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Saving Ourselves

Keeping Ourselves Safe on the Fire Ground

September 2018

Instructors

- Lead Instructor –
- Instructors
  - A
  - B

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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

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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.

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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

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Sacramento

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Section 2

HOW WE GET IN TROUBLE ON THE FIREGROUND

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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%

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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)

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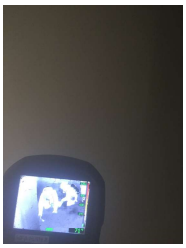
Lost / Separated

- 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



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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

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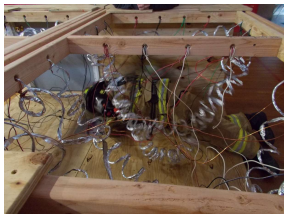
Trapped

- Collapse
- Entangled
- Secured Location
  - Auto locking doors
- Trapped by fire



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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

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Medical

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

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WHEN WE CAN'T AVOID TROUBLE

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Be Prepared

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

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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

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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

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Calling the MAYDAY

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

L
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P
S

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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

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CALM BEGETS CALM

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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

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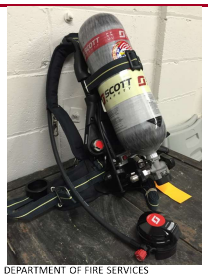
Air Management



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

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Reilly Breathing Technique

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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

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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!

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Cylinder Ratings

Rated Duration (40 lpm)	Volume of Air	Time to 25% EOSTI (60 lpm)	Time to 33% EOSTI (60 lpm)	Weight (full) 4500psi	Weight (full) 5500psi
30-Minutes	45 ft^3	16 min	14 min	11 pds	10 pds
45-Minutes	65 ft^3	23 min	20.5 min	15 pds	14 pds
60-Minutes	87 ft^3	31 min	27.5 min	19 pds	18 pds

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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.

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PHYSIOLOGICAL EFFECTS OF STRESS

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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

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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

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EMERGENCY PROCEDURES WITH THE SCBA

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Air Problem Procedures

- 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

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Regulator Breathing

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

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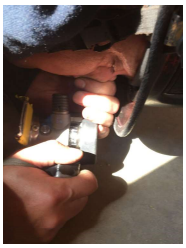
Cylinder Breathing

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



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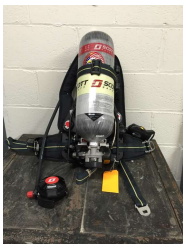
Troubleshoot

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



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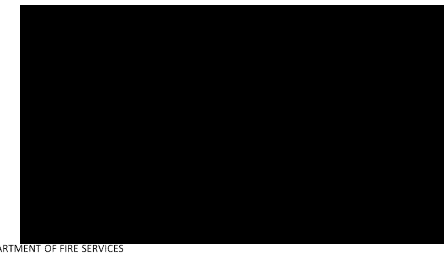
Jeff Bowen Story



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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

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- Example for a 4500 psi SCBA compliant with NFPA 1981 (2007 edition)
  - 4500 psi on entry
  - 4500 psi – 1125 psi = 3400 psi (rounded)
  - (3400 ÷ 2) + 1125 = 2800 psi (rounded)
  - Add an appropriate safety factor depending on the size of the building

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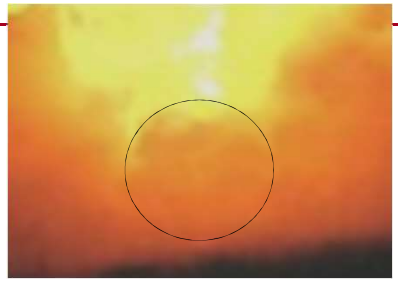
Air Management Rules

- 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

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

Flashover



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Wear your PPE

- 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

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KNOTS

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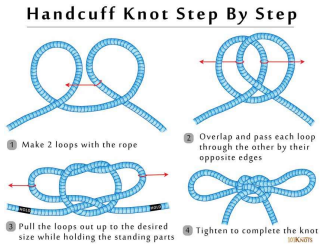
Handcuff Knot



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Clove Hitch

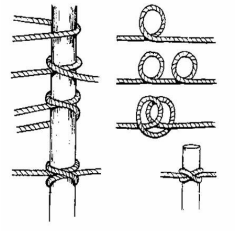

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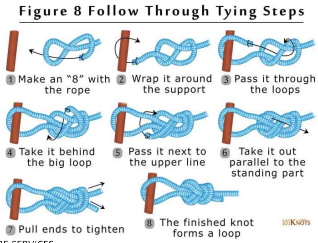
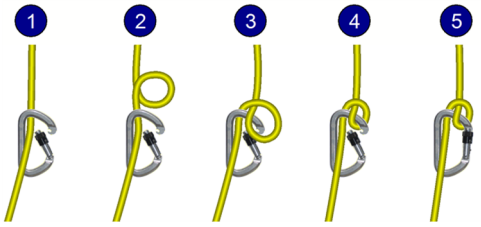
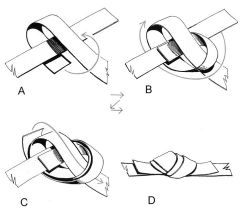
Figure 8 Follow Through



Munter Hitch



Water Knot



Today's Practical Stations

GETTING OUT OF TROUBLE

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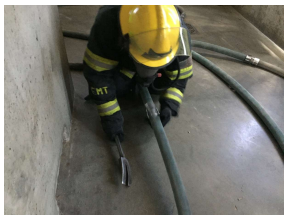
Long Lug Out

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



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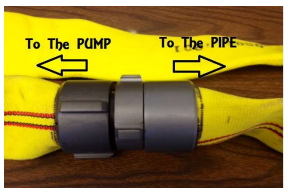

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BREACHING WALLS

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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

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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

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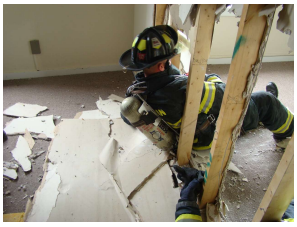
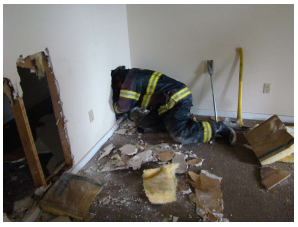

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ENTANGLEMENT

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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

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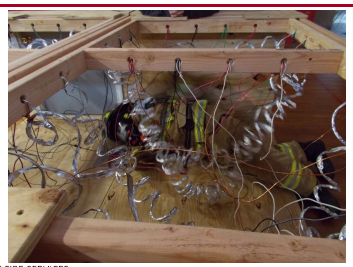

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Entanglement Keys

- 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!

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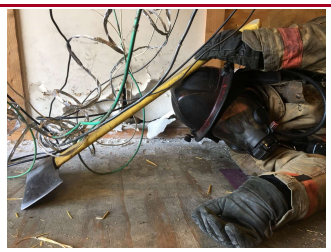
Entanglement With Axe



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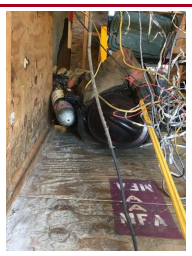
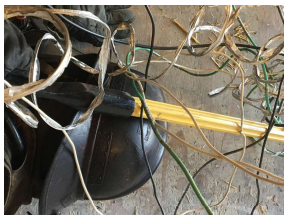
Entanglement With Pole





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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

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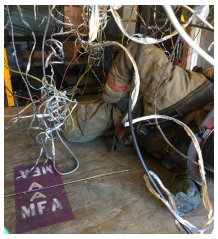
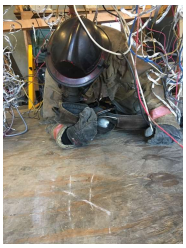
Turtle





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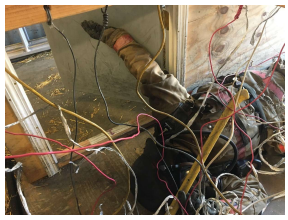
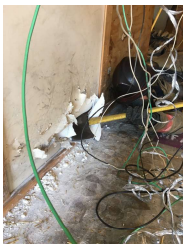
Alternative Exits





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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

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Saving Ourselves

Keeping Ourselves Safe on the Fire Ground Day 2

September 2018

Instructors

- Lead Instructor –
- Instructors
  - A
  - B

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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

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DECREASING THE POTENTIAL FOR MAYDAY

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Staying Out of Trouble

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

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Freelancing

- 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

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Section 2

HOW DO WE GET OUT OF TROUBLE

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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

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Calling the MAYDAY

- MAYDAY – MAYDAY – MAYDAY
- Location
- Identification
- Problem
- Survive!

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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

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Orientation

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

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Sheltering in Place

- Stay low
- Conserve your air
- Make Noise
- Make Space (if possible)
- Compartmentalize yourself
  - Close doors
- Notify Command of changes / needs

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Thomas Brooks, Patricia Conroy, Marc Kolenda

CASE STUDY
BRICELYN ST PITTSBURGH
2/14/1995

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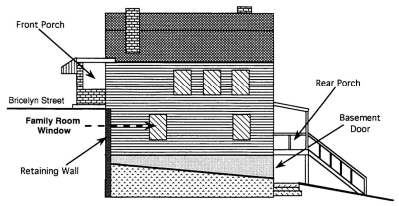
Bricelyn St. 1995

EAST SIDE OF DWELLING - 8361 Bricelyn Street



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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

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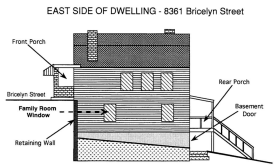
Bricelyn St - Accountability

- 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

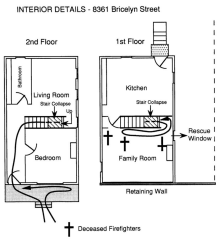


Bricelyn St - Equipment

- 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



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Joyce Craig

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

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FF 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

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Alpha and Charlie Sides

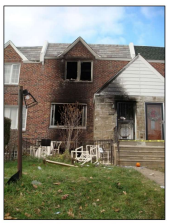

Photo 1. Front of row house.
(NIOSH photo.)

Photo 2. Rear of row house.
(NIOSH photo.)

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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

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Important Lessons

- Crew Integrity
- Incident Management
- Training
  - Fire Behavior
  - Hose management
  - Fireground tactics
  - MAYDAY procedures

Joyce Craig-Lewis

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Lt Steven Velasquez, FF Michael Baik

CASE STUDY
BRIDGEPORT CONNECTICUT
7/24/2010

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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

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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

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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

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Lessons

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

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Today's Practical Stations

GETTING OUT OF TROUBLE

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HOLE IN THE FLOOR

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Conscious

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

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Through Floor Methods

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Hose Bight

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Rescuers on Top

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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

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WINDOW BAILS

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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

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Rope Bail Key

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

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Ladder bails

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

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Ladder Bails

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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

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Toronto Bail

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Randolph Bail

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F4 BAIL

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Sterling F4 System

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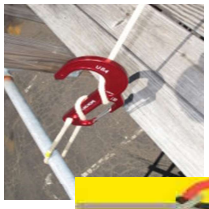
PERSONAL ROPE FOR BAILOUT

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

Securing the Hook



Friction Device

Bailout

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Outside Positioning

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Descend

Slide - Not a Rappel!

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PARTIAL BAIL

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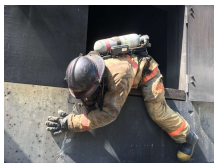
Hang

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



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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

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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

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