Saving Ourselves
Keeping Ourselves Safe on the
Fire Ground
September 2018

Instructors

• Lead Instructor –
• Instructors
  – A
  – B

Why are we here?

• Every time a firefighter enters a building, they are exposing themselves to the potential for exposure to a varied number of hazards
• The dynamics of the fireground require us to be prepared for the unforeseen
Why are we here?

• A great deal of our survival will rely on our ability to help ourselves.
• Though we work as a team, we must be prepared to survive on our own.
• We have to identify factors that contribute to Line of Duty Deaths and work to lessen their likelihood and impact.

Objectives

• By the end of this class, you should have a clear understanding of the following:
  – Types of MAYDAY situations and how to call a MAYDAY
  – The importance for early recognition of a problem and request for help
  – Techniques to improve survivability during a variety of MAYDAY events
  – Importance of PPE and mastery of its use

Sacramento
Section 2
HOW WE GET IN TROUBLE ON THE FIREGROUND

Conditions

Types of Maydays  %
Falls from roof  22%
Falls Through Floor  19.8%
Lost/Separated  19.2%
Air Problems  15.2%
Trapped  12.2%
No Communication  2.2%
Other  4.3%
Medical  8.1%

Falls

• We are working in a structure that is under attack
• If you can't see your feet, don't be on them
  - 71% of falls through floor, from standing position
• Use sound practices when working on a roof
  - 30° - 45° Roof Ladder
  - > 45° Aerial (Dunn 1992)

Lost / Separated

- Disoriented
- Off the hose line / Search Rope
- Zero visibility conditions are only a heartbeat away
- Utilize technology, but do not over rely
- Do a good Size-Up

Air Problems

- Mastery of the SCBA is imperative
- Must be able to troubleshoot when something fails
- Manage your air
- 25% to 33% low air indicator is only good if you heed its warning

Trapped

- Collapse
- Entangled
- Secured Location
  - Auto locking doors
- Trapped by fire
No Communication

- Poor reception
  - Building Construction
  - Direct vs Repeated Channels
- Wrong Channel
  - Do you have the right frequency?
- Damaged radio
  - Protect the plastic and rubber

Medical

- Stay physically able to do this job
  - 54% of medical were Heart Attacks
  - 31% were over the age of 50

WHEN WE CAN’T AVOID TROUBLE
Be Prepared

- Tools & Equipment
  - Webbing
  - Personal Escape Rope
  - Door Wedges
  - Radio
  - Flashlight
  - Properly worn PPE

Terminology

MAYDAY
- An immediately life threatening event that requiring a clear radio frequency and assistance of other personnel.
- Example
  - Collapse with firefighter pinned

URGENT
- A potentially life threatening event / situation that requires limited radio traffic advisement of all personnel on the fireground.
- Example
  - Bulging wall, threat of collapse

Either can be called by anyone on the fireground

Recognizing the MAYDAY

- Recognize a MAYDAY Situation
  - Collapse
  - Trapped / Stuck, Entangled
  - Fall through floor / roof
  - Lost
  - Low on air, not near an exit
  - Any emergent situation that can’t be fixed in 30 seconds
Calling the MAYDAY

- MAYDAY-MAYDAY-MAYDAY
  - Wait for acknowledgement
- Location, Identification, Problem
  - Confirm acknowledgement
- Survival
  - Activate PASS
  - Manage air
  - Help yourself as possible

Avoid the Killers

Don't wait to call for the MAYDAY

- Common Causes for delay
  - Failure to recognize the problem
  - Loss of situational awareness
    - Temporal Distortion
    - Disorientation
  - Afraid of consequences of calling the MAYDAY
  - Pride

CALM BEGETS CALM
Maintaining Calm

When we panic:
- Respiration increases
- We don’t think as clearly
- We speak faster
- We speak with a higher tone
- We forget the basics

Barriers to getting out safe:
- Running out of air
- Making poor decisions
- Unintelligible radio transmissions
- Loss of fine motor skills

Air Management
- You can’t make more of it!
- Control your breathing!
- Reign yourself back in!
- Start to solve the problem!

Reilly Breathing Technique
Air Misconceptions

- 30 minutes is 30 minutes
- Cylinders are rated for firefighter's air consumption
  - 4,500 psi cylinders hold 45 cubic feet of air
  - 45 cubic feet of air = 1274 liters
  - 1274 liters / 40 lpm = 32 minutes

Air Facts

- Firefighters use upwards of 60 lpm in fireground ops
- Reserve air was not meant for firefighting.
  - NFPA 1404 requires exit IDLH prior to consumption of reserve air
- Now your 32 minute cylinder is around 14 minutes!

Cylinder Ratings

<table>
<thead>
<tr>
<th>Rated Duration (40 lpm)</th>
<th>Volume of Air</th>
<th>Time to 25% DSST (40 lpm)</th>
<th>Time to 50% DSST (40 lpm)</th>
<th>Weight (full) 4000psi</th>
<th>Weight (full) 5000psi</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Minutes</td>
<td>45 ft³</td>
<td>16 min</td>
<td>14 min</td>
<td>11 lbs</td>
<td>10 lbs</td>
</tr>
<tr>
<td>45-Minutes</td>
<td>65 ft³</td>
<td>23 min</td>
<td>20.5 min</td>
<td>15 lbs</td>
<td>14 lbs</td>
</tr>
<tr>
<td>60-Minutes</td>
<td>87 ft³</td>
<td>31 min</td>
<td>27.5 min</td>
<td>19 lbs</td>
<td>18 lbs</td>
</tr>
</tbody>
</table>
Engineering Problem or Attitude Problem?

- We kill firefighters in structures because they run out of air...
- NFPA 1403 engineers the problem by changing our EOSTI to 33% from 25%
- The real solution will come from changing attitudes and respecting the hazards of running out of air in a structure.

PHYSIOLOGICAL EFFECTS OF STRESS

- Ideal heart rate between 115 and 145
  - Increased vigilance
  - Brain perceives more from field of view
- Over 155 bpm
  - Cognitive skills deteriorate
- Over 175
  - Tunnel vision
  - Irrational Behavior
Breath Control

- Autogenic Breathing
  - In through your nose for three count
  - Out through the mouth for a three count
- Decreases heart rate up to 30% for 40 seconds

EMERGENCY PROCEDURES WITH THE SCBA

- MAYDAY
- PASS Alarm
- Do not remove mask
- Mask knocked off
  - Get low and replace it
- Mask compromised
  - Hand over the leak
  - If compromised by heat, may stick to your glove
Regulator Breathing

- When mask destroyed
  - Cup mouth
  - Open purge valve
  - Inhale through mouth
  - Exhale through nose

Cylinder Breathing

- Cup mouth and cylinder valve
- Open cylinder valve enough to provide sufficient air
- Inhale through mouth
- Exhale through nose

Troubleshoot

- No air?
  - No air left
  - Cylinder open fully?
  - Crimped hoses
    - Back off the crimp
  - Cut hoses
    - Place hand over the cut
Jeff Bowen Story

Air Management Rule of Thumb

- To calculate a turnaround or departure psi if conducting search or similar activity:
  - Read the cylinder pressure on your remote gauge prior to entry.
  - Subtract your EOSTI activation psi from your entry psi
  - Divide this number by 2 then add to your EOSTI activation psi


- 4500 psi on entry
- 4500 psi – 1125 psi = 3400 psi (rounded)
- \((3400 \div 2) + 1125 = 2800\) psi (rounded)
- Add an appropriate safety factor depending on the size of the building
**Air Management Rules**

- Always enter with a full cylinder
- Know when to get out
- Always stay oriented to a hose line, search line or wall
- Call MAYDAY as soon as you are lost or disoriented

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**PPE**

- Firefighter Joel Mumie
- Hazelton, PA
  - Early morning fire
  - Vent, enter, search of second floor bedroom
  - Room flashes over shortly after entry
  - FF Mumie bails out window he entered
  - All his PPE was properly in place

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**Flashover**
• FF Mumie escaped major injury because all his gear was properly in place
• VEIS is one of the most dangerous operations we can do on the fireground

Wear your PPE
**KNOTS**

**Handcuff Knot**

**Handcuff Knot Step By Step**

1. Make 3 loops with the rope.
2. Using loop and pass each loop around rope in this manner.
3. Pull the loops up to the desired size and knot the standing parts.
4. Tighten to complete the knot.

**Clove Hitch**
Figure 8 Follow Through

Munter Hitch

Water Knot
Today's Practical Stations

GETTING OUT OF TROUBLE

Long Lug Out

- Female coupling connects to the pump
- Follow the female coupling
- Smooth, bump, bump to the pump
BREACHING WALLS

Breaching Walls

• Make inspection hole to ensure where you’re going is safer than where you are!
• Not all walls will be breach friendly
  – Types of building materials and types of walls
• Open a hole tall enough for you to get out, but small enough to keep a barrier

After the Breach

• Sit against the opening and backstroke through
  – Left arm first
• Reduced Profile
  – Loosen pack and remove right arm from shoulder strap
  – Place pack on left side, reducing profile and go through wall
• Low Profile
  – Remove pack and place on floor in front of you, cylinder stem away, crawl through
Entanglement

- Call the MAYDAY
- Activate PASS
- Clear valve stem
- Rotate cylinder into corner (when possible)
- Clear regulator
- Slide hand down body, to wall, overhead, create void
- Push into the void
Entanglement Keys

- Stay calm!
- Don’t push beyond the void
- Keep back into the wall
- Know the parts of your pack that will get hung up
- If you get hung up, keep the wire taught until you have a hand on it
- Only cut what you know!

Entanglement With Axe
Entanglement With Pole

- When not along a wall, with a hoseline
- Call the MAYDAY
- Activate Pass
- Loosen Waist
- Remove right arm from shoulder strap and spin pack underneath you from left side
- Clear Cylinder and spin yourself around

Entanglement (Turtle)

- When not along a wall, with a hoseline
- Call the MAYDAY
- Activate Pass
- Loosen Waist
- Remove right arm from shoulder strap and spin pack underneath you from left side
- Clear Cylinder and spin yourself around

Turtle
Alternative Exits

- Mastery of the PPE is essential for survival in emergency situations
- Keep yourself calm to stay alive
- Air management is a key component of survival

Train as though your life depends upon it, because it does

Summary

- Mastery of the PPE is essential for survival in emergency situations
- Keep yourself calm to stay alive
- Air management is a key component of survival

Train as though your life depends upon it, because it does
Saving Ourselves
Keeping Ourselves Safe on the Fire Ground Day 2
September 2018

Instructors

- Lead Instructor –
- Instructors
  - A
  - B

Objectives

- By the end of this class, you should have a clear understanding of the following:
  - How we get into trouble
  - Methods of protecting ourselves in MAYDAY situations
    - Falling into a hole
    - Trapped in wires
    - Trapped in a room above the first floor
DECREASING THE POTENTIAL FOR MAYDAY

- Follow policies and Procedures
  - Air management
  - Accountability
  - Risk Management
- Maintain Situational Awareness
  - Good size-up
  - Constant evaluation
  - Crew integrity

Staying Out of Trouble

- Freelancing
  - Acting outside the purview of your assigned duties, or performing actions without the knowledge or permission of a supervisor
- No place on the fireground
  - Just because you think it is the right thing to do, doesn’t mean it is
Section 2
HOW DO WE GET OUT OF TROUBLE

Self Rescue Techniques

• The best solution is to stay out of trouble
• If you can’t stay out of trouble, the following scenarios are all emergencies
  – Call the MAYDAY first!
  – After MAYDAY is acknowledged, activate PASS
• Stay Calm
  – Autogenic Breathing

Calling the MAYDAY

• MAYDAY – MAYDAY – MAYDAY
• Location
• Identification
• Problem

• Survive!
GRAB LIVES

Gauge – Check Air
Radio – Make the transmission
Activate – PASS alarm
Breathe – Control breathing

Low – Stay low under smoke
Illuminate – lights on
Volume – Make noise
Exit – Find a way out
Shield – last resort, remove regulator and shield with hood

Orientation

• Orient yourself to the building
  – Windows
  – Doors
  – Furniture
  – Expansion Joints
  – Hose lines
  – Search ropes

Sheltering in Place

• Stay low
• Conserve your air
• Make Noise
• Make Space (if possible)
• Compartmentalize yourself
  – Close doors
• Notify Command of changes / needs
Thomas Brooks, Patricia Conroy, Marc Kolenda

CASE STUDY
BRICELYN ST PITTSBURGH
2/14/1995

Chronology

- 00:27 – E 17 on scene
- 00:58 - Truck 17 Captain, low on air, rescued from 1st floor window
- 01:07 – EMS reports more firefighters in the building
- 01:09 - EMS reports firefighters removed from building
- 01:39 – Three firefighters located in building
Bricelyn St - Accountability

- Crews did not maintain integrity throughout the incident
- No one knew the location of E18 for more than 40 minutes
- Confusion arose from identifying by the helmet shield

Bricelyn St – Size-up

- Disoriented on first floor, believed they were in the basement
- All in Alpha side (Family Room) partially below grade but near windows

Bricelyn St - Equipment

- PASS Alarms present, not turned on
- Radios present, never used
  - One radio was later found to be defective
- SCBA was worn, but members ran out of air
  - 2 members still had face pieces on
  - 2 died from smoke inhalation (Tube disconnected from regulator)
  - 1 died from hypoxia (face piece tightly in place)
Bricelyn St - MAYDAY

- No one used the tools they had to call for help
- Radios
- PASS

CASE STUDY
WEST OAK LANE, PHILADELPHIA PA
12/9/2014

Joyce Craig

- Two Story Row House with a Basement
  - A side grade was first floor
  - C side grade was basement level
- Crews working on first floor with fire in the basement
- E-73 Firefighter separated from her officer and conditions rapidly deteriorate
- RIT Company delayed by heavy traffic
Alpha and Charlie Sides

Communications

• MAYDAY was transmitted and emergency button activated at 0302
  – Confusion about whose emergency button
  – No MAYDAY acknowledgement
• 18 minutes before crews were able to locate her on Div 1

Important Lessons

• Crew Integrity
• Incident Management
• Training
  – Fire Behavior
  – Hose management
  – Fireground tactics
  – MAYDAY procedures
CASE STUDY
BRIDGEPORT CONNECTICUT
7/24/2010

Lt Steven Velasquez, FF Michael Bia

Double LODD
- 2 ½ story frame building
- Rental units on floors 1 & 2
- Owner occupied finished attic space.
- Unfinished basement
- Fire on 2nd floor extended up to 3

Fire Progress
- 1547 E3 and L5 on scene
- Crews had two lines in operation and were making progress
- 1613 – First MAYDAY call – unacknowledged
- 1616 – Second MAYDAY by company finding firefighter down in rear stairs
- 1619 – Firefighter out of the building
Second Firefighter

- As the first firefighter was removed, the Safety Officer called for a PAR
- 1624- 3rd and 4th MAYDAYS called by Engine Company that locates downed firefighter on third floor.
- 1634- Firefighter removed from third floor to second floor landing

Lessons

- Crew Integrity
- Air Management & SCBA Use
- Training
  - Building orientation
  - Tactics
  - Accountability
  - Communications

Today’s Practical Stations

GETTING OUT OF TROUBLE
HOLE IN THE FLOOR

Conscious
- Place ladder into hole when available
- Hoseline looped down through hole
- Stand on bight and squeeze hose together
- Crews will pull from above

Through Floor Methods
**Hose Bight**

- Rescuer enters hole on hoseline (pole slide)
- Drop rescue rope 1 with handcuff knot
  - Attach to downed firefighter just above elbows
- Drop second rescue rope with handcuff knot
  - Attach at forearms / wrists

**Rescuers on Top**

**Unconscious**

- Rescuer enters hole on hoseline (pole slide)
- Drop rescue rope 1 with handcuff knot
  - Attach to downed firefighter just above elbows
- Drop second rescue rope with handcuff knot
  - Attach at forearms / wrists
WINDOW BAILS

Rope Bail

- Tie off personal rope to sturdy item near window
- With rope behind your back, approach window and drop bag to ground below
- Straddle window sill with rope in hands as a friction device
- Gently exit window keeping feet below you
Rope Bail Key

- Keep hands outside of the sill
- You are not rappelling! Keep feet down
- Not effective above floor 3

Ladder Bails

- Ladder set for rescue
- Hook second rung
- Reach to fourth rung
- Pivot torso on beams of ladder
- Slide down beams upright
Ladder Bail Keys

- Stay low in the window
- Do not grab a rung with the 'hook' hand
- Keep legs bent to maintain weight distribution on the ladder when pivoting

Toronto Bail

Randolph Bail
PERSONAL ROPE FOR BAILOUT

Note rope visible is the Belay. The evacuation rope is tied to the haligan.

Securing the Hook

Friction Device
Bailout

Outside Positioning

Descend

*Slide - Not a Rappel!*
PARTIAL BAIL

Hang

- Conditions deteriorating
- No Rope
- Too high for rope bail

Learning From our Past

- NIOSH Reports
  - Look and learn
  - Do not criticize
- Firefighter Close Calls
  - For every LODD there are dozens of near misses
  - Read the reports and prevent an LODD
Summary

- Every firefighter needs to be prepared for the MAYDAY situation
- Survival will rely on ability to control emotions
- PPE competence is a key to survival
- Train to the worst case scenario