an Officer in all five Rescue companies which are normally staffed by five firefighters and an Officer. The following units responding to this incident on the first alarm had the additional fifth firefighter: Engines 42, 46, and 75, and Rescue 3.

Approximately 150 fire fighters and 35 apparatus were on scene at 1010 hours when the fire was brought under control.

At the time of the incident, the victims were wearing their full array of personal protective clothing and equipment, consisting of turnout gear (coat and pants), helmet, Nomex® hoods, gloves, boots, and a self-contained breathing apparatus (SCBA) with an integrated personal alert safety system (PASS). The victims were also equipped with portable radios.

Structure

The structure involved in this incident was a four-story brick apartment building built in the 1920s (see Photos 1 and 2). The building dimensions were 40 feet wide by 90 feet long. Each floor had three apartments. The building had a central stairwell that went from the first floor entrance all the way to the roof. Interior construction was plaster over wood lathe. There was an exterior fire escape on the rear western side of the structure. There was another exterior fire escape located on the front of the structure. There was an identical mirror image structure of the fire building attached to the west side with an air shaft located in the center of the two structures.

The apartments involved in this incident had been renovated into single room occupancies (SROs). The original apartments were partitioned into five separate bedrooms with a communal kitchen and bathroom. Each SRO had a single entrance and at the time of the incident each bedroom door was padlocked by the occupants for security. A new partition wall constructed with wood framing and covered with sheet rock limited access to the rear fire escape. The SRO renovation was considered a violation of local building codes since the structure did not have automatic fire sprinklers and no

permits were issued for this construction (see Diagrams 2 and 3 for a layout of the 3rd and 4th floor apartments).

According to fire investigators, the cause and origin of the fire was faulty electrical wiring in a receptacle in a 3rd floor apartment. The occupants of the apartment building were in the process of evacuating as fire department apparatus were arriving on scene.

Weather

The weather at the time of the incident included light snow with a temperature of 17°F and an average wind speed of 12 mph, with gusts up to 45 mph from the northwest. A blizzard leaving a snow depth of 13 inches occurred within hours preceding the incident. Weather conditions played a role in this incident with frozen hydrants, wind affecting the fire conditions, and a slightly delayed response time due to road conditions. The entire city block around the structure had not been plowed prior to the incident.

INVESTIGATION

On January 23, 2005, at approximately 0759 hours a fire was reported on the 3rd floor of a 4-story apartment building. Engine 42 was the first engine on the scene at 0803 hours and parked in front of the structure. Ladder 27 was the first due Ladder Company but arrived behind Ladder 33 due to traffic and weather conditions. Ladder 33 arrived at 0805 hours and positioned in front of the building. Ladder 27 arrived next and positioned at the northwest corner of the adjoining apartment building. Within the next two minutes, Engine 46, Engine 75, and Battalion 19 (the initial IC) arrived. Engine 46 was positioned at a hydrant approximately 320 ft west of the apartment and Engine 75 was positioned 160 ft east of Engine 42 (see Diagram 1).

The Ladder 33 Lieutenant and two fire fighters made entry to the third floor just ahead of Engine 42's hoseline and forced open the fire apartment door. Occupants of the 4th floor were beginning to evacuate down the stairwell past the fire apartment. The Ladder 33 crew kept the fire apartment door closed until occupants evacuated and the hose arrived.

As the Engine 42 Captain went up the apartment stairwell, he met several evacuating building occupants who told him the fire was on the 3rd floor. The Engine 42 crew started advancing an uncharged 1¾-inch hand line to the fire located within a third floor apartment. The crew observed moderate grayish white smoke pushing out the closed front door of apartment 3I (see Diagram 2). The Engine 42 driver/operator radioed to the interior crew that the hydrant was frozen.

The Ladder 27 Officer (Victim #1) and two fire fighters advanced up the stairwell and informed the Ladder 33 crew that they would operate on the floor above the fire. The Ladder 27 crew did a forceable entry on the 4th floor apartment 4L above the fire and began conducting a search for trapped occupants (see Diagram 3).

The initial IC (Battalion 19) transmitted a size-up to dispatch and informed dispatch the responding units should be aware of frozen hydrants. Dispatch notified that Engine 43, Squad 41, Rescue 3, Ladder 59 (RIT team) and Division 7 were responding.

Activities of Fire Fighters Operating on the Fire Floor

The Engine 42 crew operated on booster water until another engine could supply them with hydrant water. The crew flaked out six 50-foot lengths of 1¾-inch hoseline up the stairwell to the 3rd floor and into an adjacent apartment. The Engine 46 crew assisted with the hose stretch on the 1st and 2nd floors. At 0809 hours, the Engine 42 Captain radioed his Chauffeur to charge the hoseline and the crew advanced into the fire apartment down the hallway towards the bedrooms. At the same time, the Ladder 33 crew was already in the fire apartment searching for trapped occupants. Conditions within the apartment were heavy smoke with intense heat. The Ladder 33 crew located the fire within the kitchen and directed the Engine 42 crew to the kitchen doorway. Engine 42 pulled the hoseline back, entered the kitchen and operated on booster water for about two minutes. The Engine 46 crew was now assisting with the hose on the third floor. *(Note: The fire department investigative report stated "This resulted in eight fire fighters and two officers crowded in a relatively small area operating with the 1¾-inch hoseline").*

The crew reported that the hoseline lost pressure several times while operating in the kitchen. The hose would lose pressure, the nozzle would be shut, the hose would become firm again but the water stream was very weak. At 0819 hours the crew lost water pressure entirely. *(Note: It was initially reported that a hoseline had burst. Fire fighters on scene thought that ice had formed in the hoseline restricting flow. The fire department internal investigation reported that the loss of water was one or a combination of factors: (1) hoseline kinks, (2) overcompensation for excessive pressure in lines during relay operations by the pressure governor on the pump or (3) loss of prime due to air entering the pumper).* The Engine 42 Captain ordered the hoseline withdrawn based on the increasing heat. The Engine 42 and Engine 46 crews then backed the hoseline out of the fire apartment. The Ladder 33 crew also exited the fire apartment.

Engine 75 had attached to a hydrant on the corner block east of the structure and supplied Engine 42 with hydrant water at 0816 hours, but water supply problems persisted.

Activities of Fire Fighters Operating on the Floor Above the Fire

At 0809 hours, Rescue 3 arrived and the IC ordered them to conduct a search on the 4th floor. 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. Battalion 19 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 bringing 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; conditions were heavy smoke with little heat. As the crew was searching for occupants 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 SRO layout).*

Deteriorating Conditions on the 4th Floor

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. A Rescue 3 fire fighter searching in the 4th floor apartment hallway dove out the apartment door as intense flame erupted from the kitchen. He closed the door behind him and a few seconds later reopened it; he saw a wall of fire within the apartment hallway. Rapidly progressing flames now trapped four Ladder 27 firefighters (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. Reacting to the change in conditions, fire fighters operating on the roof began to clear the snow and open a ventilation hole over the 4th floor apartment.

Activities of Ladder 27 Fire Fighters at the time of the Fatal Events

Upon reaching the 4th floor, the Officer of Engine Company 42 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 IC was coordinating the rescue of civilians from the front fire escape and did not immediately hear the Mayday transmissions. Once the IC understood the gravity of the situation, he ordered Ladder 59 to the roof and Ladder 56 to 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 from the end (see Diagram 3). There was a metal child guard gate (see Photo 3) blocking the window and 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 firefighters #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 from the end. *(Note: The back yard of the apartment building is actually below grade (see photo 4). The distance was equivalent to a 5 story fall).*

Activities of Rescue 3 Fire Fighters at the time of the Fatal Events

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 approved 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 carabineer 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.

Fire Fighter Activities on the Fireground after the Fatal Events

The six fire fighters fell to the ground between 0830-0831 hours. A Squad 41 fire fighter on the roof hearing their Mayday transmissions was lowered on a rope *(Note: This rope was provided by the fire department)* in a rescue attempt, just as the last of the six trapped fire fighters fell.

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.

CAUSE OF DEATH

According to the medical examiner's findings, the cause of death for both victims was mass trauma of the head, torso and extremities with multiple contusions of the extremities.

RECOMMENDATIONS

Recommendation #1: Fire departments should review and follow existing standard operating procedures (SOPs) for structural fire fighting to ensure that fire fighters operating in hazardous areas have charged hoselines.

Discussion: It is department policy to initiate an aggressive interior attack (offensive strategy) whenever possible. Fire departments should ensure that a hoseline is in position prior to entering hazardous or potentially hazardous areas. At this point, the hoseline can be charged and entry made. If the hoseline doesn't charge or flow is restricted, fire fighters will still have time and space to escape.

According to Dunn, the most important fire fighting operation at a structure fire is stretching the first attack hoseline to the fire.[2, 3] A properly positioned and functional fire attack line saves the most lives during a fire.[2] "It confines the fire and reduces property damage. Searches will proceed quickly, rescues will be accomplished under less threat, sufficient personnel will be available for laddering, ventilation will be effective, and overhaul above the fire room will be unimpeded."[2]

Firefighters should continually train on SOPs including but not limited to establishing effective water supply, proper hose deployment, and advancing and operating hoselines to ensure successful interior attacks. Refresher training should be provided to all fire fighters on a regular basis or as needed to ensure effective fire fighting skills are maintained.

Recommendation #2: Fire departments should ensure that fire fighters are trained on the hazards of operating on the floor above the fire without a charged hoseline and follow associated standard operating procedures (SOPs).

Discussion: The most dangerous location on the fire ground is operating above the fire, especially during operations without the protection of a hoseline.[2, 3] Before operating above a fire, it is a good practice to deploy a hoseline. Where there is risk of extension to concealed spaces, additional precautionary hoselines are needed. According to Dunn, fire fighters are most often trapped on a

floor above a fire because they fail to size-up the fire below them.[3] Fire fighters should make certain that they take all necessary precautions and size-up the fire before making entry above it. Fire fighters should determine whether suppression teams are capable of extinguishing the fire and notify command. If not, then command should not permit fire fighters above the fire until conditions change. In this incident, operations continued above the fire on the 4th floor after the withdrawal of Engine 75's hoseline.

Recommendation #3: Fire departments should ensure that fire fighters conducting interior operations provide the incident commander with progress reports.

Discussion: Frequent progress reports to the IC are essential in the continuous size-up and assessment of an incident.[4-7] Interior crews working in areas not visible to the IC are the IC's eyes and ears during an incident. Progress reports also provide everyone on the fireground with information on aspects of the incident that relate to their activities (primary search, suppression, ventilation, etc.).

Recommendation #4: Fire departments should ensure that team continuity is maintained during interior operations.

Discussion: Fire fighters should always work and remain in teams whenever they are operating inside a burning structure.[6, 7] Team continuity means knowing your team members and who is the team leader, staying within visual contact at all times (if visibility is low, teams must stay within touch or voice distance of each other), communicating needs and observations to the team leader, staging as a team, and watching out for other team members. Teams that enter burning structures should enter and leave together to ensure that team continuity is maintained. Working in teams and maintaining team continuity provides an added safety net of fellow team members.

Recommendation #5: Fire departments should review and follow existing standard operating procedures (SOPs) for incident commanders to divide up functions during complex incidents.

Discussion: Incident commanders have to address multiple tasks simultaneously during high stress activities.[8] Incident commanders can only manage so much information and should divide up functions to make the span of control more manageable. During complex events, the IC should assign other personnel to functions such as accountability, radio communications, incident safety, company tracking, and resident evacuation in order for the IC to effectively focus on fire command.

Recommendation #6: Fire departments should ensure that Mayday transmissions are prioritized and fire fighters are trained on initiating Mayday radio transmissions immediately when they become trapped inside a structure.

Discussion: In this incident, there was an initial delay in determining who made the initial Mayday transmission. 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 firefighter 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 structural fire, they must initiate emergency radio transmissions.[6, 9] They should manually activate their personal alarm safety system (PASS) device and announce "Mayday-Mayday" over the radio. A Mayday call will receive the highest communications priority from dispatch, the IC, and all other units. The sooner the IC is notified and a RIT is activated, the greater the chance of the fire fighter being rescued. A transmission of the Mayday situation should be followed by the fire fighter providing his last known location. A crew member who initiates a Mayday call for another person should quickly try to communicate with the missing member via radio and, if unsuccessful, initiate a Mayday providing relevant information.

Recommendation #7: Fire departments should develop standard operating procedures (SOP's) for fire fighting operations during high wind conditions.

Discussion: Fire departments should develop SOPs to protect firefighters, including using defensive tactics if necessary, during incidents when high wind affects fire conditions. According to Dunn, "when the exterior wind velocity is in excess of 30 miles per hour, the chances of a conflagration are great; however, against such forceful winds the chances of successfully advancing an initial hoseline attack on the structure are diminished. The firefighter won't be able to make forward hoseline progress because the flame and heat under the wind's additional force will blow into the path of advancement."[3] The wind at the time of the incident was gusting up to 45 miles per hour, blowing from the northwest, speeding the fire extension to the 4th floor.

Fire fighters encountering high wind conditions should change their strategy. According to Dunn, "the interior line should be withdrawn and the door to the fire area closed. The officer in command must be notified of the inability to advance the interior attack hoseline due to the strong wind. A second hoseline should be advanced on the fire from the opposite end, the window or door through which the wind is blowing. This method may require the firefighters to stretch the line up an aerial ladder, fire escape or portable ladder. The second attack line will advance on the fire from the upwind side."[3]

Recommendation #8: Fire departments should provide fire fighters with the appropriate safety equipment, such as escape ropes, and associated training in jurisdictions where high-rise fires are likely.

Discussion: According to NFPA 1500 *Standard on Fire Department Occupational Safety and Health Programs*, 2007 Edition, Section 7.1.1, "the fire department shall provide each member with appropriate protective clothing and protective equipment to provide protection from the hazards to which the member is or is likely be exposed."[10] In this incident, aerials and ground ladders were unable to access the rear of the apartment. When fire fighters are beyond the reach of ladders, aerials,

or elevated platforms, an option of last resort is a rope rescue. NFPA 1500, Section 7.16 *Life Safety Rope and System Components* states "all life safety ropes, harnesses, and hardware used by fire departments shall meet the applicable requirements of NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*." NFPA 1983 specifies the minimum design, performance, testing, and certification requirements for life safety rope, water rescue throwlines, life safety harnesses, belts, and auxiliary equipment for emergency services personnel.[11] Fire departments in jurisdictions where high-rise fires are likely should provide all fire fighters with escape ropes per NFPA 1983 and the appropriate training to effectively utilize their escape ropes during emergencies. Additionally,

Recommendation #9: Building owners should follow current building codes for the safety of occupants and fire fighters.

Discussion: State building codes require that single room occupancies (SROs) in non-fireproof tenement buildings have automatic fire sprinklers in every hall or passage within the apartment and at least one sprinkler head in every room. This apartment building did not have sprinklers. The transformation of the 4th floor apartment into a SRO led to the construction of an interior partition wall that impeded the discovery of the fire and hindered the fire fighters' searches. It also prevented fire fighters from reaching the rear fire escape, their secondary means of egress.

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INVESTIGATOR INFORMATION

This investigation was conducted by Steve Berardinelli, Virginia Lutz, Mark McFall, and Nancy Romano, Safety and Occupational Health Specialists with the Fire Fighter Fatality Investigation and Prevention Team, Fatality Investigations Team, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. Also assisting in the investigation was Chris Griffin, an engineering technician with NIOSH. Technical reviews were provided by Chief Vincent Dunn, Fire Safety Consultant and Deputy Chief William Goldfeder, Loveland-Symmes Fire Department and editor of www.FirefighterCloseCalls.com.

Photo 1. Front of Incident Structure

Photo 2. Rear of Incident Structure

Photo 3. Child Guard Gate on Apartment Windows

Photo 4. Location in Rear of Structure where Fire Fighters Fell

Career Lieutenant and Career Fire Fighter Die and Four Career Fire Fighters are Seriously Injured during a Three Alarm Apartment Fire - New York

Diagram 1. Aerial Diagram of Fireground

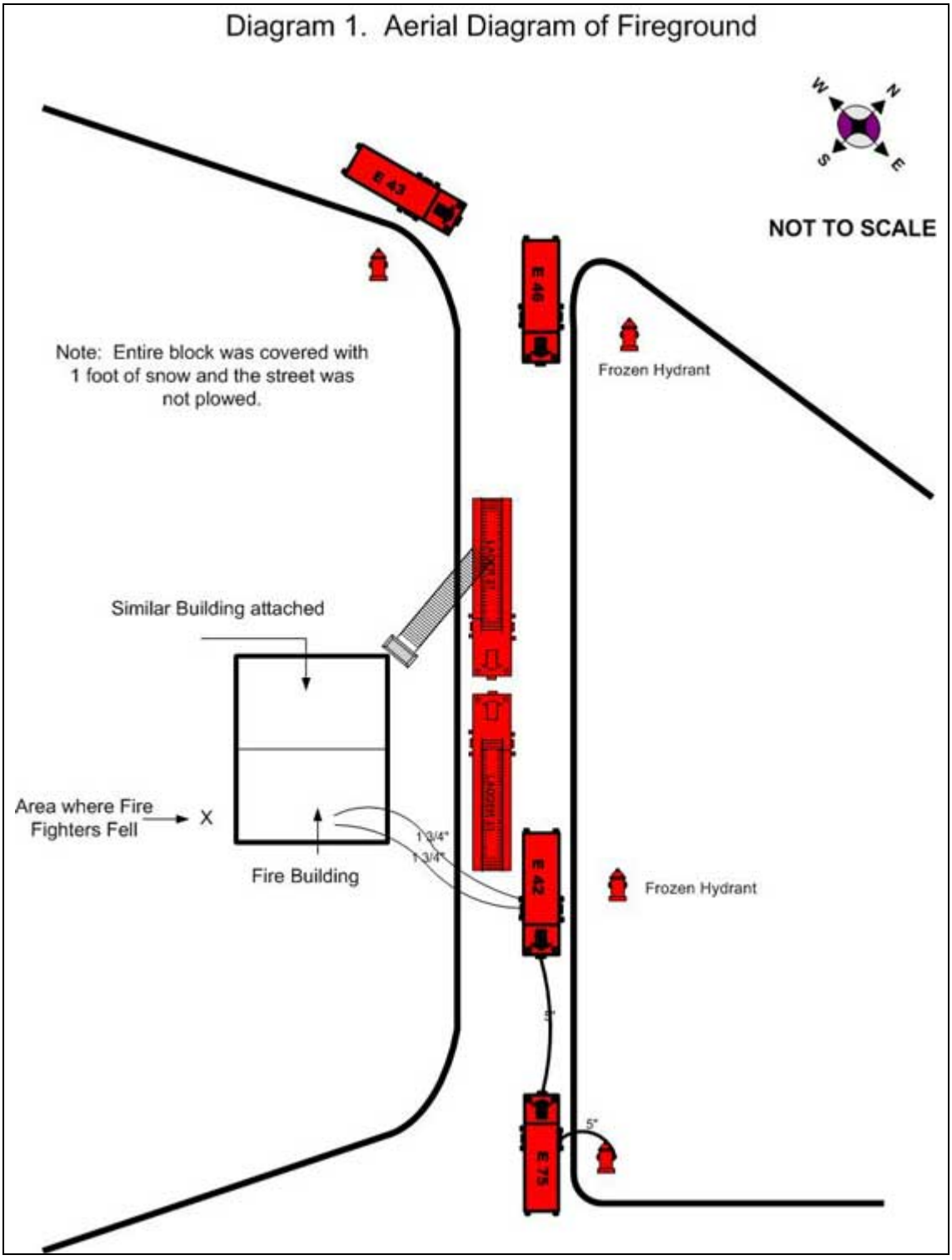


Diagram 2. Layout of Third Floor Fire Apartment.

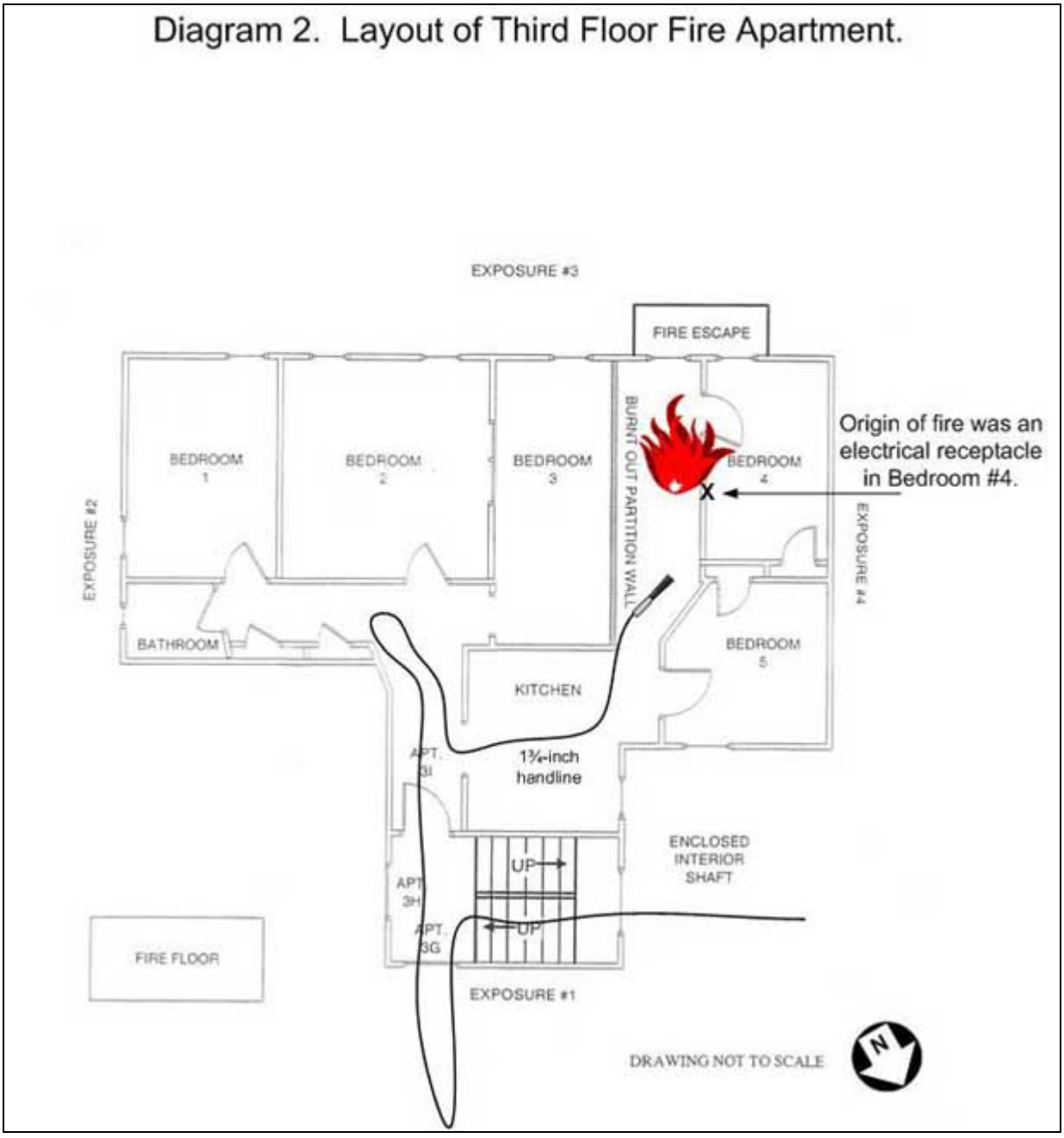
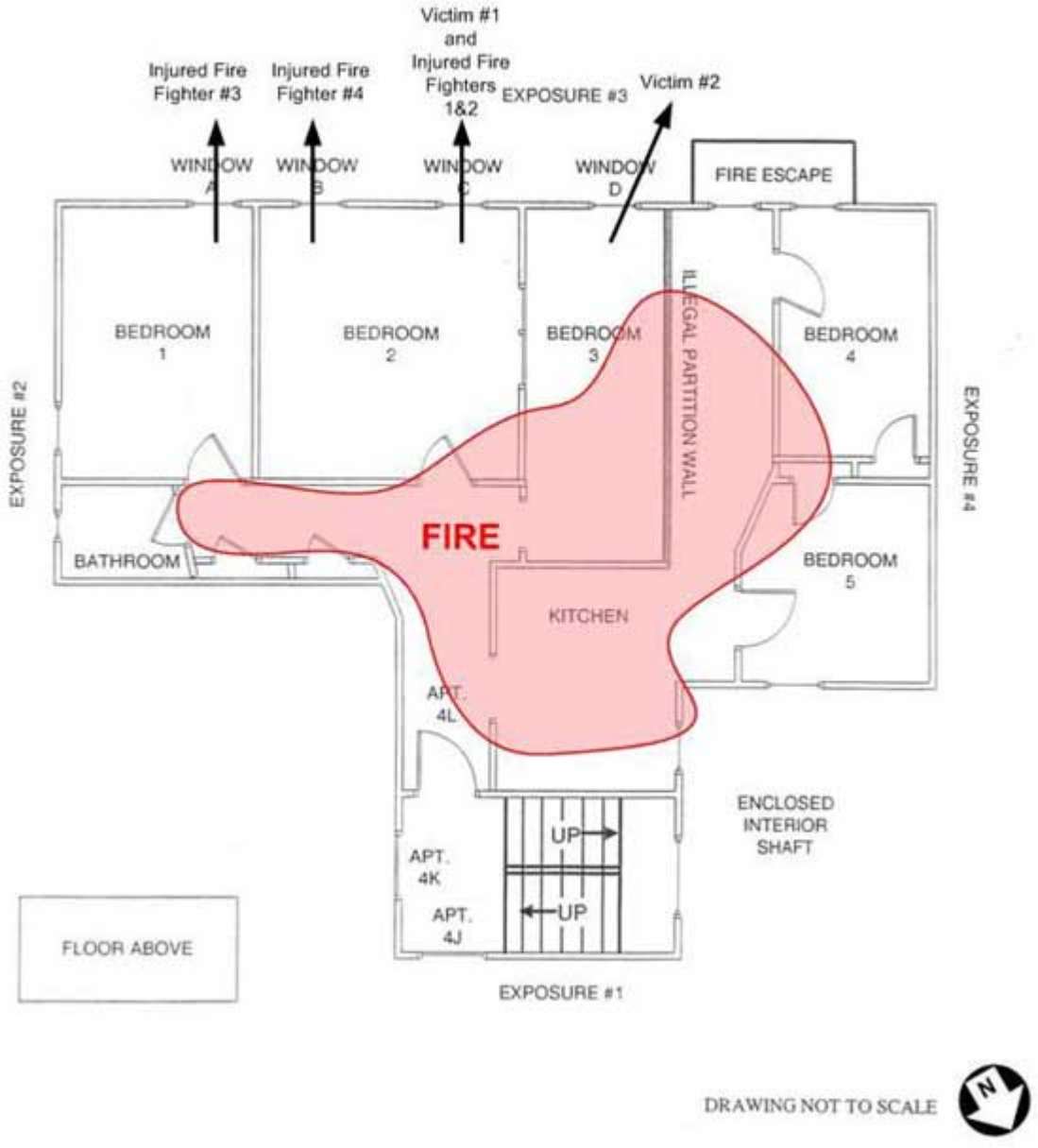


Diagram 3. Layout of Fourth Floor Apartment above the Fire



Commack Fire Department

Training Division

Badge#	Name:

Date
__/__/__

EMERGENCY ESCAPE SYSTEM

TASK	Pass	Fail	COMMENTS
Demonstrates how to properly set up system	☐	☐	
Demonstrates how to properly store system within pocket	☐	☐	
Demonstrates how to properly deploy system with a gloved hand	☐	☐	
Demonstrates how to remotely anchor	☐	☐	
Demonstrates how to properly move across the floor	☐	☐	
Demonstrates a proper MAYDAY	☐	☐	
Completes a controlled exit and decend for Slide 1	☐	☐	
Completes a controlled exit and decend for Slide 2	☐	☐	
Completes a controlled exit and decend for Slide 3	☐	☐	
Completes a controlled exit and decend for Slide 4	☐	☐	
Completes a controlled exit and decend for Slide 5	☐	☐	
Understands that exit from environment within is top priority	☐	☐	

PASSED ALL SKILLS ☐

Evaluator:	Signature


COMMACK
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DIVISION
CFD
F
D
"GET INVOLVED"

Emergency Escape System EES

Written: 9/2022
Version #1

Revision #: _____
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