PROJECT MAYDAY CAREER 2015-2019

WELCOME
TO THE
PROJECT MAYDAY
WEBSITE

Thank you for visiting the PROJECT MAYDAY website, we hope that you will leave us comments on your visit and the information provided. You may download this information and use it for your fire department.

PROJECT MAYDAY

Saving lives, through research and learning

PROJECT MAYDAY

The "MAYDAY" Project is a comprehensive study of "mayday" incidents, responses, and prevention. Funded for one year (2015) by a private foundation grant to, since that first year, Bev & Don have financed Project Mayday, themselves

Command Emergency Response Training, Glendale, Arizona

Don & Bev Abbott

Dr. Vinton Bennett Dr. Jason Bebermeier

Dr. Albert Grisson Dr. Allan McCourtee

Dr. George Grant Capt/Dr. Philip Stuart

Dr. Matt Walker Dr. Linda McNeil

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Participation in this project is voluntary and confidential, department names or individual names are not released or used in this project without their written permission.

We thank all these departments, Chiefs, Officers and Firefighters for their time and interest in furthering firefighter safety.

PROJECT MAYDAY

Mayday Project Surveys

Component 1: **Survey of department information; organization, number members, apparatus, runs, response type/numbers, SOPs, and training.**
(98 questions)

Component 2: **Upon the completion of Component 1, Component 2 will be sent, it deals with all the identified components of your Mayday, size-up, critical factors, IAP, communications, response, etc.**
(194 questions)

PROJECT MAYDAY

Component 3: **Upon completion of Component 2, Component 3 will be sent, it deals with the department's handling post action response, critique, follow-up Training, etc.**

(118 questions)

"In order for a firefighter to survive the dangers of firefighting, he must know how other firefighters have died or been seriously injured."

Vinny Dunn, Deputy Chief FDNY (ret.)

PROJECT MAYDAY

MAYDAY FD Information

“Project Mayday” has accumulated 4,839 radio traffic audio and 610 dash/video tapes, confirming almost all of our information and data, along with tactical worksheets, notes, dispatch logs, SOPs, mayday training information, follow-up reports, internal investigation documents

PROJECT MAYDAY

We hope that this "Mayday Project" will be the most complete informational analysis on "maydays" ever conducted and proven recommendations on communications, command/ operations, response, training, and follow-up.

We have a twenty-four person Advisory Board that is preparing a "Project Mayday" Report with recommendations for prevention, training, response and follow-up.

PROJECT MAYDAY

TERMINOLOGY

"Mayday, Mayday, Mayday"

RED ALERT

PERSONAL EMERGENCY

PROJECT MAYDAY

NFPA 1500

- 10 - 101 - 472 - 473 - 475 - 1001 - 1002 - 1003 - 1006 - 1021 - 1051 - 1071 - 1221 - 1051 - - 1071 - 1221 - 1403 - 1404 - 1521 - 1561 - 1581 - 1582 - 1583 - 1670 - 1700 - 1851 - 1852 - 1901 - 1906 - 1911 - 1912 - 1925 - 1931 - 1932 - 1936 - 1951 - 1952 - 1961 - 1962 - 1964 - 1971 - 1975 - - 1977 - 1981 - 1982 - 1983 - 1984 - 1989 - 1991 - 1992 - 1994 - 1999 - 3000

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MAYDAY ….

"The term *mayday* should not be used for fire ground communications in that it could cause confusion with the term used for acronautical and nautical emergencies"

(NFPA 1500-45,8.2.3) 2007

Instead use the (past tense) we should use terms like "firefighter down, firefighter missing, or firefighter trapped"

(NFPA 1500, Appendix A.8.2.3) 2013

Maydays for "life-threating situations" and provides examples of "lost or missing member an SCBA malfunction or loss of air, a member seriously injured or incapacitated, member trapped or entangled or any life-threating situation that cannot be immediately resolved.

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NFPA 1500 ….
Defines mayday readiness “as the ability to donn, doff, and manipulate the SCBA in zero visibility while wearing firefighters gloves.”

MAYDAY ….

anytime a firefighter(s) cannot safely exit a IDLH hazard zone.

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Initiation or transmission of a firefighter distress signal, “Mayday, Mayday, Mayday” produces more stress and potential chaos than any other single type of incident we may encounter throughout our careers.

A trapped or disoriented firefighter has two factors working against them. 1) Limited air supply and, 2) flame impingement barring the fact that direct physical trauma is not involved.

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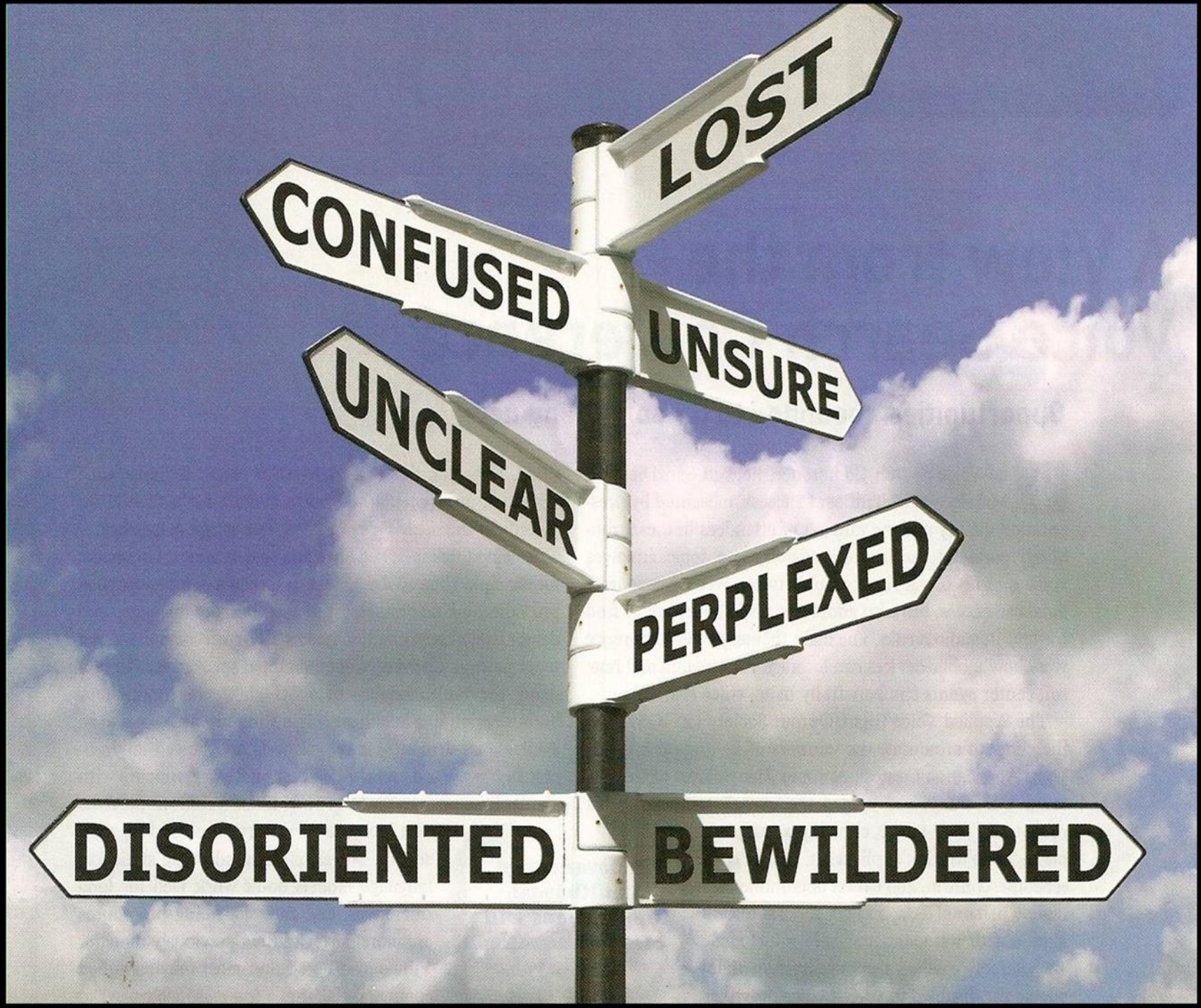

Larger Homes

+

Open Spaces

+

Evolving Fuel Loads

+

Void Spaces

+

Changing Bldg. Materials

+

Smaller Lots

+

New Technologies

=

- **Faster fire propagation**
- **Shorter time to flashover**
- **Rapid changes in fire dynamics**
- **Shorter escape time**
- **Shorter time to collapse**
- **Exposure problems**
- **New and Unknown hazards**

PROJECT MAYDAY

FIREFIGHTER SAFETY RESEARCH INSTITUTE

UL's FSRI is dedicated to increasing firefighter knowledge to reduce injuries and deaths in the fire service and in the communities they serve.

2006 DHS Grant 2007 DHS Grant 2008 DHS Grant 2009 DHS Grant 2010 DHS Grant 2011 DHS Grant Attic Fire Basement Fire Basement Fires Chicago Fire Department Dimensional Lumber Door Control Engineered Lumber Exterior Fire FDIC FDNY Fire Dynamics Firefighter Smoke Exposure firehouse expo fire protection engineering fire service Flashover Furniture Governor's Island Horizontal Ventilation Legacy Legacy Home Lightweight Construction Modern Modern Home NIST Overhaul Photovoltaic PV systems shock Smoke Smoke Particulate solar panels Structural Collapse Suppression tactics Training Ventilation Vertical

UL

NIST
National Institute of Standards and Technology
U.S. Department of Commerce

PROJECT MAYDAY

Flow Path

Vent Point Ignition

Bi-Directional Flow Path*

Ventilation Limited Fire

Fuel Limited Fire

Vent-Enter-Isolate-Search

Transitional Attack

Heat Release Rate

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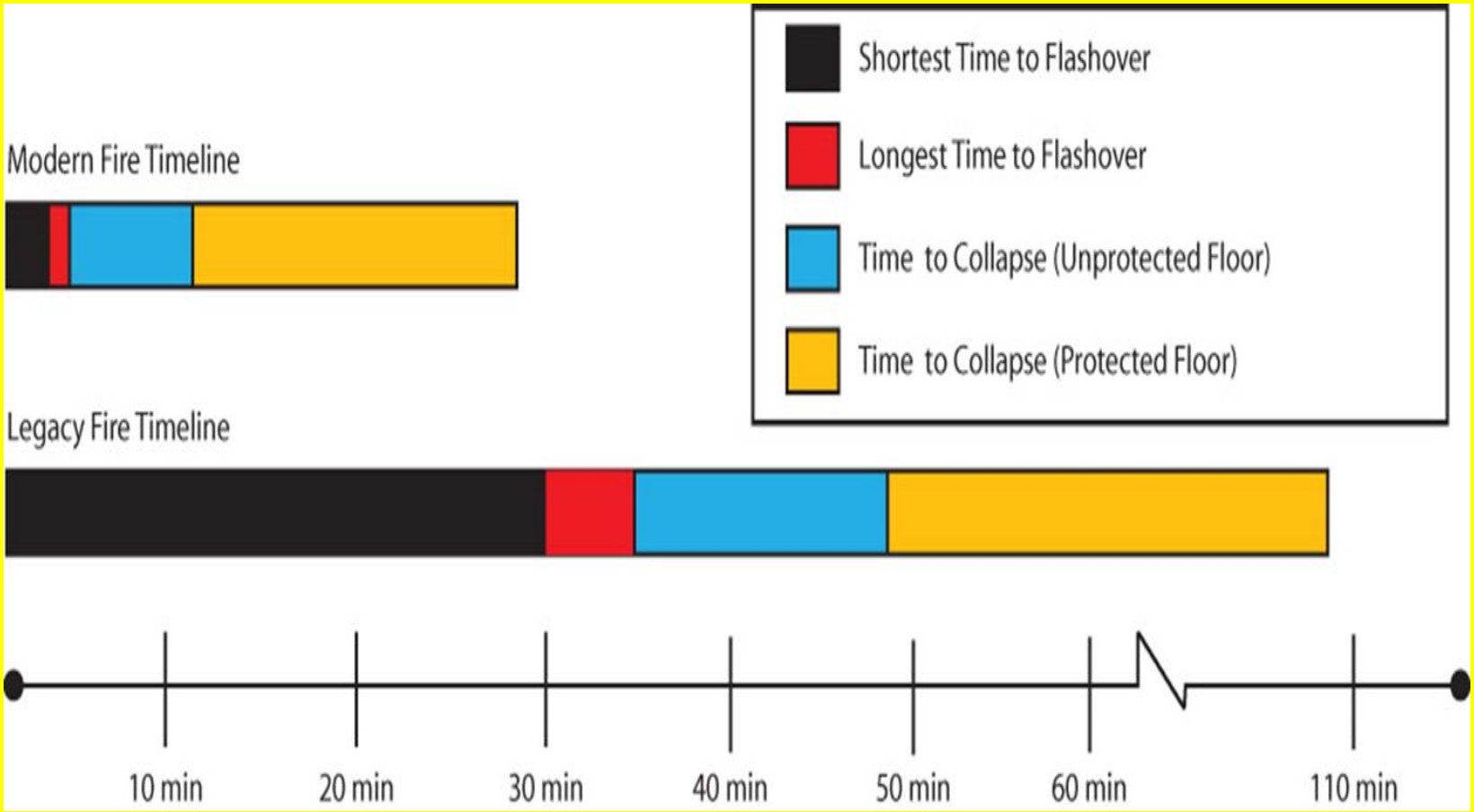
Modern vs. Legacy Timelines



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FLOW PATH

- Improving the inlet and/or exhaust paths from the seat of the fire will result in fire growth and spread.
- Interrupting the fire flow path by limiting or controlling the inlet or controlling the outlet can limit fire growth.
- Controlling the door—keeping doors closed allows less oxygen into the fire and equals lower temperatures.
- Anyone in the exhaust portion of the flow path—between the fire and the direction of its travel—is in a high hazard location.
- Controlling the flow path improves victim survivability.

Courtesy of NIST.

PROJECT MAYDAY

EXTERIOR ATTACK

- An offensive exterior fire attack through a window or door, even when it is the only exterior vent, will not push fire.
- Water application is most effective if a straight stream is aimed through the smoke into the ceiling of the fire compartment. Water should be flowed for about 10–20 seconds. This technique allows heated gases to continue to vent from the fire compartment while cooling the hot fuel inside. Fog patterns should not be used in this application. The fog pattern entrains large volumes of air and pushes air into the building. A fog stream can also block a ventilation opening, effectively changing the fire flow path.
- Applying a hose stream through a window or door into a room involved in a fire resulted in improved conditions throughout the structure.
- Even in cases where the front and rear doors were open and windows had been vented, application of water through one of the vents improved conditions throughout the structure.
- Applying water directly into the compartment as soon as possible resulted in the most effective means of suppressing the fire.
- Transitional attack is an offensive exterior fire attack that occurs just prior to entry, search, and tactical ventilation. This technique is also known as a blitz attack, a transitional attack, or softening the target.
- The transitional attack should begin from the outside, but it is necessary to finish it from the inside.
- Coordinate the fire attack with vertical ventilation—do not ventilate before an attack stream is ready.

Courtesy of NIST.

PROJECT MAYDAY

FIRE OCCUPANTS

- Suppressing the fire from the exterior as soon as possible improves potential survival time.
- Additional ventilation that is not immediately followed by effective fire suppression reduced potential survival time.
- Being in the exhaust flow path of the fire resulted in reduced potential survival time.
- Controlling the flow path improves victim survivability.
- Controlling the door to a room when performing VEIS improves the safety of the fire fighter and the building occupant.
- Compartmentation (being behind a closed interior door) prior to fire department arrival provided increased protection compared to being in a room or area connected to the fire.
- Greater distance from the fire improved chances of survival.

Courtesy of NIST.

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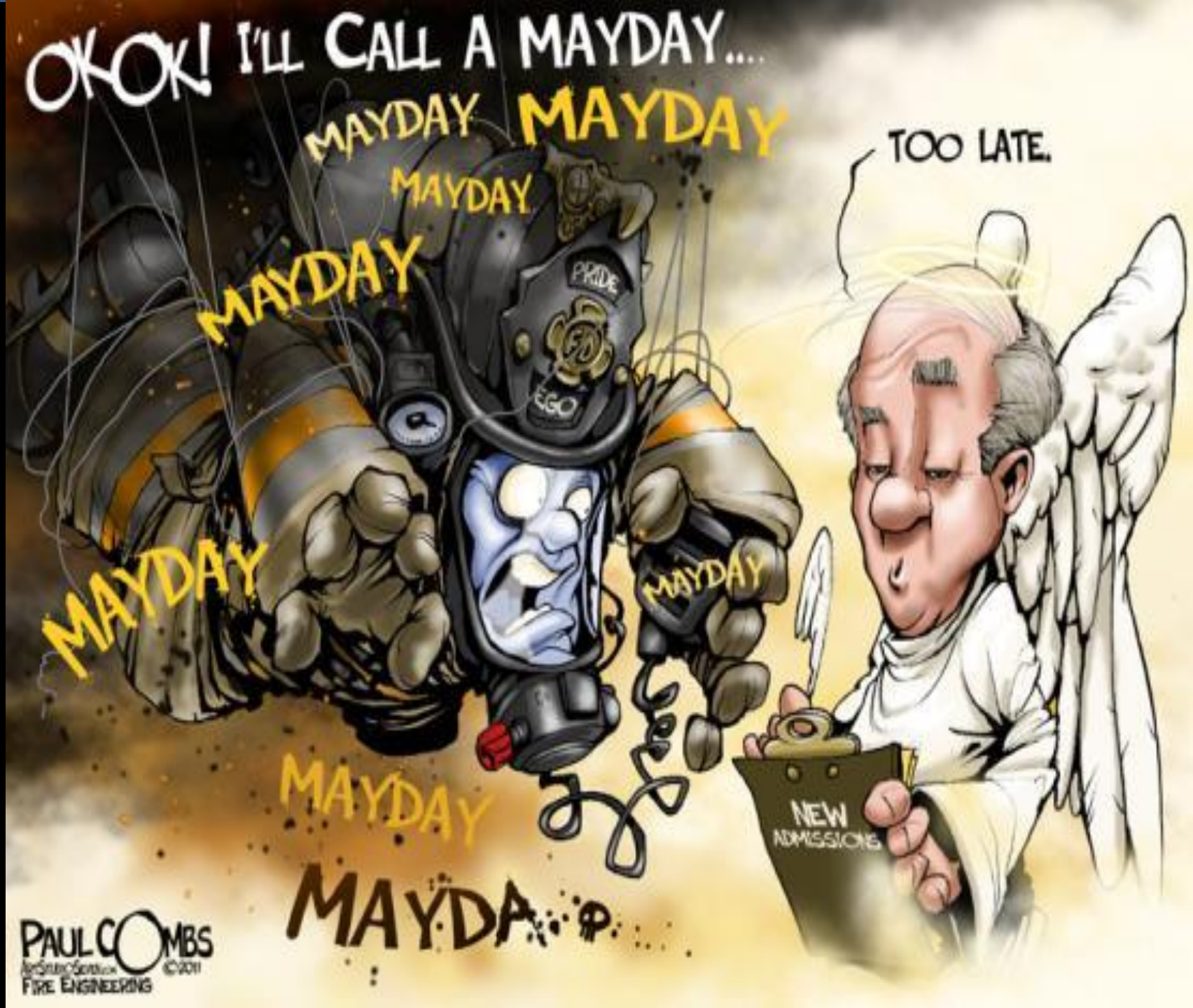

“MAYDAY” PROJECT

MAYDAY PROJECT

2015-2019
54 months
CAREER

"Mayday" reports from 5,878 career fire departments representing 50 states

Completed Components

(June 30, 2019)

Component 1: **5,611 departments**

Component 2: **5,491 department**

Component 3: **4,108 departments**

MAYDAY PROJECT

2015 – 2018
48 MONTHS
VOLUNTEER

“Mayday” reports from 2,831 volunteer fire departments representing 48 states

COMPLETED COMPONENTS

Component 1:	**2,603**
Component 2:	**2,584**
Component 3:	**2,067**

NOT ALL MAYDAYS ARE CREATED EQUAL

“There is a tendency to believe that since a certain practice has thus far not killed us, that it is an acceptable practice”

Capt. John Peters

PROJECT MAYDAY

Component 2: On-Scene Information

REMEMBER

Whatever you allow to happen, without intervention is your …

"STANDARD OF CARE"

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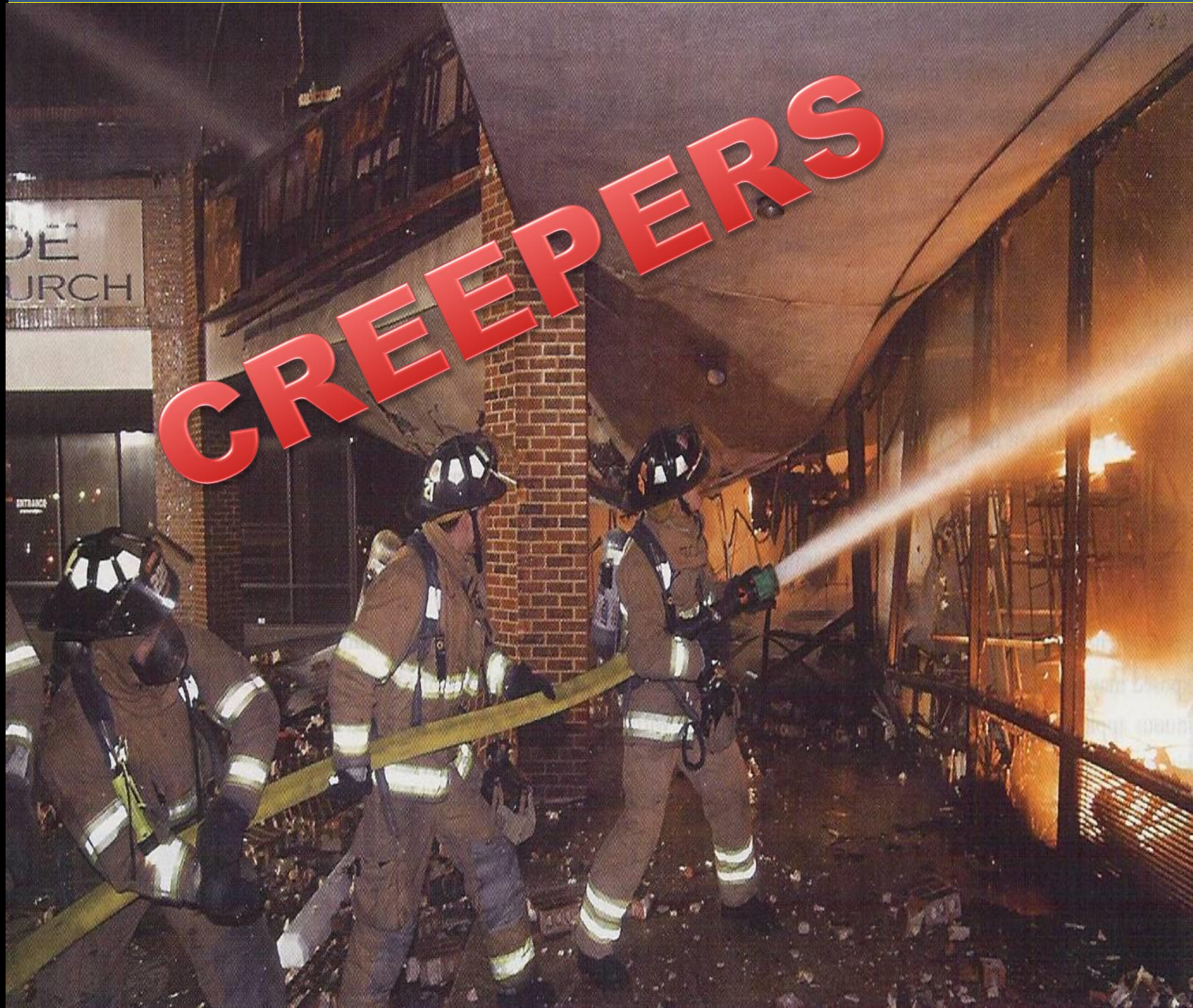

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Fire Department "MAYDAY" Profiles

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Component 1 : Department Staffing

WHAT IS THE SIZE OF YOUR FD?

50 – 100	539
101 – 200	1,171
201 – 500	1,256
501 – 1,000	974
1,001 – 2,000	556
2,001 – 3,000	571
> 3,000	424

2015- 2018

PROJECT MAYDAY

“MAYDAY” Information Data

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DEPLOYMENT

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"MAYDAY" Information Data

TIME OF DAY "MAYDAY"

CAREER
2015-2018

0001 – 0300	1,545	28.1%
0301 – 0600	1,383	25.1%
0601 – 0900	769	14%
0901 – 1200	341	6.2%
1201 – 1500	209	5.6%
1501 – 1800	223	4%
1801 – 2100	365	6.6%
2101 - 2400	656	11.9%

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"MAYDAY" Information Data Units Involved in Mayday

Units Involved in *Maydays*

1st Unit 57%
2nd Unit 26%
3rdUnit 14%
4thUnit 2%
5thUnit 1%
6thUnit 1%
7thUnit 0%

Units Involved in *Maydays*

Engines 54%
Ladders 44.5%
Rescues 1%
EMS Unit 5%

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Component 2: On-Scene Information

Number of Apparatus on the Scene at the time of the Mayday

Engines:	*Ladders:*	*Rescues:*	*Batt.Chiefs:*
2 … 33%	1 … 79%	1 … 52%	1 … 89%
3 … 35%	2… 21%	2 … 48%	2 … 7%
4 … 29%	3 … 1%		3 … 4%
5 … 19%			
6 … 4%			

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Component 2: On-Scene Information

Number of FF on the scene at the time of the Mayday

9 – 15 ….. **21%**
16 – 22 … **33%**
23 – 29 … **24%**
30 – 36 … **13%**
37 – 42 … **6%**
43 > … **3%**

Crew Size:

- 2 persons 33%
- 3 persons 41%
- 4 persons 25%

5,491

Crew Size:

- 3 persons ……. 41%

  - Splitting up
  - Crew members off hose lines
  - Failure to maintain focus on assignment
  - Tunnel vision

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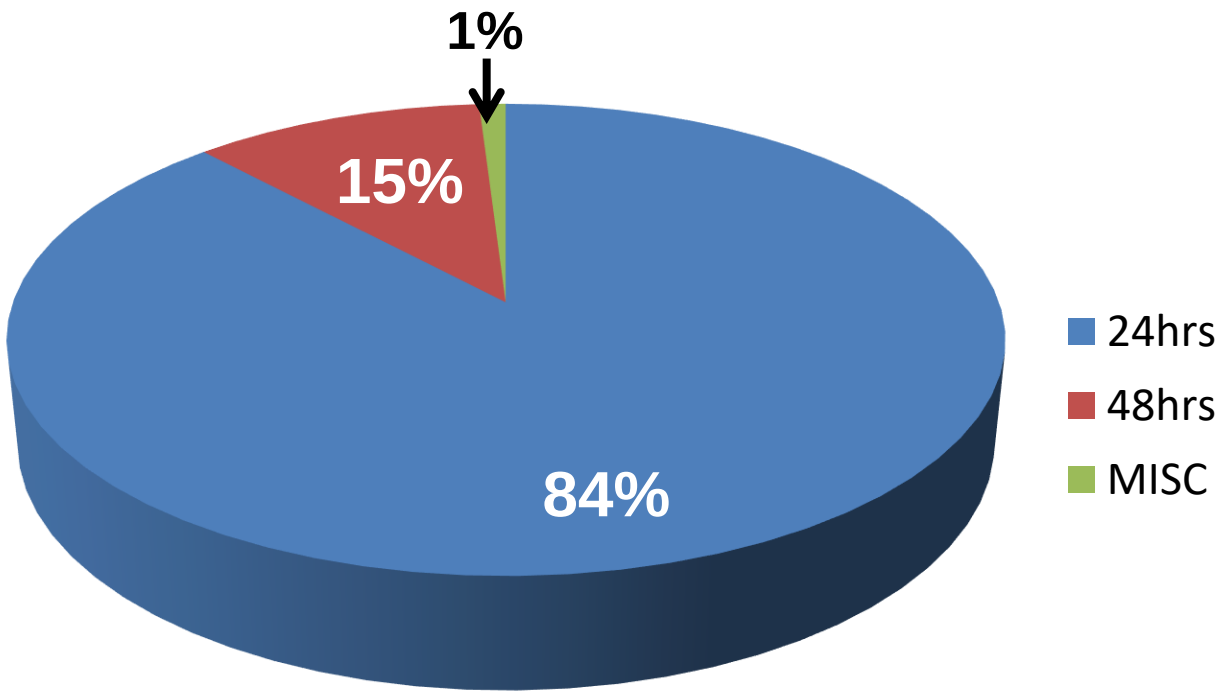
COMPONENT 1: WORK/SHIFT HOURS

WORK/HOUR SHIFTS SCHEDULE



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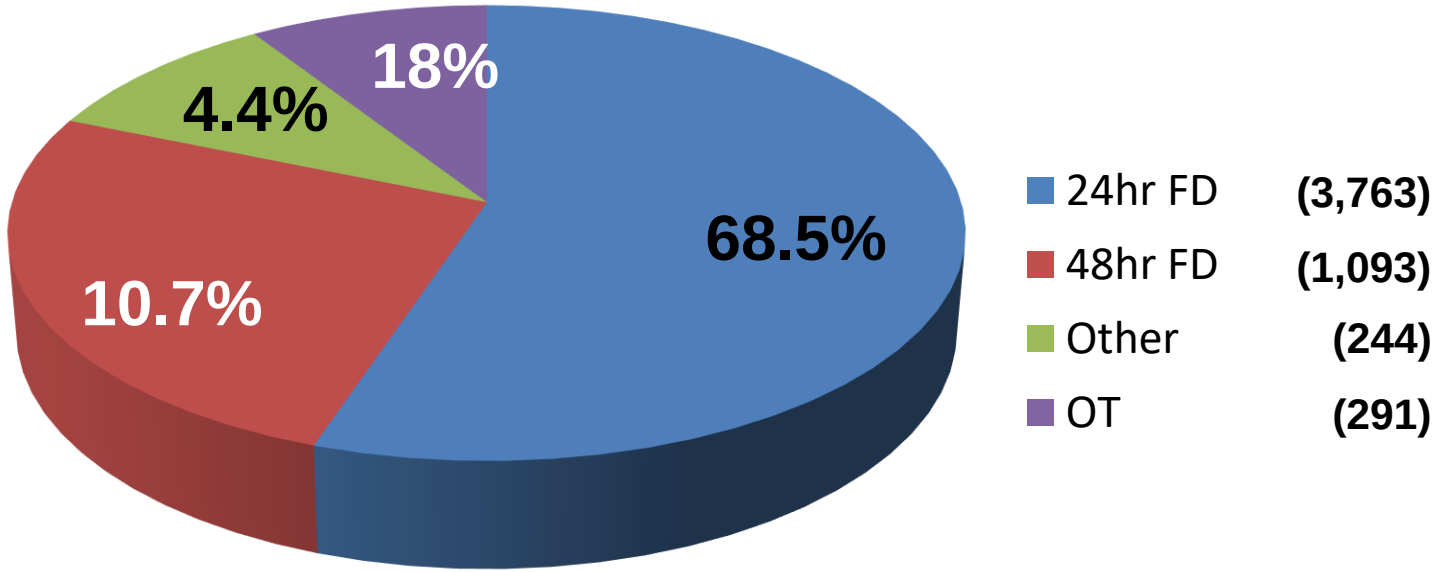
Component 1: Work Hours/Shifts

CAREER DEPARTMENTS



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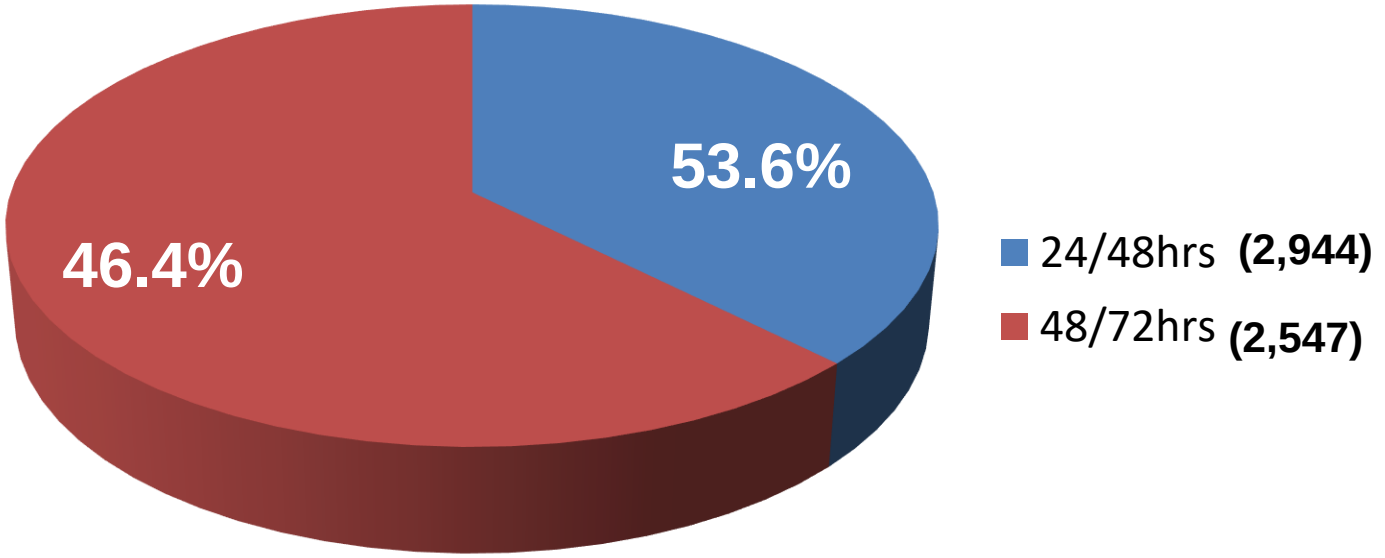
COMPONENT 1: WORK/SHIFT HOURS

Work/Shift Hours - Overtime



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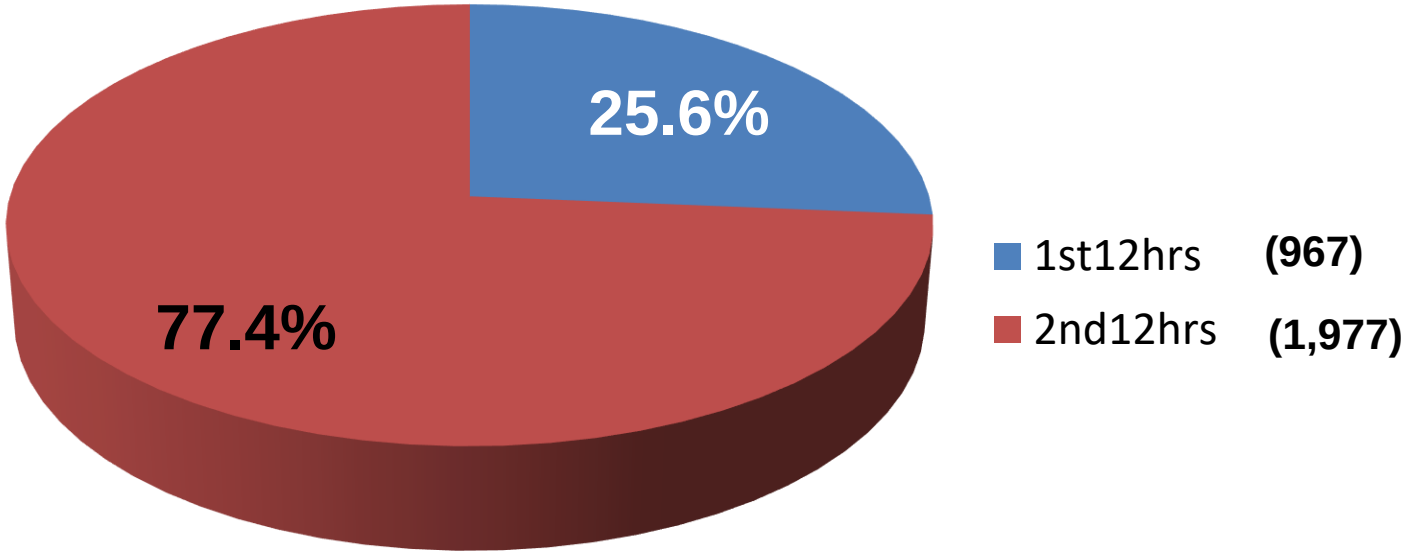
COMPONENT 1: WORK/SHIFT HOURS

24hrs Work/Shift Schedule



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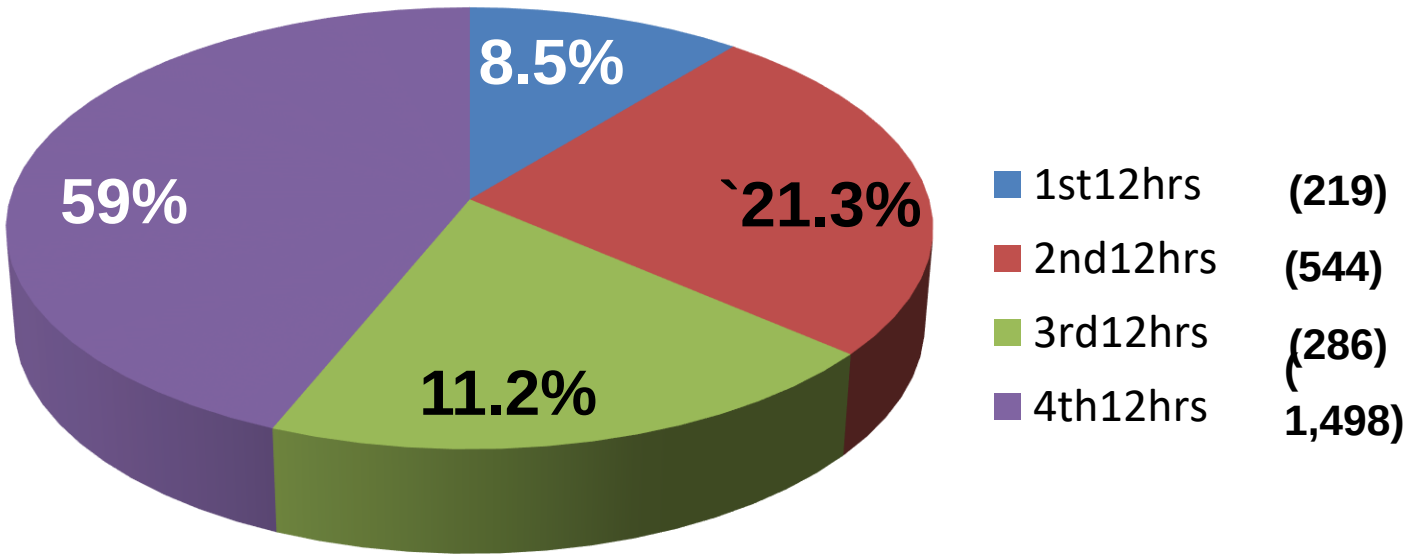
COMPONENT 1: WORK/SHIFT HOURS

48hrs Work/Shift Schedule



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ASSUMPTION, CONFIRMATION, and POSITIONING of COMMAND

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Its not a matter of if a fire fighter has a MAYDAY...

ITS WHEN

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Component 2: Size-Up / Initial Radio Report

CAREER DEPARTMENTS

Size Up / Initial Radio Report: (5,491)

360: **NO 360: 57%**
Incomplete: 18%
Completed: 25%

When 360 completed:

- **Confirm size ….. 96%**
- **Life Safety issues ….. 90%**
- **Significant Hazards ….. 96%**
- **Smoke and Fire from New Location ….. 44%**
- **Changes in original Strategy ….. 23%**

2015-2018

PROJECT MAYDAY

Component 2: Size-Up / Initial Radio Report

CAREER DEPARTMENTS

Problem Description: Benchmarks

- Smoke / Fire Conditions 86*%
- Actual Location of F & S 59*%

"WATER ON FIRE"

RIT Operations:

- Established ….. 63%
- Exception ….. 39%

- 2nd RIT established ….. 21%

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RESCUE TEAM BY ANY NAME

IRIC	**Initial Rapid Intervention Crew**
RIC	**Rapid Intervention Crew**
RIT	**Rapid Intervention Team**
FAST	**Firefighter Assist and Search Team**
IRT	**Immediate Response Team**
RDU	**Rapid Deployment Team**
RICO	**Rapid Intervention Company Team**
RRT	**Rapid Response Team**

TERMINOLOGY

PROJECT MAYDAY

Component 2: Size-Up / Initial Radio Report

Declare Strategy:

- Offensive 92%
- Defensive 6%
- NO strategy declared 4%

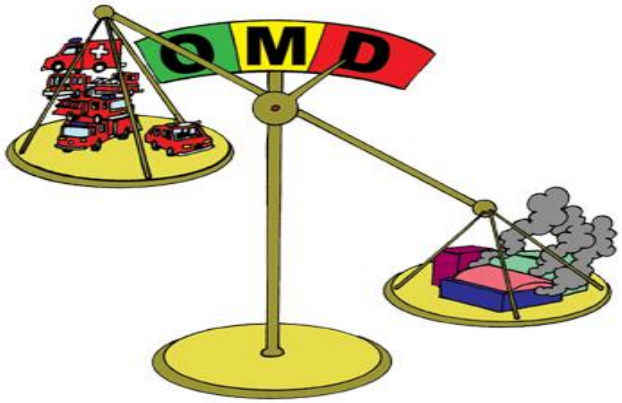
Additional Resource:

- 1st Alarm 25%
- 2nd Alarm 12%

RISK MANAGEMENT PLAN

WE'LL RISK OUR LIVES A LOT, if neccessary, TO PROTECT SAVABLE LIVES

WE'LL RISK OUR LIVES A LITTLE, in a HIGHLY calculated manner, TO PROTECT SAVABLE PROPERTY



We will NOT RISK OUR LIVES AT ALL, for what is already LOST (people or property)

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SITUATION EVALATION

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- Determine the occupant survival profile
- Go in TOGETHER, stay TOGETHER, and leave TOGETHER
- Abandon and retreat before deteriorating conditions trap YOU

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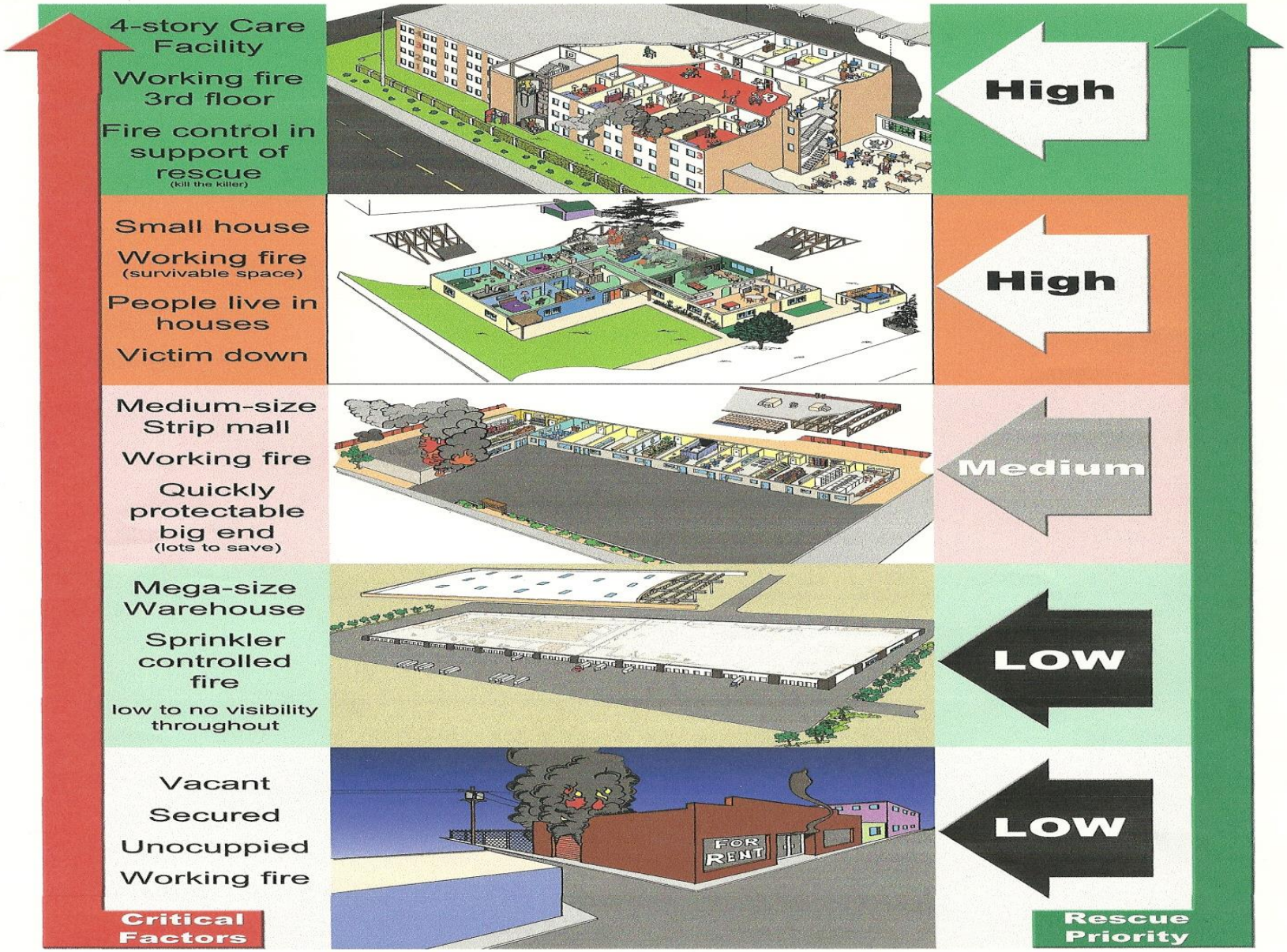
Component 2: Size-Up / Initial Radio Report



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"MAYDAY" Elapsed Time When Maydays Occur

After marking on the scene

< 10 mins	33	.5%
10 – 15 mins	224	4%
15 - 20 mins	733	13.3%
20 – 25 mins	877	15.9%
25 - 30 mins	991	18%
30 - 35 mins	897	16.3%
35 – 40 mins	624	11.3%
40 - 45 mins	577	10.5%
45 - 55 mins	383	7%
> 55 mins	167	3%

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MAYDAY PROBLEMS

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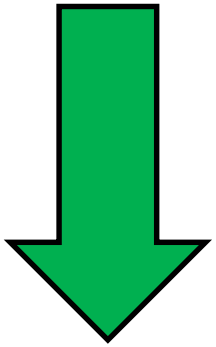
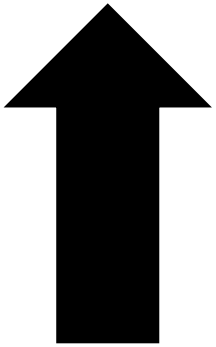
2016 NFPA Fireground Fatalities and Injuries Data

Fireground Firefighter Fatalities



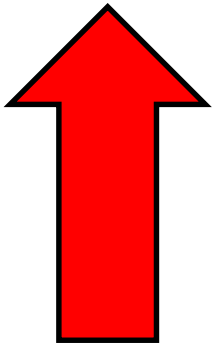
4%

Fireground Injuries



139%

Fireground Permanent Disability



244%

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MINUTES
makes the difference
Between
RESCUE
& RECOVERY

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TYPES OF MAYDAYS 5,491

- ***Lost/Separated from hose line*** ***23.9% (1,131)***
- ***Falls into Basements*** ***20.1% (1,104)***
- ***Falls through/off Roof*** ***17.1% (941)***
- ***Air Problems*** ***16.6% (916)***
- ***Entanglement*** ***10.4% (574)***
- ***Explosions (Gas) Collapses*** ***5.8% (319)***
- ***Medical*** ***4.4% (244)***
- ***Other*** ***2.3% (129)***
- ***NO Communications*** ***2.1% (117)***

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WHERE DO MAYDAYS TAKE PLACE?

Residential	43.5%
Multi-Occupancy	14.8%
Commercial	41.7%

2015-2018 5,491

PROJECT MAYDAY

CAUSE

HIGH RISK HIGH Frequency	Low Frequency HIGH Risk
• OFF Hose Line • Collapse without Entrapment	• Collapse to lower Floor • Lost in large area • Low AIR
SELF-RESCUE • Small area • ID outside wall • Locate Hose Line (use coupling)	**RIC Operations** • Large area no land-marks • AIR at 25% after attempted self-rescue • Entrapment

NON DISCRETIONARY TIME

COUNTERMEASURES

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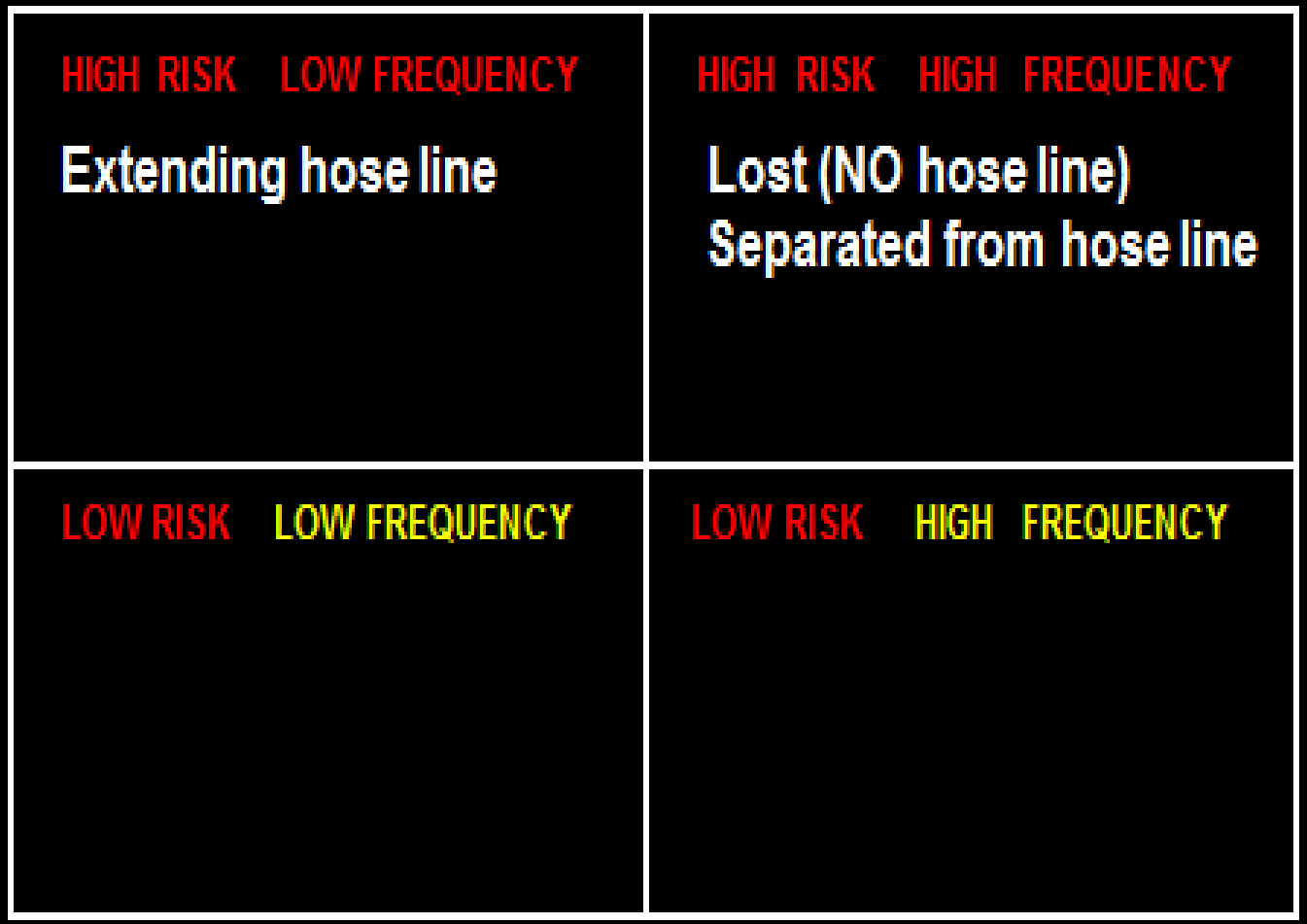
COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

PROJECT MAYDAY

Lost / Separated from Hose Line



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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

PROJECT MAYDAY

COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

Lost, Separated from Hose Line 1,131 **23.9%**

- **Lost (NO HOSE LINE) ……669 ….. (59.1%)**

- **Separated from Hose Line ... 462 ….. (40.8%)**
  - **150ft…(1 ½-1 ¾) ……77 …. (16.6%)**
  - **200ft…(1 ½-1 ¾) …… 176 …. (38%)**
  - **250ft…(1 ½-1 ¾) ……113 … (24.4%)**
  - **300ft…(2 ½-3) ……. 96 …. (20.7%)**

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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

- Residential …… 509 ….. 45%
- Apartments ….. 146 ….. 12.9%
- Commercial …. 466 ….. 41.2%

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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

COMPANY LEVEL TRAINING

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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

Hose training is critical to crew performance. each member has a role/ position that allows for a more effective use in advancing the hose line and providing potential safer and more efficient fire attack

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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

LOST:

- **Why enter a building without a hose line?**
  - **SOP/SOG allows entry … YES ….. 90%**
  - **CO has the authority to make the call … YES ….. 66%**
- **Were tag lines used instead of hose? YES ….. 11%**

General Comments:

- Easier to make a quick search
- Faster crew deployment
- Allows for multi-task actions

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COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

Separated from Hose Line:

- Why did you leave the hose line?
  - To search a larger area (rooms/floors) ….. 83%
  - Faster completion of search area ….. 66%
  - Split into two (two person) teams …. 78%
  - Given a specific assignment by the CO ….28%

- How often have you left a hose line?
  - 98.4% of the time

- Was tag used during separation … YES ….. 3%

- What do you think the average amount of time during your hose separation? ….. 4-7 mins

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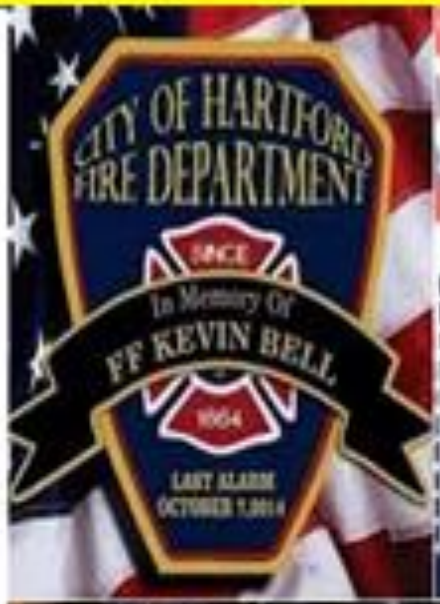
Component 2: Types of Maydays – Air Problem



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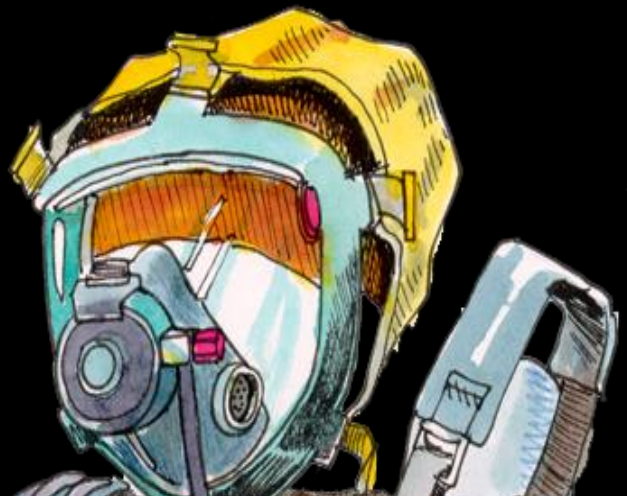
SCBA Problems

RISK

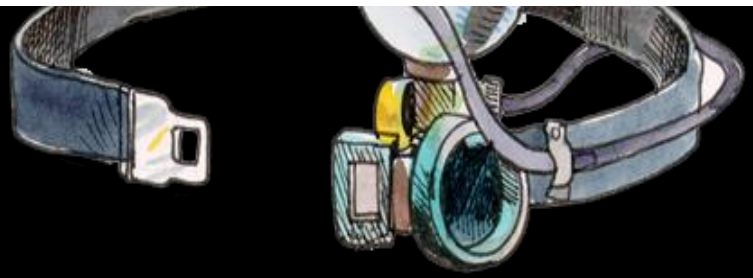
HIGH RISK LOW FREQUENCY *Out of Air* *Facepiece Issues* *Regulator Problem* *Low Air Alarm*	HIGH RISK HIGH FREQUENCY *Low on Air (<500psi)*
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY

FREQUENCY

TIME vs AIR = Survival



LOW AIR ALARM
PSI vs Time
Wet Gear vs Dry Gear
Time = Options
Options = Survival



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COMPONENT 2: Type of Mayday - Air Problem

Types of Air Problems (916)

16.6%

• Low Air *	62.8%	(576)*
• Out of Air *	20.5%	(188)*
• Facepiece problem	11.4%	(105)
• Regulator	5.1%	(47)

- Commercial structures

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Component 2: Types of Mayday - Air Problems

- Was cylinder full at time of entry? … 81%

Average Air Usage: 80L/min to 100L/min, when involved in a MAYDAY, usage increases 110L/min to 140L/min

- Do you know which way to turn your by-pass purge?
- Which way does your cylinder valve open/close?
- How many turns to turn air completely ON?

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Component 2: Types of Mayday - Air Problems

Facepiece Problem:

- facepiece deformed 29%
- facepiece damaged 2.7%

Regulator Problem:

- regulator malfunctions 1%
- regulator damaged .3%

Distress Signal Unit:

- DSU (PASS) unit malfunction 7%

Average Age of SCBA: 8.6yrs

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NAME	First Green Light Out	Second Green Light Out	Orange Light Out Low Air Warning	Alarm Stops	OOA
FF 1					
FF 2					
FF 3					

NAME	1,500psi	1,000psi	Low Air Warning	Alarm Stops	OOA
FF 1					
FF 2					
FF 3					

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

There are many factors that contribute to the length of time a firefighter takes to expend a full cylinder:

- Age
- Weight
- General health
- Size of person
- Fitness level
- Stress level
- Work intensity

We tell firefighters best way to save air is to:

- Sit down - Don't move - Breath slowly

NOT REAL !

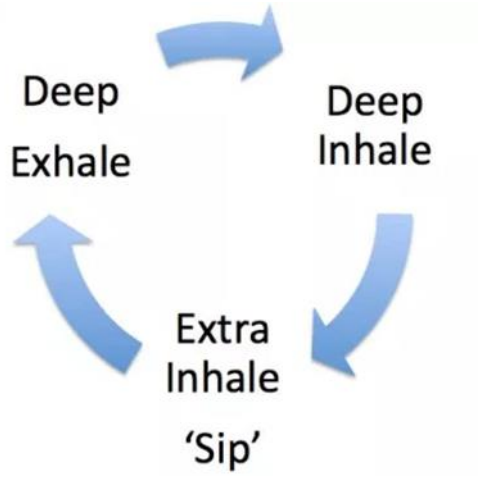
PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

- **Control**
  No specific technique, breathe slowly, conserve air
  OOA: Deep breath facepiece in place, two normal w/out facepiece
- **Skip breathing**
  A normal inhalation held for several seconds, followed by an additional inhalation before exhalation
- **Box breathing**
  A slow inhalation over 3-4 seconds, held for 3-4 seconds, exhaled over 3-4 seconds, and then held for 3-4 seconds before the next inhalation
- **Reilly Emergency Breathing Technique**
  A slow inhalation followed by an exhalation that was controlled by making a humming sound as the breath was released
- **Straw breathing**
  A slow inhalation followed by an exhalation that was controlled by pursing the lips to mimic breathing through a straw

PROJECT MAYDAY

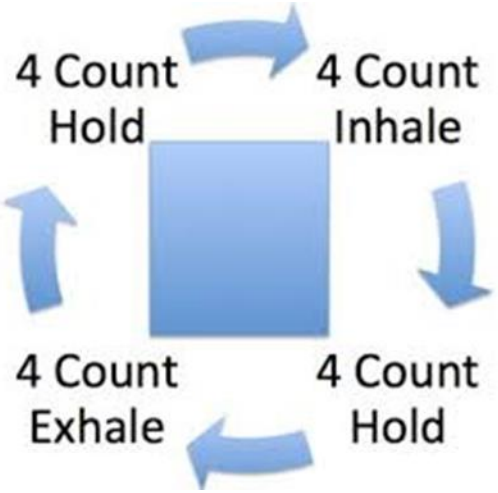
Component 2: Types of Mayday - Air Problems

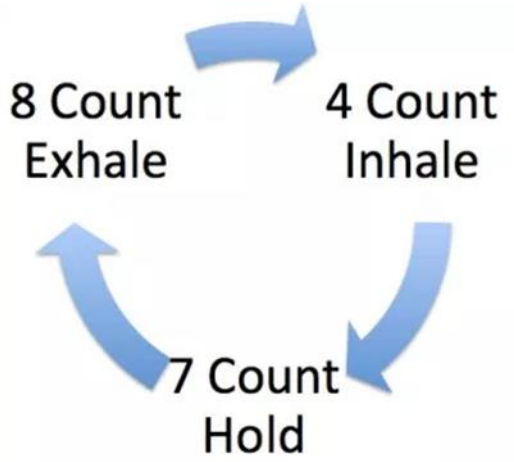


MAYDAY VICTIM'S BREATHING TECHNIQUES FOR SAVING AIR:

- Skip breathing 21%
- Box breathing 13%
- Reilly EBT 4%
- Straw breathing 3%
- Normal breathing ... 37%
- Unknown 22%

* Error rate of + / - 5%





PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

- Residential ..... 351..... 38.3%
- Apartments ..... 168..... 18.3%
- Commercial ..... 397 ..... 43.3%

916

PROJECT MAYDAY

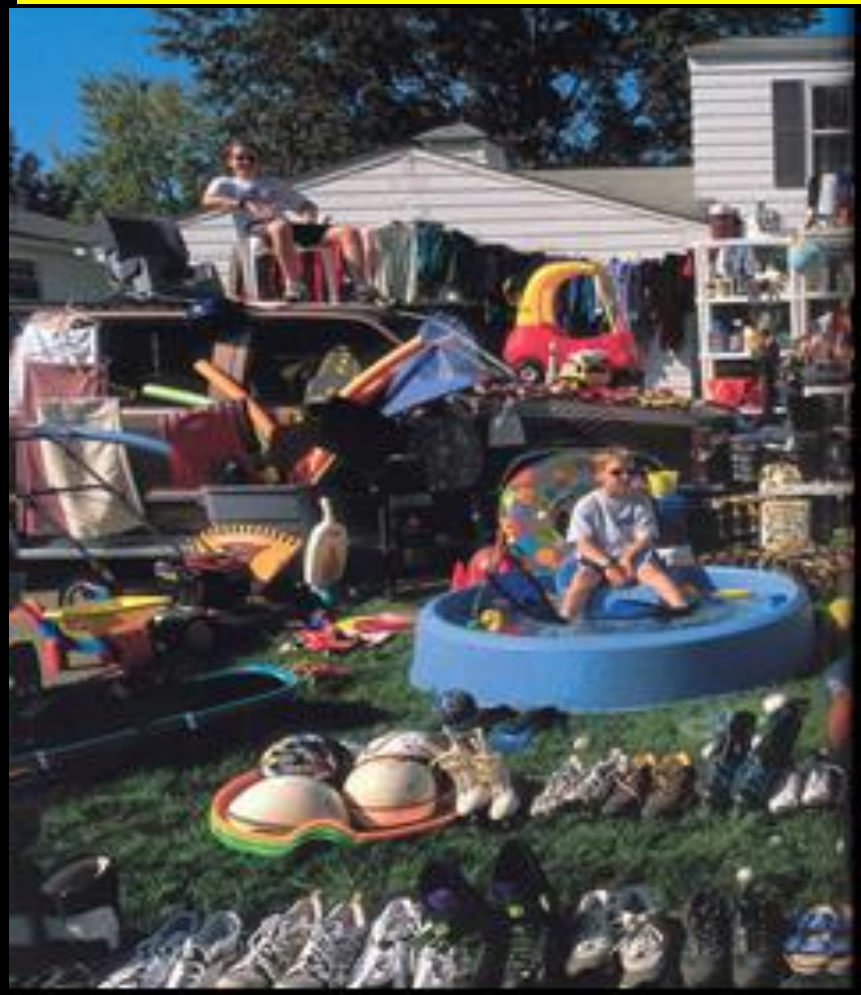
Component 2: Types of Mayday - Air Problems

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

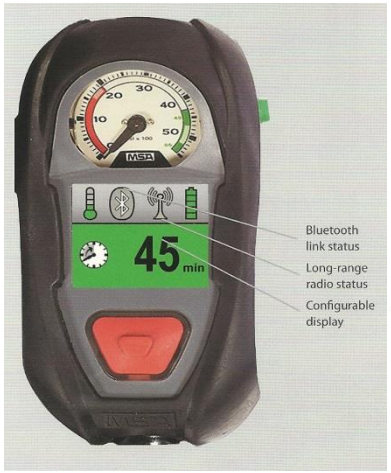
PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems



The first 1/3 of the air supply is to carry out assignment.

2018 Audio tapes we noticed a higher number of Firefighters speaking on the radio with low air alarms going off in the background that ever before.



The final 1/3 of the air supply is the safety margin.

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

We found several problems that FDs have with SCBA:

Annual Testing:

- **Facepiece bench tested … 34%**
- **Regulator bench tested … 41%**

Auxiliary IDs		
-		
Regulator	115S1611021870	
Reducer	115S1611005426	
-		
-		
Project Number	430178	
-		
Visual Inspection		
Facepiece		Pass
Backframe/Harness		Pass
Cylinder		
Low Pressure Warning		Pass
Hoses		Pass
Manifold Volume: 0.115		

Functional Tests			
Exhalation Pressure	Pass	1.9	"H2O
Facepiece Leakage	Pass	0.1	"H2O
Positive Pressure	Pass	0.9	"H2O
Primary Lockup	Pass	94.1	PSI
Primary Creep	Pass	-0.3	PSI
Air Saver Switch Activation	Pass	-4.8	"H2O
Transfer	Pass	1587	PSI
Secondary Lockup	Pass	158.6	PSI
Secondary Creep	Pass	-2.8	PSI
High Pressure Leakage	Pass	17	PSI
Secondary Pr. at High Cylinder	Pass		
Purge	Pass	203	L/min
Alarm Activation Pressure			
4500 Vibralert (35%)	Pass	1587	PSI
Gauge Accuracy			
HP Numbers	Pass		

1000 PSI		2000 PSI		3000 PSI	
Pass	1198	Pass	2203	Pass	3183

Minimum		Maximum			Breathing Results	Minimum		Maximum		
0.8	"H2O	2.1	"H2O	Pass	Facepiece Pressure	0.9	"H2O	2.4	"H2O	Pass

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

Also, the revised NFPA 1981 comes with four pretty heady changes that will affect not only purchasing decisions, but also tactical fireground considerations for fire service leaders.

1. Low-air alarm

The NFPA 1981-2007 required the alarm to sound when 25 percent of the cylinder's available air was left. The 2013 edition ups that requirement to 33 percent of the cylinder's available air.

The 2013 edition is the first that specifies an EOSTI level for fire service SCBA. The 25 percent threshold commonly accepted for years by the fire service actually came from NIOSH.

And even NIOSH never had a hard and fast 25 percent; the NIOSH standard had always been a window of 20 percent to 25 percent of available air.

NFPA 1404: Standard for Fire Service Respiratory Protection Training, 2013 edition, contains several requirements for individual air management when using SCBA:

The individual shall exit from an IDLH atmosphere before consumption of reserve air supply begins.
The individual shall recognize that the low air alarm notification indicates that the member is consuming the reserve air supply.
The committee added the higher 33 percent threshold to NFPA 1981 to increase the reserve air supply available and be in line with the specifications of NFPA 1404. The major manufacturers of SCBA are saying that they can accomplish compliance for existing SCBA through firmware upgrades for electronic EOSTI and changing spring tension on audible alarms, or the low-air bell.

With all the discussions regarding air management in recent years, including whether or not 25 percent was enough of a reserve air supply, this is a step in the right direction

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

me indicator alarm goes off (within certain limits). Currently, this indicator alarm is set to go off when the air supply reaches 25 percent of the remaining air. This is based on current requirements from NIOSH, the principal government organization responsible for baseline respirator certification.

NFPA 1981 requires SCBA meet the federal regulations for general SCBA in Title 42 Code of Federal Regulations Part 84 that pertain to SCBA. However, the committee responsible for NFPA 1981 responded to a series of requests from fire service members to in having this alarm set to go off at a higher level of remaining air supply.

These requests came as the result of fire departments realizing that they never get the full length of rated service time for their breathing apparatus. SCBA rated for 30 minutes may last only 15 minutes under hard work conditions and high breathing rates, leaving only minutes of air in the cylinder once the alarm goes off.

Many departments consider this time too short, even opting for a longer-rated SCBA is still considered inadequate. The new requirement will dictate the system to alarm at 33 percent of the full cylinder pressure as opposed the current 25 percent of the SCBA original air supply.

In addition, manufacturers will be required to change the head-up-display (HUD) to provide heads-up display signals at 100 percent, 75 percent, 50 percent, and 33 percent. SCBA are currently only required to display a signal at 50 percent; however, many manufacturers show other percentages as part of their SCBA HUD.

While NFPA was able to gain a consensus for implementing this change, it did not come easy. A change of this type is counter to the current federal regulations and would invalidate the NIOSH SCBA certification if the alarm time is other than 25 percent.

The committee had to approach the federal government to request a change in the NIOSH regulations. This change must go through a public rule-making process, which provides a means for the government to solicit comments from interested organizations or individuals regarding the proposed changes.

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

WHY DOES THE LOW AIR ALARM STOP?

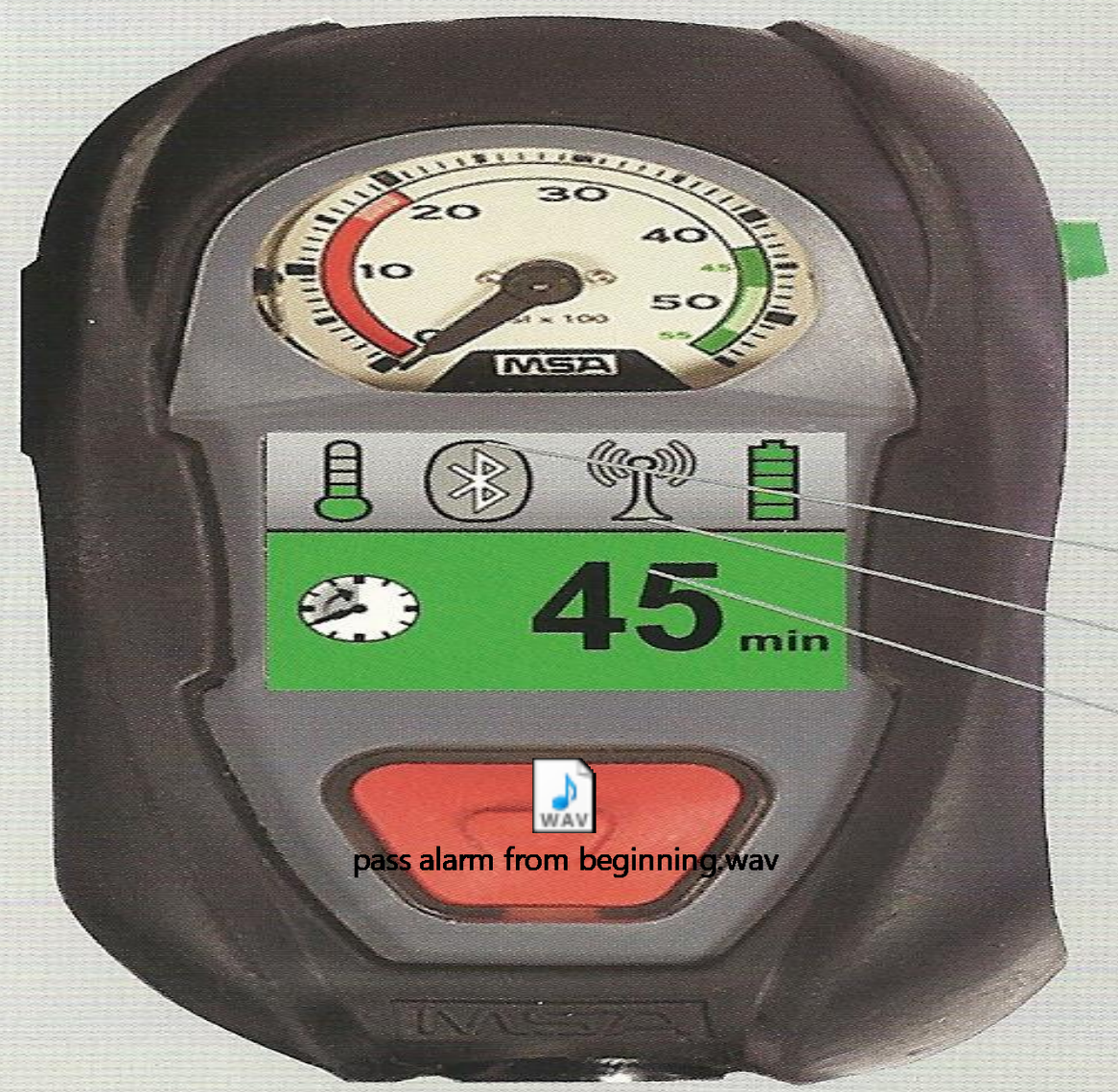
The low- air alarm is activated when the cylinder reaches 33% of its capacity. At this point, the secondary pressure regulator is activated and the facepiece mounted regulator is supplied with air at 1,000psi. When the cylinder drops below 145-165psi, the low air alarm will stop and user knows that their cylinder pressure is now at about 3%.

SO WHY STOP WORKING WHEN THAT HAPPENS?

No long after the low air alarm stops, the user's breathing becomes restricted by the low air pressure. It feels as though each breath is being drawn out of the regulator. This is very much a tolerance situation based on the individual.

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems



Bluetooth link status

Long-range radio status

Configurable display

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

PASS ALARM USE:

We can make a case for the constant activation of the PASS alarm Vs using the alarm intermittently. The constant alert of the PASS Device as in a "Mayday", will add sensory overload, to which the Firefighter will respond physiologically with increases in anxiety, Heart rate, and respiratory rate, which ALL demands more air. Although the brain may represent only 2% of body weight (?), it Uses about 20% of the body's metabolic energy.

Breathing techniques are only one technique used in classes in which we teach resiliency. We recommend a simple model: mindset controls, emotion, emotion will alter biology, and biology will effect performance. These establish mental toughness and acuity resiliency, helps establish the right frame of mind to achieve results because luck is not a sound fireground tactic.

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

New Universal PASS Tone

Incorporate a new universal PASS tone to improve audible detection by the human ear

In December 2016, a Tentative Interim Amendment (TIA) was issued requiring all manufacturers of PASS devices to change the alarm tone as required in the NFPA 1982, 2013 Edition standard for PASS devices manufactured on December 21, 2016

The new universal PASS alarm tone will be incorporated into the NFPA 1982, 2018 Edition standard

Transmitting RF PASS

Incorporate two new tests to the RF PASS section to improve reliability

PROJECT MAYDAY

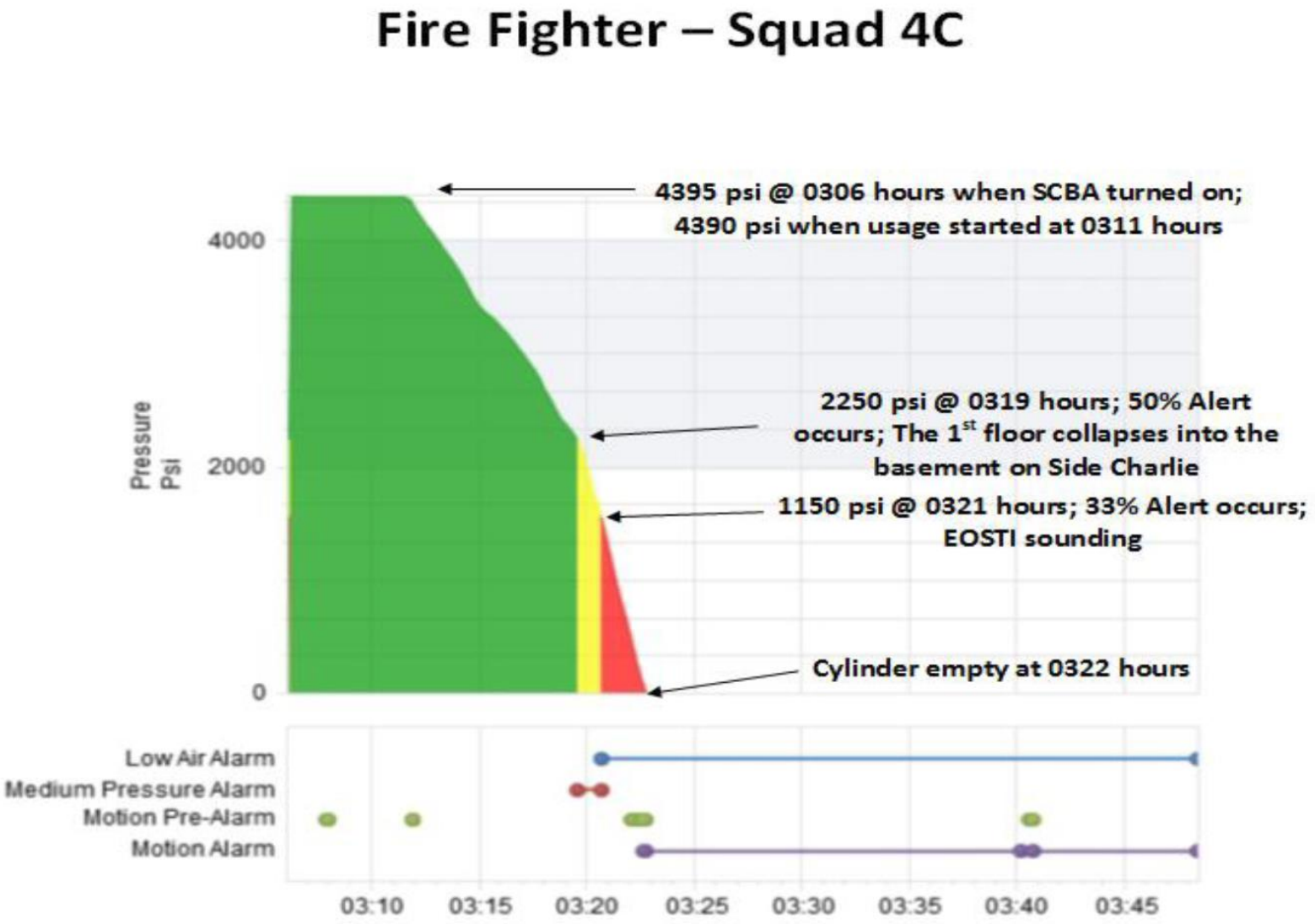
Component 2: Types of Mayday - Air Problems

NFPA 1981, 2018 Edition
Pneumatic Data-logging

- Minimum Requirements
- Initial Air Activation (pressure, date and time stamp)
- Data Logging @ 30 second intervals (pressure, date and time stamp)
- Data Logging of Pressure Milestones
- 100%, 75%, 50%, and 35% (EOSTI)
- Breathing Rate @ 30 second intervals (minimum 5 LPM resolution)
- HUD Deactivation (pressure, date and time stamp)
- Retain 36 hours of data
- Does not replace the PASS data-logging requirement for 2000 minimum events
- Output data to CSV file
- No requirement for temperature data log

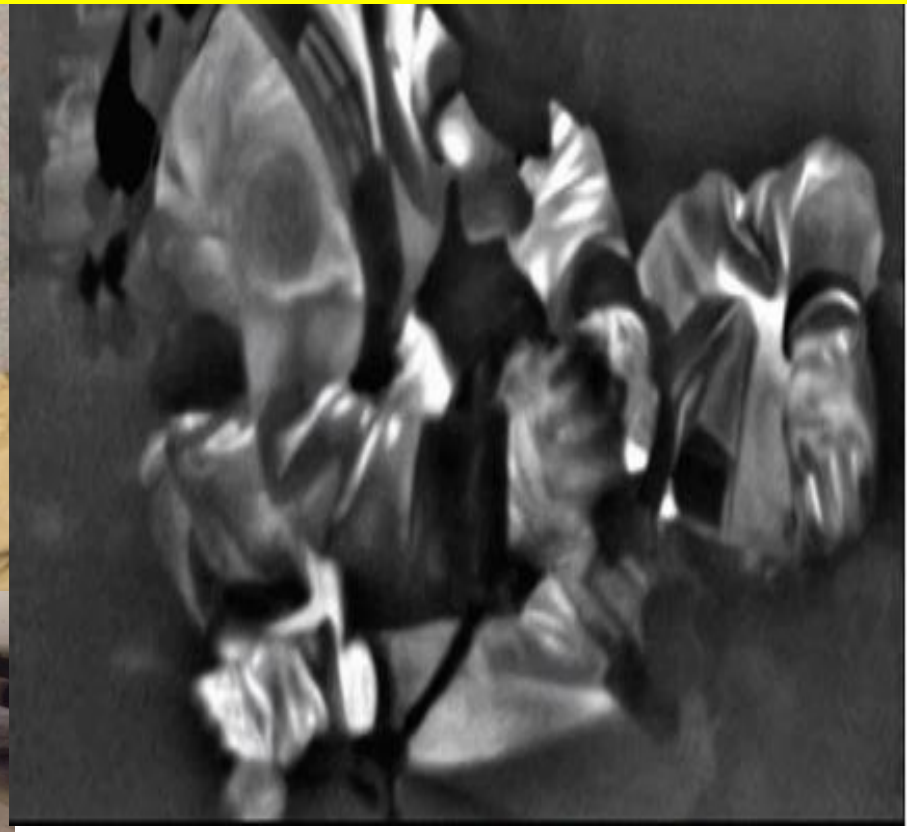
PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems



PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems



Transfills were used 37 “mayday” situations

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

In general, the most common communication problem encountered by firefighters is the ability to effectively communicate while wear SCBA.

It is essential to speak in a calm voice, at moderate volume, and with clear word enunciation.

These habits are developed everyday, depending on our training and experience by practicing these skills everyday day.

MAYDAY - MONDAYS

MAYDAY - MAY

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

- Three factors influence every breath…
  - how fast or slow
  - deep or shallow
  - abrupt or smooth
- During high work rate, the muscles need up to 100 times more oxygen than at rest, the heart must work 8 to 10 times harder.
- Physical work brings on many changes in the body:
  - increased pulse
  - faster breathing
  - more blood per heart beat
  - perspiration
  - high blood pressure
  - higher body temperature
  - more blood to the muscles
  - greater lung absorption to maximize use of of red blood cells

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

Regardless of what type of respirator is used, a vicious circle can occur:

- **Increased dead-space + greater workload = more CO_2 in the blood**
- **More CO_2 in the blood = quicker breathing**
- **Quicker breathing = shallow breathing**
- **Quick and shallow breathing = even more CO_2**
- **More CO_2 = psychological stress**
- **Psychological stress = even quicker breathing**

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

Low on Air:

- Why did you run low on air (low air alarm)?
  - Crew did not conduct air checks during incident? 68%
  - Went farther into the structure than realized, did not estimate exit time/air? 79%
  - Physically fatigued, tired, used more air than normal? 59%
  - Ill at the time of entry? 4%

Trying to fine a FF down with an activated PASS device, can be difficult. Sounds bounce off every-thing. Plus other sounds, smoke detectors, alarms and sounds.

PROJECT MAYDAY

Component 2: Types of Mayday - Air Problems

Out of Air:

- Why did you run out of air?
  - Thought I had enough air to exit? 86%
  - Other members had air, I thought I was okay? 79%
  - Assigned a task that had to be completed….. 4%

- 30 minute cylinder ….. 9%
- 45 minute cylinder ….. 59%
- 60 minute cylinder ….. 32%

30 minute	45cu.ft.	21lbs
45 minute	66cu.ft.	27lbs
60minute	87cu.ft.	32lbs

100 psi … 8 – 12 breathes ……. Pressure /Volume ?

PROJECT MAYDAY

Component 2: Types of Maydays - Medical

MEDICAL
(244)

4.4%

PROJECT MAYDAY

Component 2: Types of Maydays - Medical

(194) Heart Attacks

(103) Advancing attack lines into commercial structure (2 ½ & 3")

(21) Hand laying supply lines (4 / 5")

(54) Know heart condition

(11) FD required physical/medical assessment

PROJECT MAYDAY

Component 2: Types of Maydays - Medical

PROJECT MAYDAY

Component 2: Types of Maydays - Medical

Concussions: 371

- **Apparatus accidents (w/entrapment) 11% 29**
- **Struck by vehicle 22.3% 56 (5)**

  - apparatus blocking scene ….. 21%
  - wearing PPC only (NO vest) .. 83%

PROJECT MAYDAY

Component 2: Types of Maydays - Medical

PHYSICAL EXAI

RECOMMENDED YEARLY SCREENINC

- ☐ Vitals: BP, HR, RR, Wt, Body Fat Per
- ☐ Multi-System PE: skin, mouth, thyr
- ☐ Labs: CMP, CBC, Lipid Panel, TSH, U
- ☐ Testing: 12-lead EKG, eye exam, he
- ☐ Family History: CVD, sudden cardia
- ☐ Personal Health Behaviors: tobacc

CARDIOVASCULAR HEALTH AND FITNESS

Significant cardiovascular demands of firefighting lead to acu firefighters, in contrast to 15% of all deaths occurring on c firefighters, and these events occur almost exclusively in su therefore prudent to thoroughly screen for, and aggressively of patients.

- ☐ Ischemia is best evaluated by an imaging exercise st for clinical suspicion. Exercise stress testing without those who may need cardiac intervention (angiopla
- ☐ Consider Coronary Artery Calcium CT scan to evalua
- ☐ Echocardiography is recommended once as a baseli and HCM.

CANCER

Chronic exposures to heat, smoke, and toxic flame retardant for many cancers. The National Institute for Occupational Sa firefighters to better understand the potential link between f certain types of cancer than the general U.S. population in d especially vigilant to conduct cancer screening efforts in the firefighters do exceed those of the USPSTF guidelines for th dealing with firefighter health issues that we are strongly ad medical judgment to prescribe the most appropriate screeni

- ☐ Colonoscopy or other appropriate colon cancer scre
- ☐ Annual PSA with digital rectal exam between 40-45 treatment should be discussed.
- ☐ Annual pap smear.
- ☐ Annual mammograms beginning at age 40. Discuss s
- ☐ Annual testicular exam and instruction about self-e
- ☐ Annual head to toe skin examination and appropria
- ☐ Urinalysis annually for microscopic hematuria.

MUSCULOSKELETAL INJURIES

The high intensity and dynamic work environment of firef injuries represent approximately 50% of all job related mu and intervertebral disc injuries, often leading to significa deconditioning are strong predictors of musculoskeletal inj

- ☐ Address underlying musculoskeletal issues. Assess muscle strength.
- ☐ Refer as necessary for treatment.
- ☐ Encourage flexibility and core strengthening exerc

BEHAVIORAL HEALTH

The mental and physical stress of firefighting and repeated exposure to trauma can lead to depression, anxiety, acute stress reactions, post-traumatic stress, and suicidal ideation. Self-medication with alcohol and drugs can result in substance abuse disorders.

- ☐ Behavior health screening.
  1. Prime MD: http://www.psy-world.com/prime-md_print1.htm
  2. AUDIT & CAGE for Alcohol Screening: http://pubs.niaaa.nih.gov/publications/arh28-2/78-79.htm

LUNG DISEASE

In the line of duty, firefighters are often exposed to carbon monoxide and other inhaled toxins, or irritants that may lead to acute respiratory issues such as hypoxemia or bronchoconstriction. Repeated exposure may cause chronic pulmonary disease and abnormal lung function. Changes in lung function and the development of lung disease may be detected with baseline and periodic assessment and should include the following tests.

- ☐ Spirometry: Baseline and annual pulmonary function testing in those with a history of respiratory health problems and in healthy individuals; to include FEV1, FVC, and the absolute FEV1/FVC ratio.
- ☐ Chest x-ray: Baseline chest x-ray in those with any respiratory symptoms or disease and in healthy individuals. Repeat chest x-rays every 5 years or sooner if medically indicated.
- ☐ Consider low dose CT for screening for lung cancer in high risk individuals.

SLEEP DISORDERS

Sleep disorders are highly prevalent in firefighters and include sleep apnea, insomnia, shift-work disorder, and restless leg syndromes. It is imperative to screen firefighters for these disorders since they substantially increase the risks for motor vehicle accidents, cardiovascular disease, diabetes, depression, and anxiety in firefighters.

- ☐ Assess sleep and use of sleep medications.
- ☐ Screen for sleep apnea and consider sleep study as indicated.
- ☐ Helpful screening tools include:
  1. Epworth Sleepiness Scale: http://bami.us/Sleep/SleepScale.html / yoursleep.aasmnet.org/pdf/Epworth.pdf
  2. STOP-Bang questionnaire: http://www.stopbang.ca/osa/screening.php
  3. Berlin questionnaire: https://www.fairview.org/fv/groups/internet/documents/web_content/s_062202.pdf
  4. Diagnosis of obstructive sleep apnea (OSA) algorithm: guideline.gov/algorithm/6582/NGC-6582_1.pdf

INFECTIOUS DISEASES

Firefighters are often first on the scene of an emergency and may be exposed to HIV, hepatitis (A, B and C), TB and other infectious diseases.

- ☐ Establish immunity by vaccination record review and/or titers and update vaccines including Tdap, MMR, HBV, and Varicella. Consider hepatitis A vaccine.
- ☐ Baseline and periodic screening for HIV, HBV, HCV and other communicable diseases.
- ☐ Provide annual influenza vaccine.

SUPPORTING DOCUMENTS

Standard on Comprehensive Occupational Medical Program for Fire Departments NFPA 1582, http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards?mode=code&code=1582

PROJECT MAYDAY

Component 2: Fall through Roof - Maydays

PROJECT MAYDAY

Component 2: Fall through Roof - Maydays

PROJECT MAYDAY

Falls through / Off Roof

RISK

HIGH RISK LOW FREQUENCY Falls off the Roof Vent Cut (unknown fire location) Falls through Roof/Ceiling	HIGH RISK HIGH FREQUENCY Falls through the Roof Roof Travel (garages, structure, porch) Trapped in Attic
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY Vent Cut (know fire location)

FREQUENCY

PROJECT MAYDAY

Component 2: Falls through the Roof

FALLS THROUGH THE ROOF (941) 17.1%

- Roof Travel (611) 66%
- Vent Point (329) 34%
  - Inspection Hole (120) 38%
  - Vent Hole Cut (209) 60%
- Fell off the Roof/Ladd (154)*

NUMBER OF FF ON THE ROOF:

1 FF…..559	2 FF….167	3 FF…..79	4 FF…. 41
(69%)	(19%)	(8%)	(4%)

PROJECT MAYDAY

Component 2: Falls through the Roof

TYPES OF ROOFS (941)

- **Peaked…..572….65%**

-Asphalt	**286**	**50.2%**
-Wood	**94**	**16.4%**
-Tile	**116**	**20.3%**
-Metal	**75**	**13.1%**

-Flat Roofs …..369 ….39%

- Rubber coated	**162**	**44%**
- Membrane	**111**	**30%**
- Asp/Gravel	**96**	**26%**

PROJECT MAYDAY

Component 2: Fall Through the Roof - MAYDAYS

LADDERS: (940)

- **Ground Ladder 619 65.8%**
- **Aerial 321**
  - **Stick 214 66.6%**
  - **Tower 107 59.6%**

STRUCTURES:

- **Residential ……..446 ….. (46.2%)**
- **Apartments …….194 ….. (20.6%)**
- **Commercial ……300 ….. (32.8%)**

PROJECT MAYDAY

Component 2: Fall Through the Roof - MAYDAYS

Material	Protection	Collapse Time (min)
2x10 Solid Wood	None	18:35
2x10 Solid Wood	Lath & Plaster	>79:00
2x10 Solid Wood	Gypsum Wallboard	44:40
OSB I-Joist	None	6:00
OSB I-Joist	Gypsum Wallboard	26:23
Hybrid Truss	None	5:30

PROJECT MAYDAY

Smoke is Fuel

Smoke IS:

An aggregate of suspended particulates, aerosols, and gasses

Smoke is being developed BY:

- Incomplete combustion (burning)
- Pyrolytic Decomposition (pyrolysis – not burning)

Smoke is telling you the FUTURE:

- Most smoke is 70% particulate
- Most smoke is developed by pyrolysis
- Smoke can ignite at 450F and has a flammable range of 1-74% in air

4 of the 5 hostile fire events are smoke related:

Flame Over: The overhead smoke flow path ignites and spreads the fire

Smoke Explosion: Trapped smoke away from the fire is kissed by a spark or ember causing a momentary ignition and expansive force

Explosive Growth: Flowing, air-limited smoke, above its ignition temperature, has air re-introduced – then all the smoke ignites

Backdraft: Trapped, pressurized smoke that is O2 deficient suddenly receives air – causing a detonation/deflagration

Flashover: Radiant energy causes all materials within a space to ignite

PROJECT MAYDAY

Component 2: **Falls through the Roof**

VVDC

Smoke has four visible attributes:

- **Volume:** Sets the stage for relativity to the building involved
- **Velocity** (speed and flow energy): Tells of the heat energy. Turbulent smoke that fills a box means Flashover!
- **Density:** The fuel saturation of smoke that is telling you the future potential for severity
- **Color:** Also indicates HEAT. Remember that smoke color can be stripped (filtered) over distance and through resistance

Velocity trumps color!

PROJECT MAYDAY

Component 2: Falls through the Roof

What You See	What It Can Mean
Turbulent smoke that fills a box	Warning sign of impending flashover
Thick, black, fast	Close to the seat of the fire, super hot smoke capable of instant ignition, maybe a vent-limited fire that needs air
Thin, black, fast	Flame-pushed smoke; Fire nearby that is well ventilated
Dirty white smoke with velocity	Heat-pushed smoke that has traveled a distance or has had the carbon/hydrocarbon filtered (like smoke through a crack)
Same color (white/gray) and same velocity from multiple openings	Deep-seated fire, possibly located well within a building or in combustible voids and concealed spaces
Low volume white smoke from more than one location of a large box	Serious fire deep within
Brown smoke	Unfinished wood reaching late heating (can support flame); usually a sign that a contents fire is transitioning into a structural fire; when coming from structural spaces of lightweight wood structures, a warning sign of collapse!
Yellowish-gray smoke from cracks or seams	Warning sign of impending backdraft
Smoke moving faster than firefighters can crawl	Warning sign that rapid fire spread is imminent

PROJECT MAYDAY

Component 2: **Falls through the Roof**

PROJECT MAYDAY

COMPONENT 2: Lost, Separated from Hose Line – MAYDAY

PROJECT MAYDAY

Component 2: **Falls through the Roof**

PROJECT MAYDAY

Component 2: Falls through the Roof

PROJECT MAYDAY

Component 2: **Falls through the Roof**

PROJECT MAYDAY

Component 2: **Falls through the Roof**

PROJECT MAYDAY

Component 2: Falls through the Roof

PROJECT MAYDAY

Component 2: Falls through the Roof

Roof Travel: 611

- Did the roof crew know the location of the fire prior to roof operations? 42.4%
- Was the roof sounded by all members on the roof? YES 16% NO 84%
- Operations Daytime 12% Nighttime 88%
- Had the vent hole already been cut, prior to "Mayday"? YES 32%
- Had multi-vent holes been cut, prior to the "Mayday" YES 9%

PROJECT MAYDAY

Component 2: Falls through the Roof

Roof Travel: 611

- Had water been applied to the fire, prior to roof operations? 28.7%

Roof Vent Operations: 329

- Did the roof crew know the location of the fire? YES 27%
- Did the roof vent crew have a hose line? YES 6%
- Was a roof ladder used during vent cut? YES 4%
- Did the crew have a TIC? YES 15%

PROJECT MAYDAY

Component 2: Falls through the Roof

Fell through the Roof:

How far did you fall?

- **Half-way through the hole? 22%**
- **To the rafters? 70%**
- **To the floor? 8%**

Half-way through hole:

- **did you self-rescue? 17%**
- **did you need assistance? 86%**
- **did you drop your tools? 33%**
- **were you injured? 27%**

PROJECT MAYDAY

Component 2: Falls through the Roof

To the Rafters:

- **Did you breakthrough the ceiling?**
  YES 46%
- **What happen to your facepiece?**
  Dislodged 77%
  ***were you able to rescue and donn facepiece, in less than a minute 15%**

- **Were you injured? 65%**
- **Were you burned? 48%**
  (pants moved up, exposed legs)
- **Could you get to your flashlight? 34%**
- **Was there entanglement? 44%**

PROJECT MAYDAY

Component 2: Falls through the Roof

To the Rafters:

- **Did you lose your helmet/dislodged? 61%**
- **Could you self- rescue? 14%**
- **Did you have flame or heat impingement?**
  Flame 15% Heat 85%

What area of the structure were you on during collapse:

Residential:

- **Main structure 52%**
- **Garage 41%**
- **Porch 7%**

PROJECT MAYDAY

Component 2: Falls through the Roof

Comments:

- Difficult to get to radio
- Get to a position, where you can punch a hole in the ceiling
- Had difficulty repositioning facepiece and tightening straps
- Make sure you report possible injuries
- RIT had difficulty get victim out of area if they were unable to help

PROJECT MAYDAY

Component 2: - Trapped / Unable to Move - Maydays

PROJECT MAYDAY

Entanglement/Trapped (Collapse)

RISK

HIGH RISK LOW FREQUENCY Entangled in Attic Roof Collapse Structure Collapse Explosion (gas)	HIGH RISK HIGH FREQUENCY Entangled in Structure Ceiling Collapse
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY

FREQUENCY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

TRAPPED/UNABLE TO MOVE: 574 **10.4%**

- **Wires, duck work, etc. (361) 62.8%**
- **Ceiling/floor collapse (151) 26.3%**
- **Structure shift/collapse (62) 10.8%**

- **Occurred during salvage/overhaul ….. 30.4%**

PROJECT MAYDAY

COMPONENT 2: Trapped / Collapse - MAYDAY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

From Schupbach:

On April 14 between the time of 4am and 5am, a partial collapse accident occurred on the fire scene at 3008 W Euless Blvd. At the time of incident, I was on search team with Capt. Judd, FF Alvarado, and FF Sanders. We completed a search of the front of the restaurant and were unable to access the back of the restaurant (kitchen) from initial search entry point (side D). After everyone was pulled from front, we enter through the back door side C to search for occupant. Upon entering FF Sanders was first, initially I was second until I was entangled in wires hanging from ceiling. I told FF Alvarado to go in front while I tried to keep wires high. After FF Alvarado passed I moved behind him trying to advance while untangling wires. At that time, an unknown object came from above me, unsure where it hit me. Object forced me to the ground in a prone position and laid on the back of me. I did not feel injured at any time but I was not able to get up. FF Alvarado lifted object off me and I was then ordered to leave the building from Capt. Judd. Capt. Judd was behind me close to entrance. I was able to stand and head out of building at this time. Note incident occurred about 6 foot inside exterior doorway. Soon after exiting, I could feel stiffness in my neck, reported after being asked if I was okay.

From Alvarado:

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

- Did you carry personal tools?
  - wire cutters ….. 68%,
    could you reach them ….. YES ….. 42%
  - rescue rope ….. 33%
  - extra flashlight ….. 24%
  - gloves ….. 47%

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

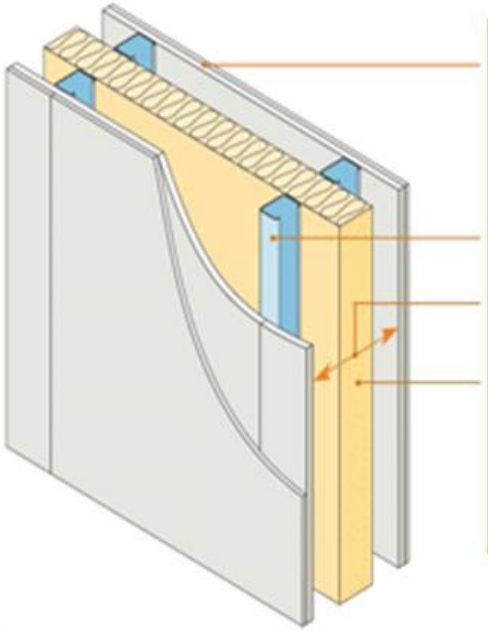
WALLshield

HIGH IMPACT

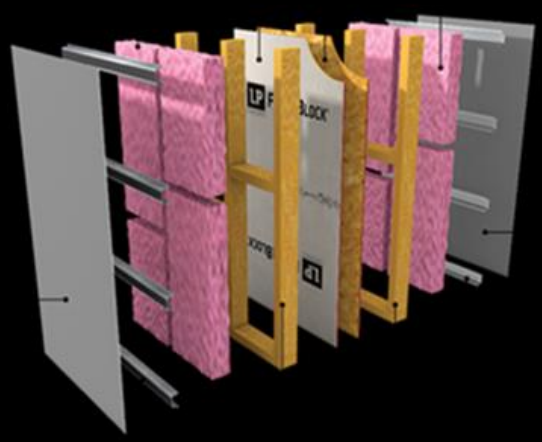
wallBarrier

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY



Wall lining	- 2 or more layers of gypsum-based board (minimum total nominal mass per unit area 22 kg/m²) both sides - all joints staggered
Wall frame	75mm (min) 'C' shape studs both sides
Wall width	**250mm (min)** between inner faces of wall linings.
Absorbent material	One layer 80mm (min) unfaced mineral wool batts (density 33-60 kg/m³)
External (flanking) wall	See Sections 1 and 2



PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

Trapped by wires, duct work, drywall, etc.

If trapped by wires, did you have wire cutters (etc.)? 68%

- **Were you able to reach it, in whatever pocket you had it in? 35%**

- **Residential ….. 264 ….. 46.2%**
- **Apartments …. 123….. 21.5%**
- **Commercial … 184….. 32.2%**

*** false ceiling grid work, shelves, products on shelves**

PROJECT MAYDAY

COMPONENT 2: Trapped/Unable to Move - MAYDAY

- Make sure all personal tools are in pockets above the waist. (i.e.. extra flashlight, cutters, etc.)
- Make sure your radio in workable space
- Cut wires or whatever on the same side as you move.
- Move duct work and flatten it, rather than cutting it.
- Before breaching a wall, evaluate what you know (where you may have been) and think about what you don't know (location, type wall, also watch for electrical wiring

PROJECT MAYDAY

Component 2: - NO Communications - Maydays

PROJECT MAYDAY

Communications

RISK

HIGH RISK LOW FREQUENCY Lost radio	HIGH RISK HIGH FREQUENCY Weak/Dead battery
LOW RISK LOW FREQUENCY Radio NOT on	LOW RISK HIGH FREQUENCY Off channel

FREQUENCY

PROJECT MAYDAY

COMPONENT 2: NO Communications

NO Communications ….. 117….. 2.1%

- **Radio OFF…… 17 ….. (14.6%)**
- **Off Channel …… 35….. (30%)**
- **Lost Radio …… 14…. (12%)**
- **Dead Battery ……. 15….. (12.9%)**
- **Wet Radio …….. 36 ….. (31%)**

- **Simplex …… 41 ….. (35.3%)**
- **800 …… 75 ….. (64.6%)**

PROJECT MAYDAY

COMPONENT 2: NO Communications

PROJECT MAYDAY

San Francisco Fire Department
2 FF Killed
Lt. Vincent Perez, FF/PM Anthony Valerio
1333 Berkeley Way
June 2, 2011

Victim 1's radio

1. *Radio 185°F
2. *RSM 293°F for How long?
3. *Cord 300°F

NFPA = 500°F for 5 min.

NFPA 1802:

STANDARD ON TWO-WAY, PORTABLE RF VOICE COMMUNICATION DEVICES FOR USE BY EMERGENCY SERVICES PERSONNEL IN THE HAZARD ZONE

PROJECT MAYDAY

Today's LMR
Protect your RSM Cord!!

1. *Radio 185°F
2. *RSM 293°F for How long?
3. *Cord 300°F

(*Temps may vary depending on make & model)

NFPA = 500°F for 5 min.

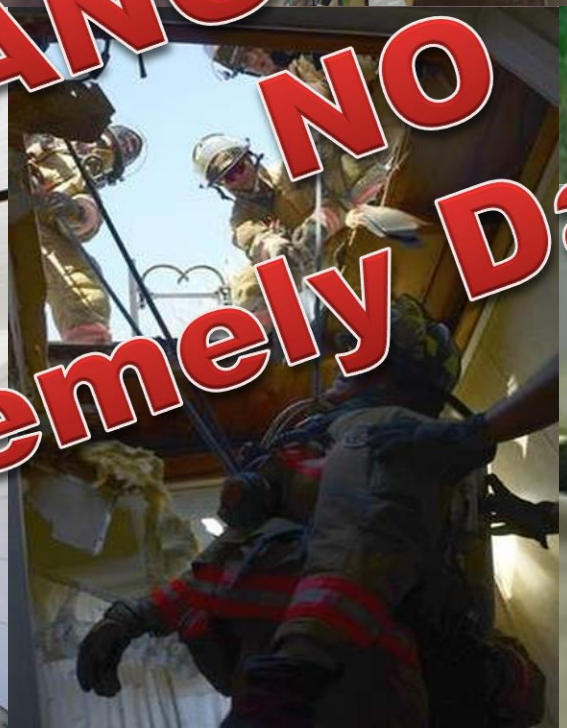
PROJECT MAYDAY

COMPONENT 2: NO Communications

- **Make sure all wires leading from radio to lapel microphone are under the coat, NOT exposed to heat.**

PROJECT MAYDAY

Component 2: - FALL INTO BASEMENT/TRAPPED - MAYDAY



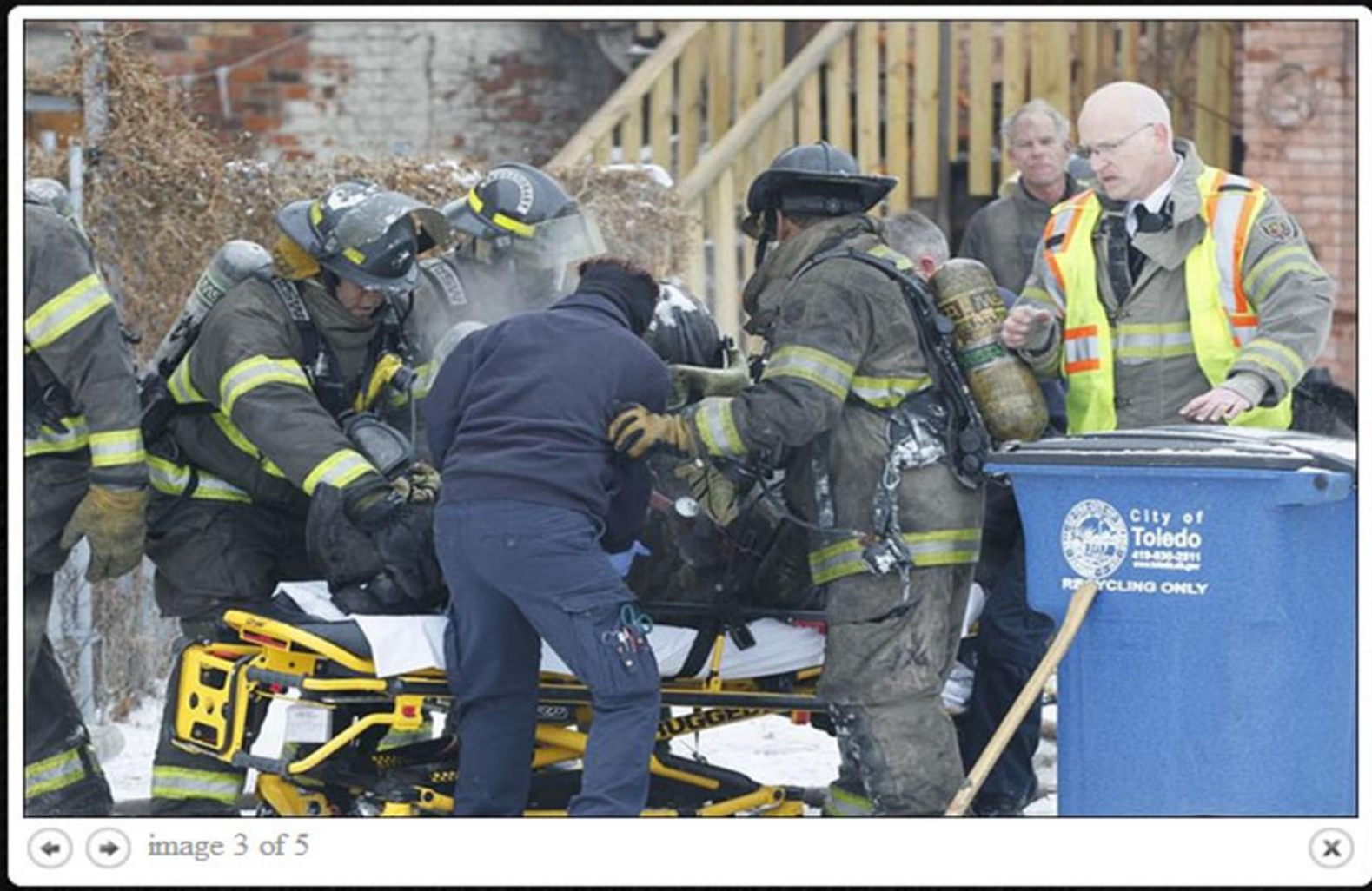
DANGEROUS

NO

Extremely Dangerous

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY



Firefighters and other emergency personnel try to resuscitate a firefighter as he is being taken to get help at the rear of the building at 528 Magnolia. The two firefighters went missing inside during the blaze. THE BLADE/JETTA FRASER

PROJECT MAYDAY

Falls into Hole/ Floor Collapse:`
(structure/basement)

RISK

HIGH RISK LOW FREQUENCY Floor collapse Stairway collapse	HIGH RISK HIGH FREQUENCY Falls through Hole
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY

FREQUENCY

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

Fall into Basement/Trapped ….. 1,131 …. **20.1%**

- **Floor above Basement (Collapsed) .. 487.. (43%)**
- **Floor above Basement (Hole) …. 395… (32.9%)**
- **Basement Stairway Collapse ….. 160 …. (14.1%)**
- **Underfloor/ceiling Collapse ….. 89 …. (7.8%)**

- **Basement Visible during 360 …. 85%***

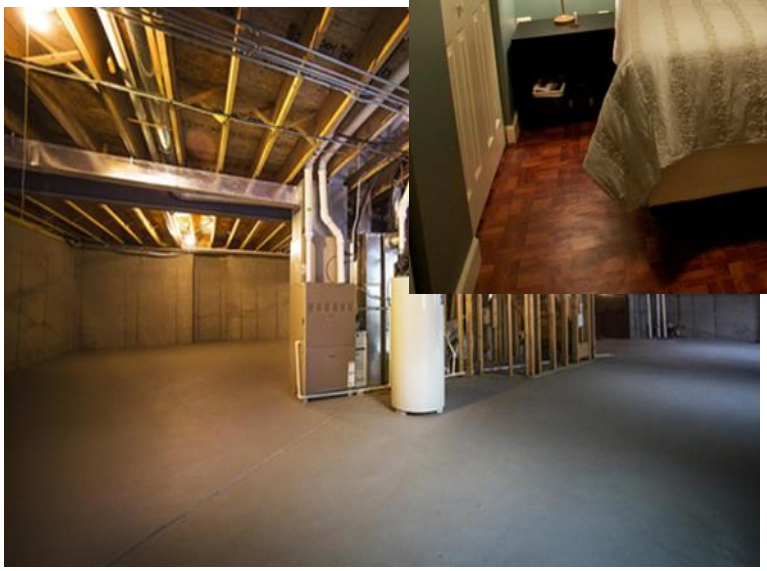
1,131

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY



PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

6

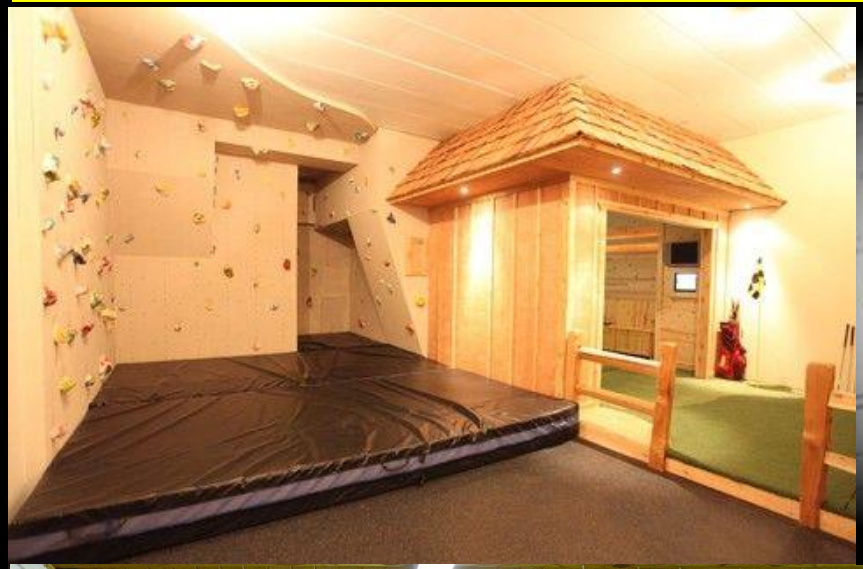
minutes
amount of time to collapse for lightweight-construction floor assembles

19

minutes
amount of time to collapse for floor assemblies built with “legacy” building materials

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY



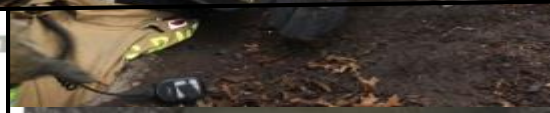
PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

- Fire flows from basement fires developed in location other than the stairs, as the floor assembly often failed close to the location where the fire started.
- Flowing water at the top of the stairs had limited impact on basement fires. In cases it may spread the fire into hidden spaces and into the upper house or take out windows.
- Offensive fire attack through an exterior door was effective in cooling the fire compartment

PROJECT MAYDAY

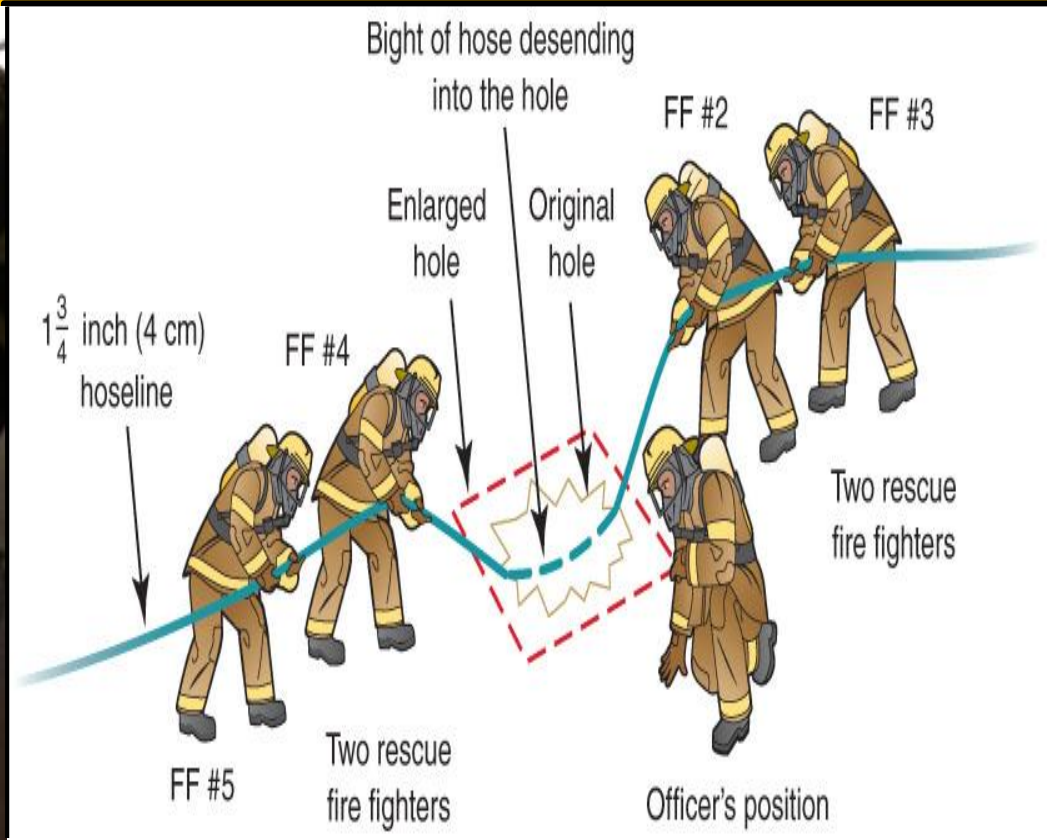
COMPONENT 2: Fall into Basement/Trapped – MAYDAY



PROJECT MAYDAY

Rescue Team, RIT, Mayday Officer Training

Was basement drills conducted as part of RIT training
31%



PROJECT MAYDAY

Rescue Team, RIT, Mayday Officer Training

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

- Basement
  - NO exterior windows …. 38%
  - Had a second exit …….. 1%
  - Finished interior……... 38%
    w/ multi-compartments 84%
  - Bedroom (s) ……. 39%

  - Basement Stairway
    - exposed steps ……. 54%
    - enclosed stairway ….. 24%
    - stairway had landing.. 28%

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

- **Was a basement identified prior to your entry?**
  YES …. 32%
- **Was floor sounded/tapped during entry?**
  YES …. 23%
- **Were you standing up at the time of the floor collapse? YES …. 77%**
- **How many FF were on the floor at the time of the collapse? (1) …. 62% (2) …. 30% (3) …. 5% (4) …. 2%**
- **Was a TIC used to identify fire in the basement?**
  YES …. 36%

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

- **Basement collapse conditions:**
  - **When you fell into the basement, how did you land …. - face down …. 35%**
    - face up …. 40%
    - on side …. 25%
  - **Was there fire in the basement? YES …. 93%**
  - **could it be controlled by a single handline YES …. 52%**
  - **debris (furniture, etc.) came on top of us after we fell in the basement … YES …. 73%**
  - **were you able to self-rescue? YES …. 30%**
  - **was stairway in tack? YES …. 37%**

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

- Was victim packaging required? YES …. 37%
- Concerns while trapped in basement?
  - power was still on …. YES …. 46%
  - potential further collapse …. YES …. 92%
  - fire control …. YES …. 65%
  - being able to move to a safe position … YES …. 57%
  - identified possible injuries, reported them to the IC …. YES ….91%
  - able to give instructions to rescuers .. YES… 63%
  - lost radio/would not work .. YES …. 42%
  - facepiece dislodged .. YES …. 89%
  - lost helmet .. YES …. 43%

PROJECT MAYDAY

COMPONENT 2: Fall into Basement/Trapped – MAYDAY

360

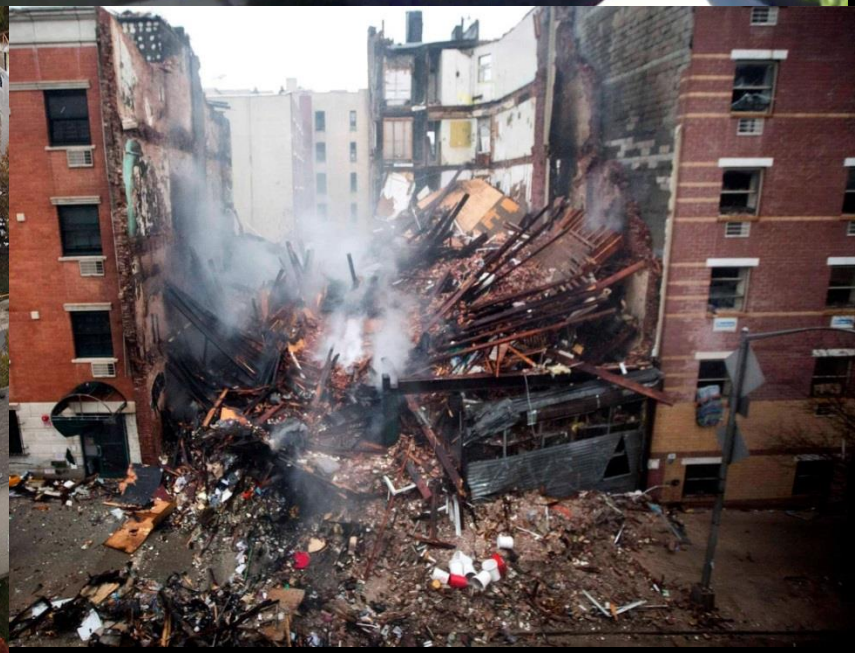
PROJECT MAYDAY

SEARCH

LARGE AREAS
MULTIPLE LEVELS
MULTIPLE VICTIMS
DOOR SWING
(Rule of Thumb)
TOWARD YOU
Closets / Level Changes (Basements/Attic)
AWAY FROM YOU
other rooms
Room Description

PROJECT MAYDAY

COMPONENT 2: Explosions



PROJECT MAYDAY

COMPONENT 2: Explosions

Gas Explosions 319 (5.8%)
(LODD 2018 …. 3)

- Firefighters notified of gas leak by dispatch … 77%
- Firefighter informed of gas smell on arrival … 67%
- Firefighter enters structure with above information … 53%
- Firefighters air monitored prior to entry … 56%

PROJECT MAYDAY

COMPONENT 2: **Other**

PROJECT MAYDAY

COMPONENT 2: Other

Other: ….. 235 **2.3%**

- Holdup (drugs) ……. 33 ….. (14.8%)
- Assaults …….. 102 ….. (37.4%)

- Gunshots/Shootings … 107….. (48%)
- Drug Lab …….. 13 ….. (11.4%)

- Near drowning …….. 6 ….. (2%)

2015-2018.6 129

PROJECT MAYDAY

"The capability of our protective gear can now consistently out perform the natural limits of our anatomy and physiology…just because you can go someplace on the fire ground doesn't mean you should go there … simply our modern turnouts can live a lot longer than our old fashioned bodies."

Chief Alan Brunacini

PROJECT MAYDAY

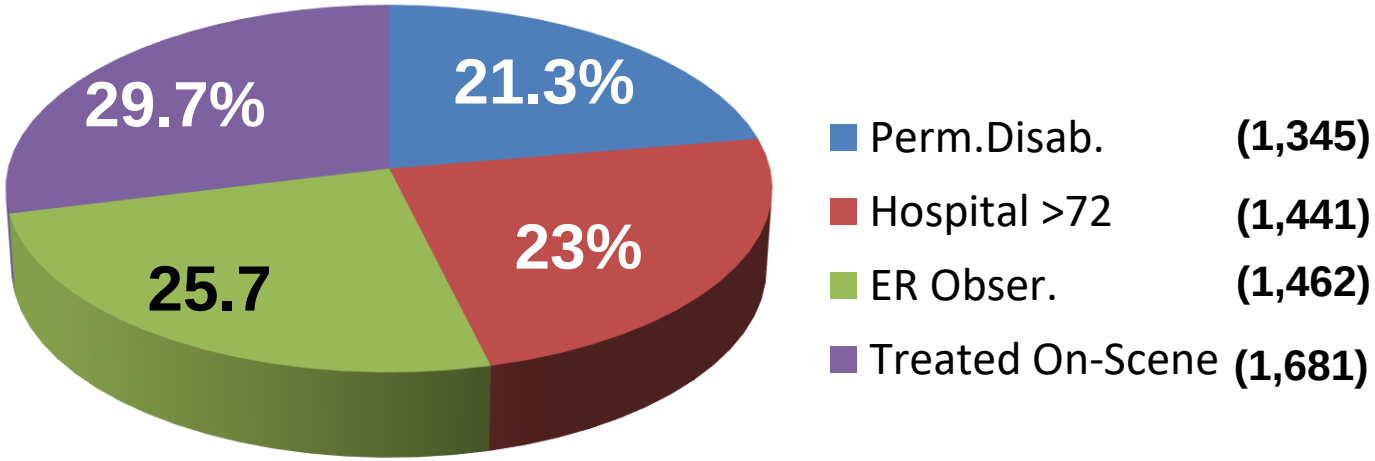
BE PREPARED

PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

CAREER

Injuries from Maydays



5,491

PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

PERMANENT DISABILITY **CAREER**

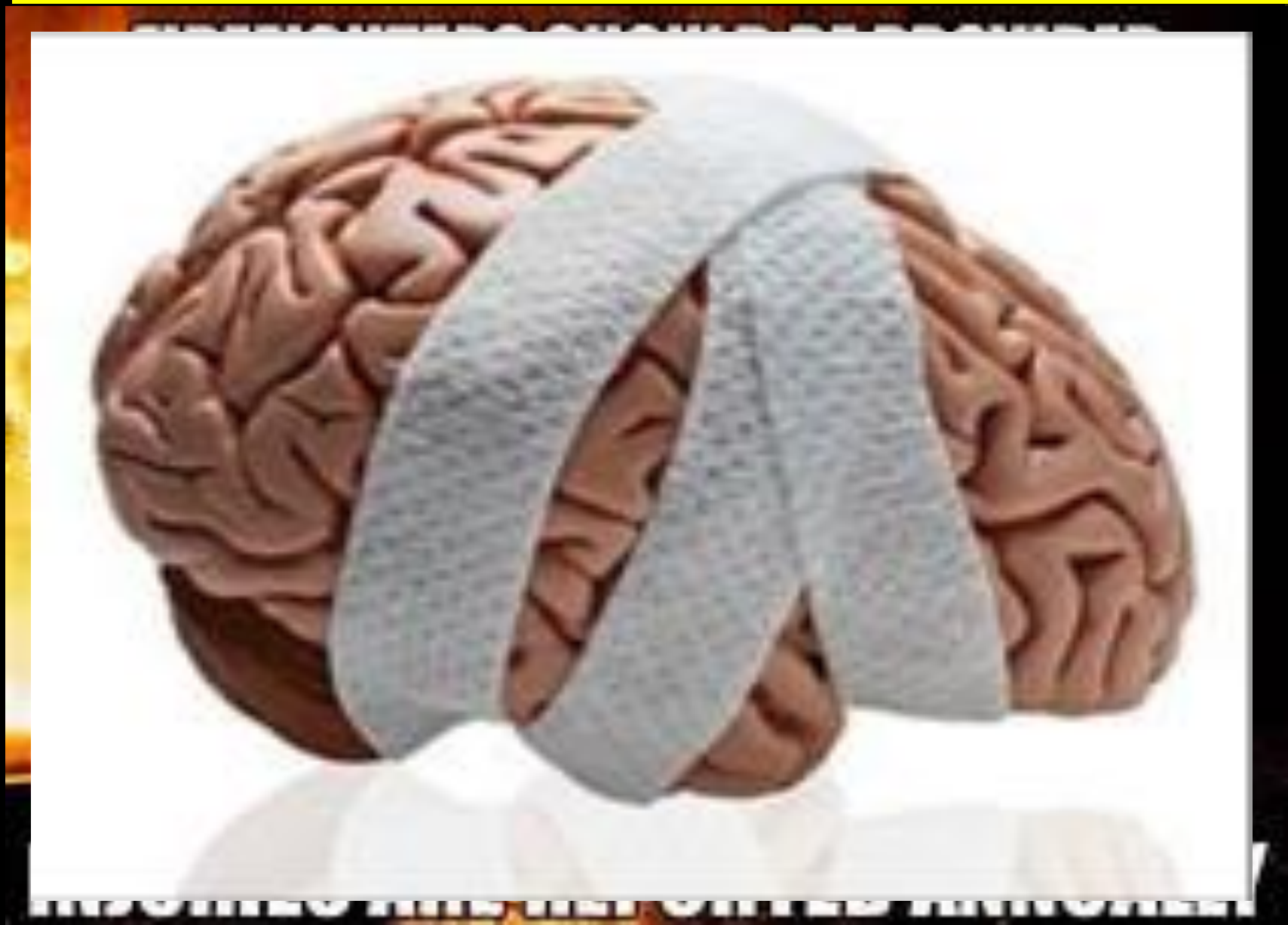
- Quadriplegic …. 34
- Paraplegic …… 55
- Spinal injuries ….. 203
- Head Injury ….. 244
- PTSD ….. 278
- Impact trauma …. 139

- 3rd degree burns… 30 to 50% of the body ….. 177
- 3rd degree burns…50 to 70% of the body ….. 158
- 3rd degree burns…> 70% of the body ….. 104
- 2nd degree burns...> 30% of the body ….. 279

- multi-fractures lower body ….. 171

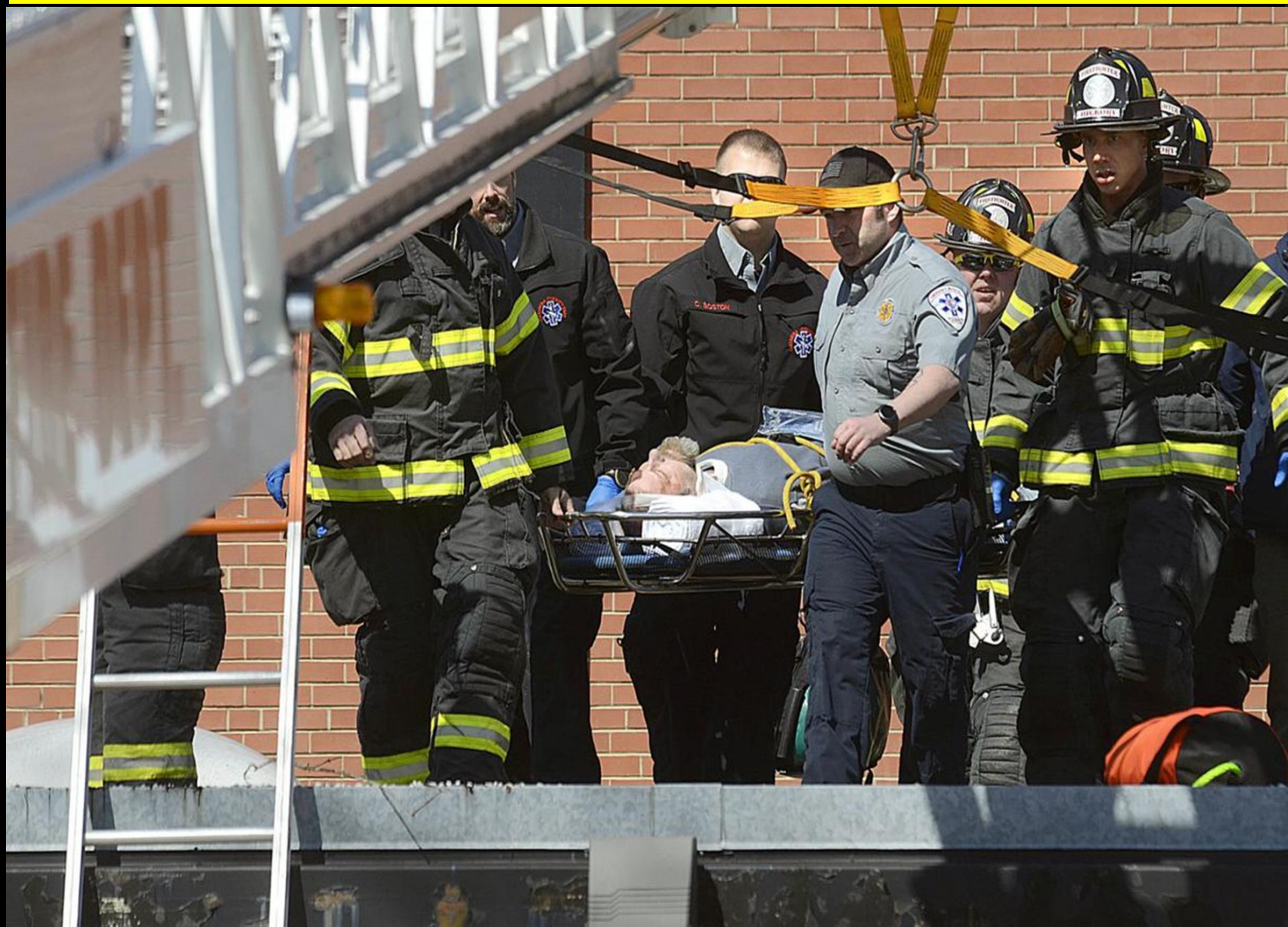
PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS



PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS



PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

Signs and Symptoms

Signs and symptoms of MTBI generally fall into four categories: physical, cognitive, emotional, and sleep, and may include:

Physical	Cognitive	Emotional	Sleep
• Headache • Nausea • Vomiting • Balance problems • Dizziness • Visual problems • Fatigue • Sensitivity to light • Sensitivity to noise • Numbness/ Tingling • Dazed or stunned	• Feeling mentally "foggy" • Feeling slowed down • Difficulty concentrating • Difficulty remembering • Forgetful of recent information or conversations • Confused about recent events • Answers questions slowly • Repeats questions	• Irritability • Sadness • More emotional • Nervousness	• Drowsiness • Sleeping less than usual • Sleeping more than usual • Trouble falling asleep

PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

Sample questions from ImPact test

The ImPact test is administered at the start of a sports season to determine an athlete's baseline results, and again following a concussion to determine if his or her brain has recovered from the trauma. The memory and recognition tests, samples shown below, are conducted in conjunction with a general healthy history questionnaire and a survey of recent symptoms.

SYMBOL MATCHING

Evaluates visual processing speed, learning and memory

Click on the number that corresponds to the following symbol:

Symbols are shown with corresponding numbers. As a symbol is displayed below, the subject must click on the matching number above. After 27 matches, the subject must remember the correct symbol-number pairing.

DESIGN MEMORY

Evaluates attentional processes and visual recognition memory

Was this one of the designs displayed?

Yes No

Twelve designs are presented for 750 milliseconds, twice to facilitate learning. The subject is then shown a series of correct and incorrect designs and asked if each was displayed previously.

COLOR MATCH

Evaluates reaction time, impulse control/response inhibition

RED

BLUE

GREEN

Some words are displayed in their matching color (e.g. RED appears in a red color) and some do not (e.g. BLUE appears in a green color). The subject is instructed to quickly click on the word box only if the word and color match.

SOURCE: ImPact

LAURA SPARKS - State Journal

PROJECT MAYDAY

COMPONENT 2: Injuries from MAYDAYS

CAREER

DISABILITIES: 1.094

Estimated Cost: $ 2,561,945, 000.00

(pension payments, medical care, insurance transportation, salary, replacement cost)

Pending Lawsuits: 171

Estimated Cost: $ 5,600,000,000.00

Sixteen Settlements …. $ 55,000,000.00

PROJECT MAYDAY

PPC Worn During Mayday

PPC Worn During Mayday:

- Nomex 47% *(Wet – 41.6%)*
- PBI 51% (Wet – 49.2%)
- Other 3% (Wet – 2%)

- Hood
  - Nomex 50% (Wet- 4.1%)
  - PBI 49% (Wet- 6.7%)
  - None 1%

Only 19% of the Project Mayday reporting FDs, had a second set of PPC.

PROJECT MAYDAY

PPC Worn During Mayday

PPC Worn During Mayday:

- **Gloves**
  - **FF 97.6%** ***(Wet 9.2%)***
  - **Non 1.9%**
- **Helmet**
  - **Leather 39.2%**
  - **Syn/Pol 61.8%**

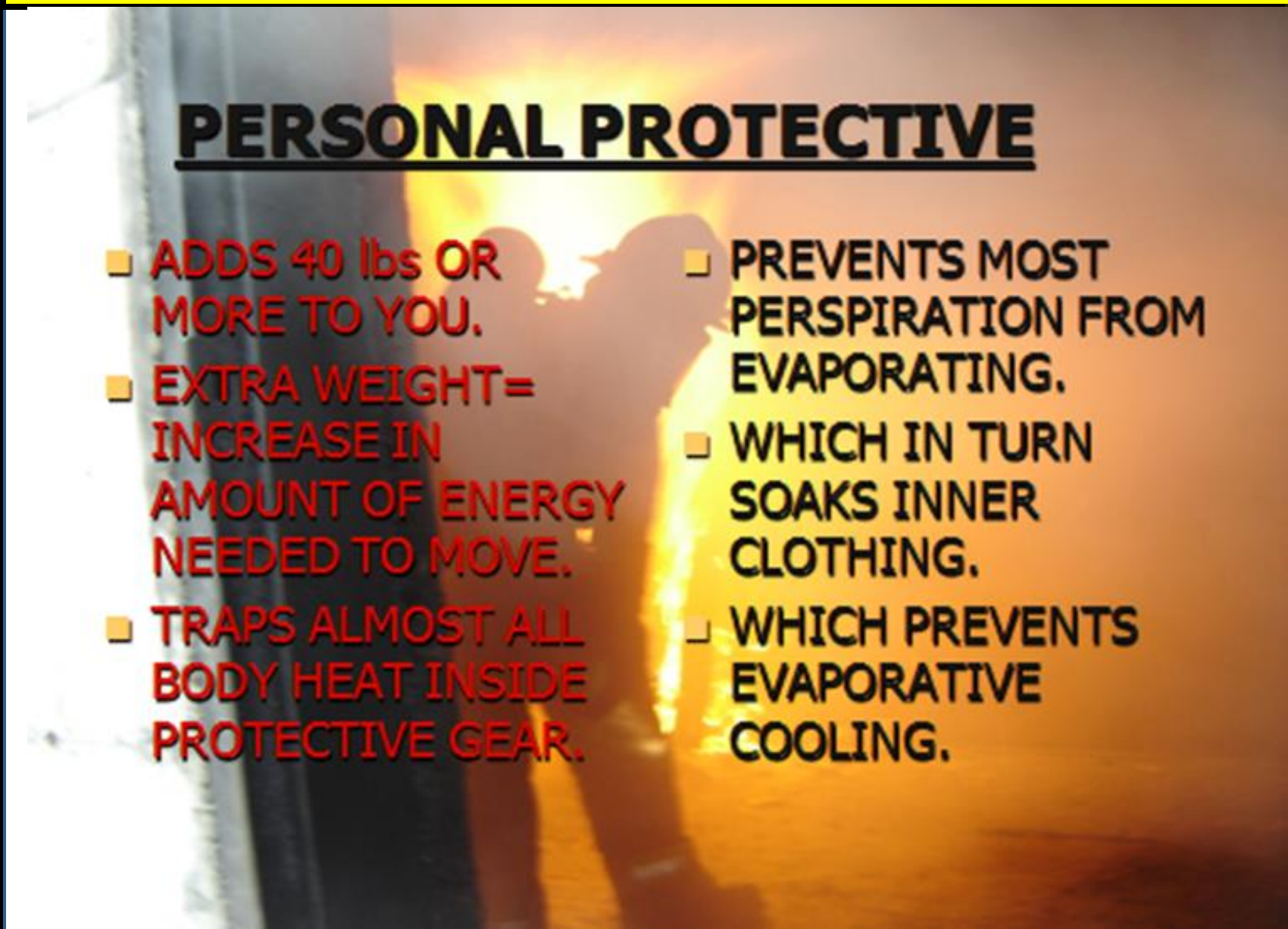
- **Rubber Boots 34%**
- **Leather Shoes 66%**

PROJECT MAYDAY

PPC Worn During Mayday

PROJECT MAYDAY

PPC Worn During Mayday



PROJECT MAYDAY

PPC Worn During Mayday

Under Garments:

Shirt:

- Uniform Non-FR (SS) 9.1%
- Uniform Non-FR (LS) 4.4%
- Uniform FR (SS) 3.8%
- Uniform FR (LS) 2.7%
- Polo Non FR (SS) 11.6%
- Polo Non FR (LS) 2.4%
- Polo FR (SS) 5.4%
- Polo FR (LS) 2.2%
- T-Shirt Non FR (SS) 19.8%
- T-Shirt Non FR (LS) 5.6%
- T-Shirt FR (SS) 6.1%
- T-Shirt FR (LS) 3.2%
- Synthetic 4.8%
- None .6%
- Sweatshirt Non FR 4.6%

* Wet 8.1%

Pants:

Long:

- Uniform Non-FR 24.7%
- Uniform FR 19.2%

Shorts:

- Uniform Non-FR 33.4%
- Uniform FR 11.2%
- Synthetic 11.5%

* Wet: 8.7%

PROJECT MAYDAY

MAYDAY - Garments

The fourth perception associated with FR station wear is also a fact. The two standards that refer to station wear both permit the use of non-FR garments.

NFPA® 1975: *Standard on Emergency Services Work Clothing Elements* makes flame resistance optional for station wear. NFPA® 1500: *Standard on Fire Department Occupational Safety, Health and Wellness Program* supports NFPA® 1975 in the body of the standard, although appendix section A.7.1.5 clarifies:

> *Clothing made from 100 percent natural fibers or blends that are principally natural fibers should be selected over other fabrics that have poor thermal stability or that ignite easily.*
>
> *The very fact that members are fire fighters indicates that all clothing that they wear should be inherently flame resistant to give a degree of safety if unanticipated happenings occur that expose the clothing to flame, flash, sparks, or hot substances.*

PROJECT MAYDAY

MAYDAY - Garments

COTTON:

Cotton affords better protection that other fabrics, except FR, remember cotton is a fuel and can ignite if exposed to an ignition source.

SYNTHETICS:

Although NO standard today allows synthetic or synthetic blend fabrics to be worn, for many fire departments they are the station wear fabrics of choice. Unlike FR fabrics, synthetics easily melt, drip, run and add to firefighter injuries.

Non FR (polyester blend) garments, when worn under turnouts with minimum acceptable TPP rating, begins to melt in just 28 seconds, at 350 degrees.

PROJECT MAYDAY

Underwear Worn During Mayday

Wearing [redacted] he board issue.

- Polye
  - brief
  - boxe
- Cotto
  - brief
  - boxe
- Polye
  - brief

- .4% NO underwear worn

Five reported underwear Emergencies
1 - Critical
2 - Serious
2 - steam burns

PROJECT MAYDAY

MAYDAY - Garments

PROJECT MAYDAY

COMPONENT 2: Mayday Rescues

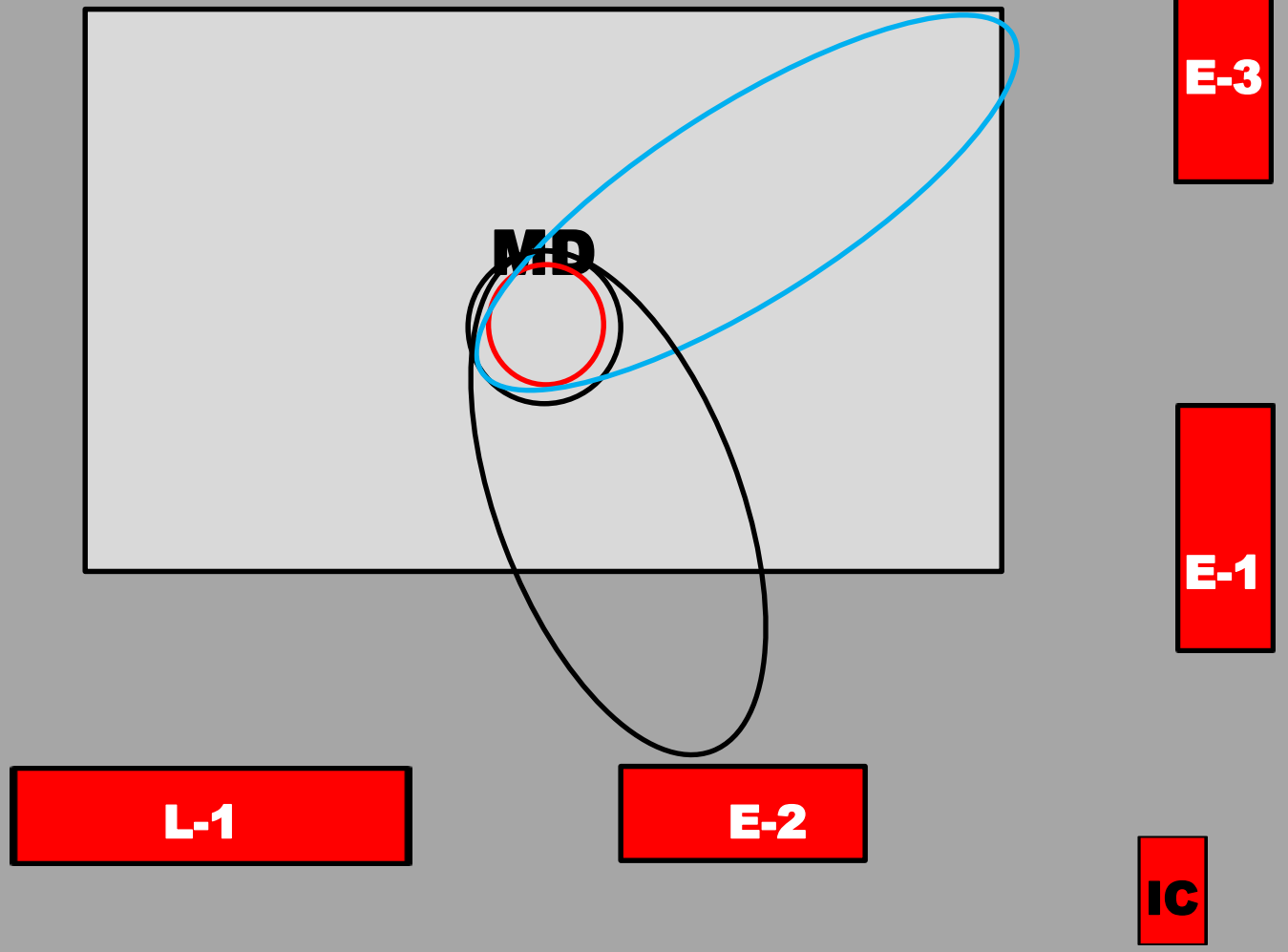
MAYDAY RESCUE

• Self-rescue	2,103	35.5%
• Victim's Crew	1,677	26.1%
• Interior Crew	1,385	25.3%
• RIT	349	6.6%
• Other	306	6%

MAYDAY LOCATIONS

• Residential	2,437	44.3%
• Multi-Occupancy	1,283	23.3%
• Commercial	2,187	39.8%

PROJECT MAYDAY



PROJECT MAYDAY

COMPONENT 2: Mayday Rescues

SELF-RESCUES:

- Relocate hose …….. 21%
- Low reduce profile ... …. 15%
- Wall breach …….. 13%
- Wire cutting ……..... 7%
- Found stairway intact … 9%
- Unknown …… 35%

Average Time for Self-Rescue:

Average time for Self- Rescue 4 ½ to 7 minutes
(this result is difficult to be exact, because of a lack of actual time stamping from Radio traffic to IC Tactical worksheets, to victims mental time stamping)

PROJECT MAYDAY

COMPONENT 2: Mayday Rescues

TOOLS USED IN SELF-RESCUE:

- Hand wire cutters 7%
- Halligan tool 16%
- Axe 9%
- Combination tool 7%
- NO hand tools 34%
- NO personal tools 24%
- Unknown 3%

MAYDAY VICTIM"S REMOVED BY INTERIOR CREWS, TECHNIQUE USED:

- Standing assist 23%
- Walking assist 34%
- Carried 6%
- Dragged 17%
- Stokes, sked, mega mover ..... 14% (outside/in)
- Unknown..... 6%

PROJECT MAYDAY

10 SURVIVAL STEPS for Lost/Trapped Firefighters

1. Declare “MAYDAY”
2. “EA” button activation
3. Stay calm, preserve your air
4. Activate your PASS Turn PASS / OFF ….. radio
5. PCAN report (situation/problem reporting)
6. Stay together – if lost with your crew
7. Follow hose line
8. Retreat to an area of safety
9. Horizontal positioning
10. Flashlight and tool tapping

PROJECT MAYDAY

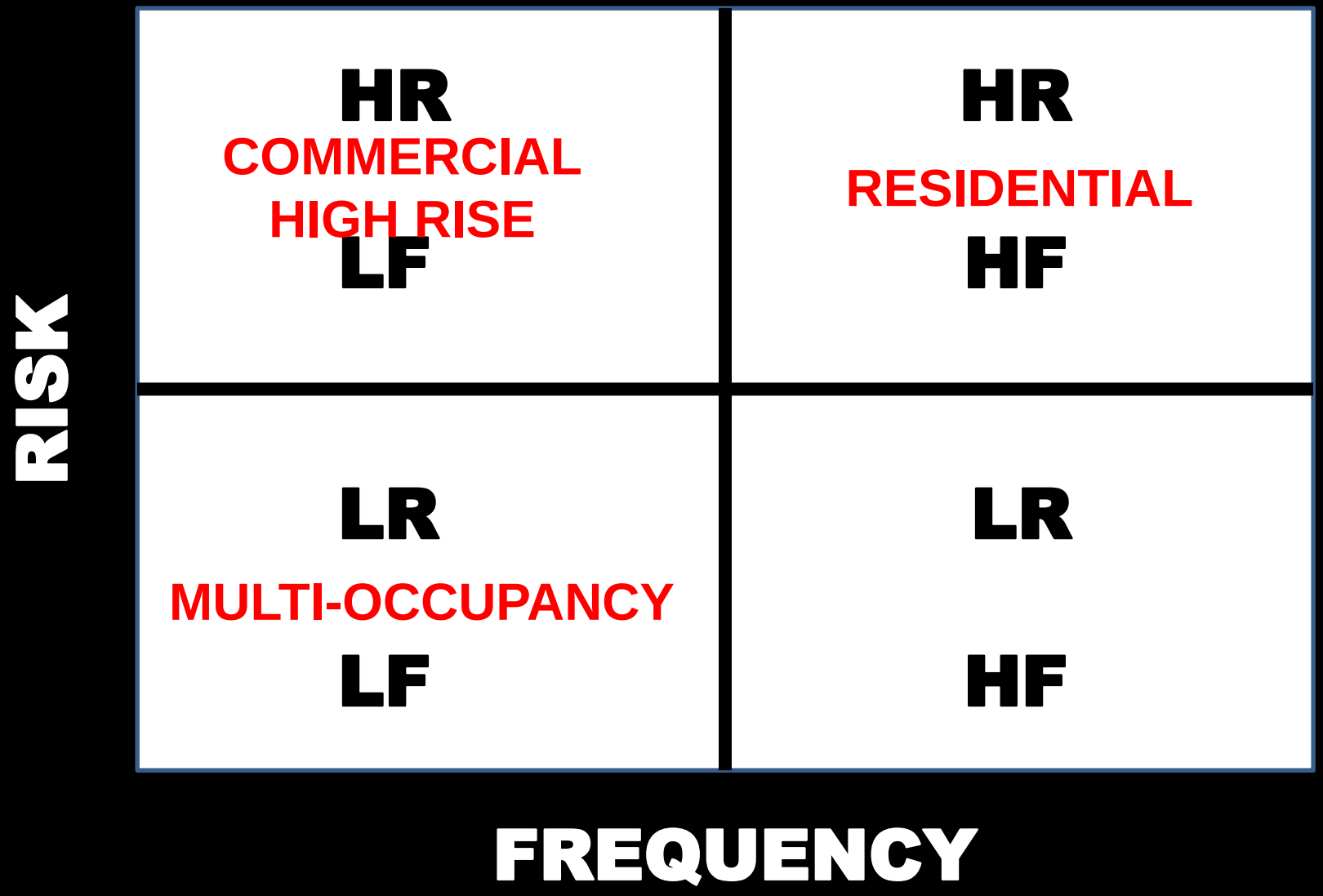
Visibility

ZVC

READ THE SMOKE (volume, velocity, density, color, location)

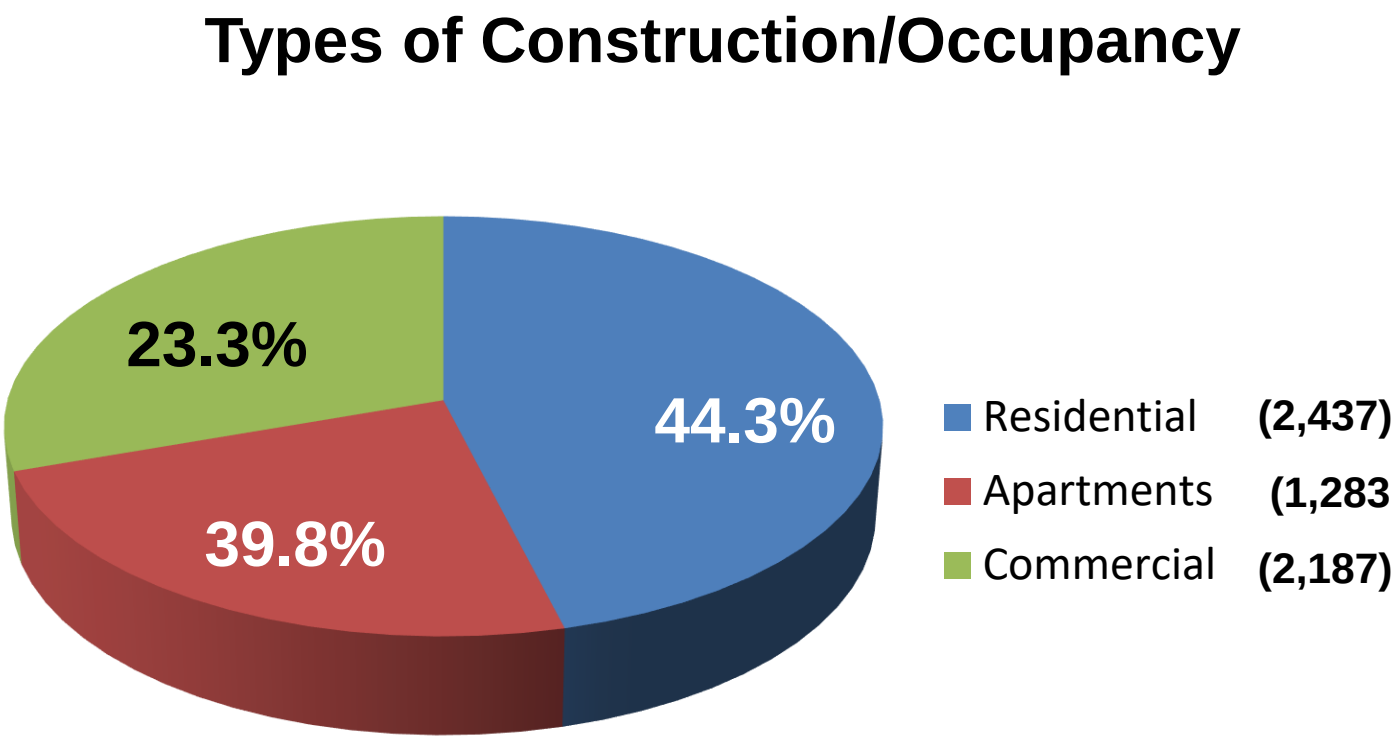
NOT (light, moderate, heavy, thick)

PZVC


HR
COMMERCIAL
HIGH RISE
LF
HR
RESIDENTIAL
HF
LR
MULTI-OCCUPANCY
LF
LR
HF
RISK
FREQUENCY

PROJECT MAYDAY

COMPONENT 2: TYPES OF CONSTRUCTION/ OCCUPANCY



5,491

PROJECT MAYDAY

COMPONENT 2: Residential Construction/ Occupancy

PROJECT MAYDAY

COMPONENT 2: Residential Construction/ Occupancy

RESDENTIAL MAYDAYS

PROJECT MAYDAY

RISK

HIGH RISK LOW FREQUENCY Entanglement	HIGH RISK HIGH FREQUENCY SCBA issues Lost/Separated from hose line - Falls through roof Fall into Holes/Floor Collapse Flashovers
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY

FREQUENCY

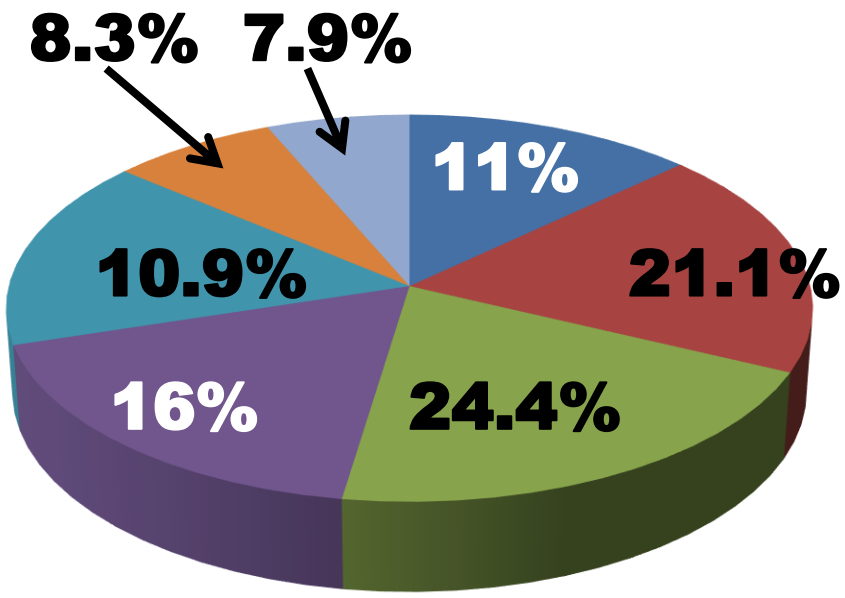
PROJECT MAYDAY

COMPONENT 2: Residential Construction/ Occupancy

Residential Construction/Occupancy

CAREER

44.3%



< 1,500sqft	(270)
1,501-2,400sqft	(516)
2,401-3,200sqft	(596)
3,200-4,500sqft	(391)
4,501-5,600sqft	(266)
5,601-7,200sqft	(204)
> 7,200sqft	(194)

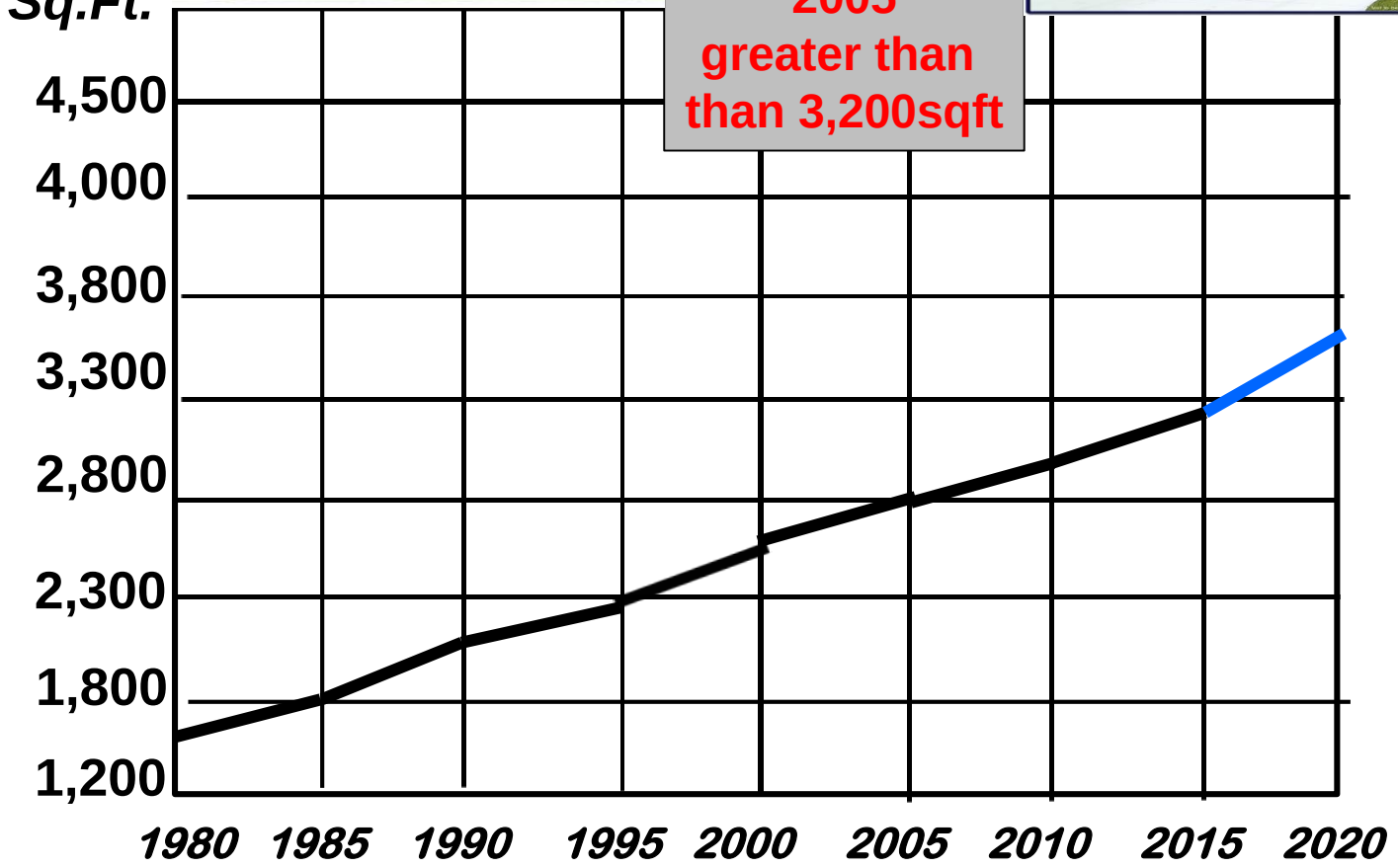
VB/AB 17%

2,437

PROJECT MAYDAY

COMPONENT 2: TYPES OF CONSTRUCTION/ OCCUPANCY

34% of residences built since 2005 greater than than 3,200sqft



PROJECT MAYDAY

COMPONENT 2: TYPES OF CONSTRUCTION/ OCCUPANCY

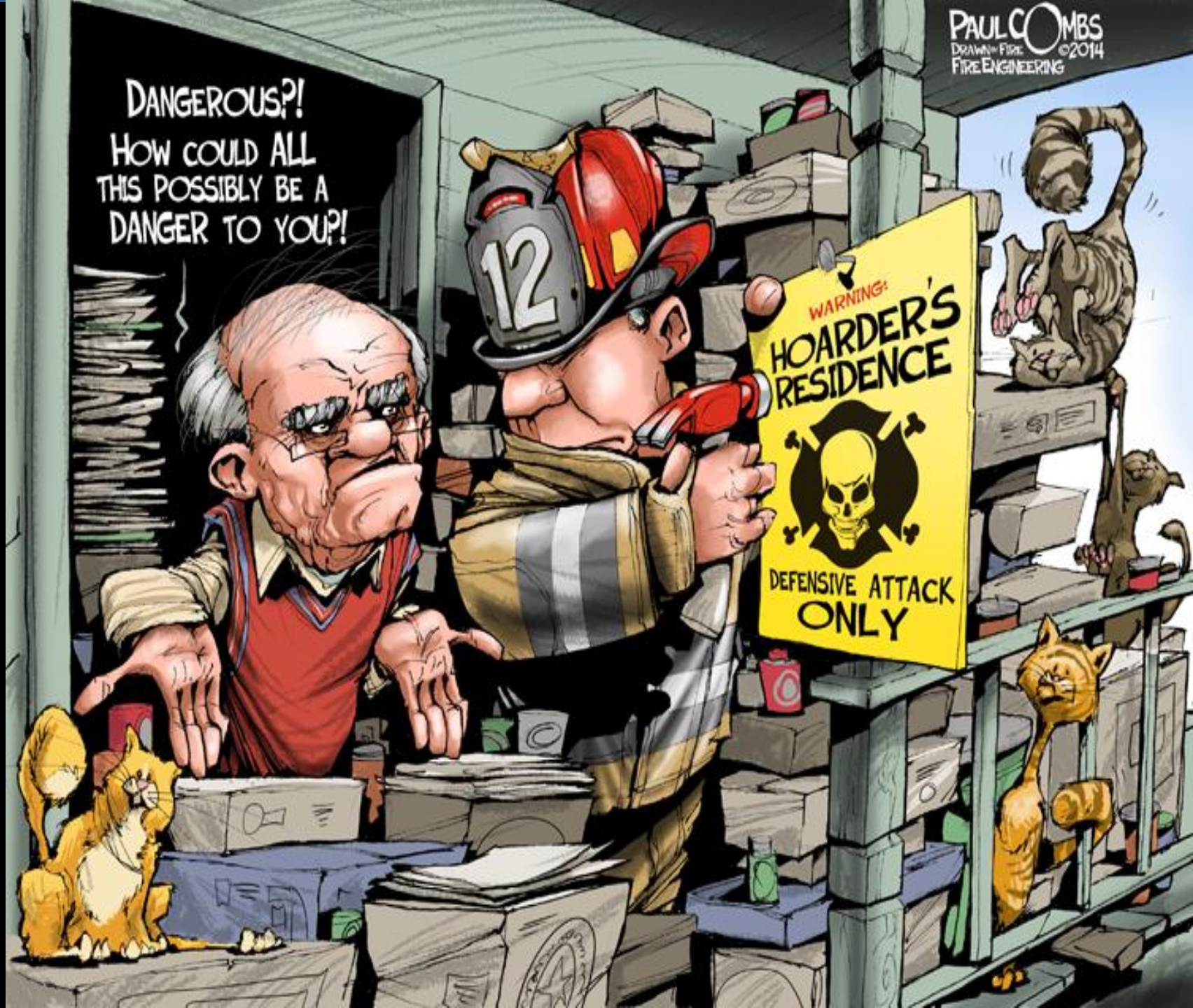
MAYDAY PROJECT

HOADER HOUSE

SLOW DOWN
ID 2nd Exit

Don't Over Crowd the Interior
ALL Crews should have a TIC

MAYDAY PROJECT



PROJECT MAYDAY

COMPONENT 2: Residential Construction/ Occupancy

Size	Numbers	1 Story	2 Story	3 Story	Basement
< 1,500sqft	(270)	261	9		149
1,501-2,400sqft	(516)	366	150		233
2,401-3,200sqft	(596)	376	186	66	291
3,201-4,500sqft	(391)	243	128	20	177
4,501-5,600sqft	(266)	68	152	54	209
5,601-7,200sqft	(204)	11	163	30	145
> 7,200sqft	(194)	22	85	87	116

PROJECT MAYDAY

COMPONENT 2: Apartment Construction/Occupancy

PROJECT MAYDAY

COMPONENT 2: Apartment Construction/Occupancy

PROJECT MAYDAY

Multi-Occupancy MAYDAYS

RISK

HIGH RISK LOW FREQUENCY Falls into holes or floor collapse Entanglement	HIGH RISK HIGH FREQUENCY SCBA problem Lost/Separated from hose line
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY

FREQUENCY

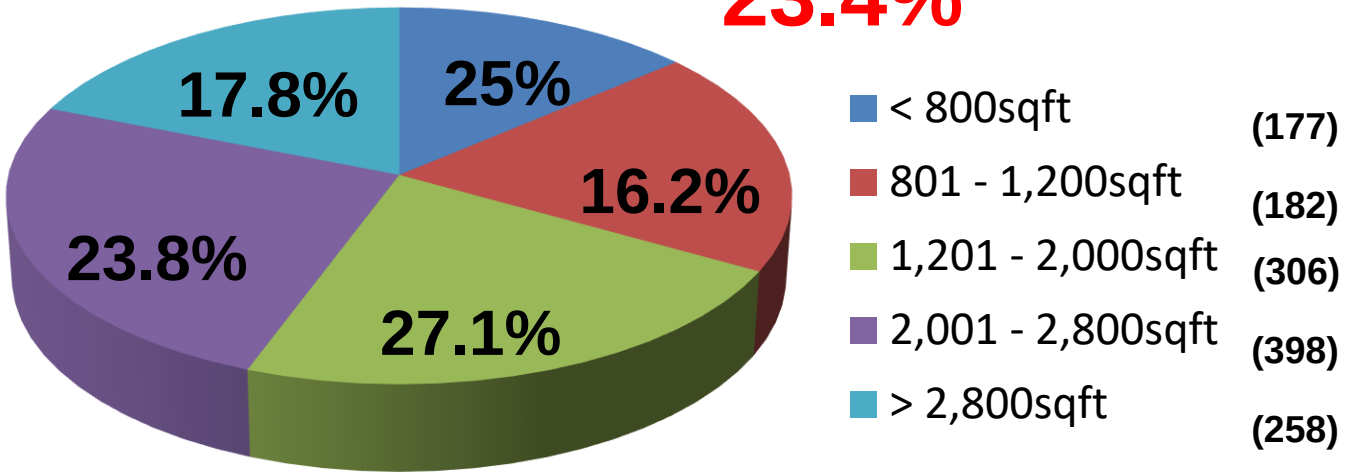
PROJECT MAYDAY

COMPONENT 2: Apartment Construction/Occupancy

CAREER

Apartment Construction/Occupancy

23.4%



1,283

PROJECT MAYDAY

COMPONENT 2: Apartment Construction/Occupancy

Size	*Numbers*	*1 Story*	*2 Story*	*3 Story*	*4 Story*
< 800 sqft	(117)	79	29	9	
4units 18), 8units (20) 16units (16)					
801-1,200 sqft	(182)	67	71	44	
8units (38), 16units (77) 24units (54)					
1,201-2,000sqft	(306)	96	88	63	
16units (69), 24 units (109) 32units (54)					
2,001-2,800sqft	(398)	32	66	54	51
16units (45), 24units (61) 32units (31)					
> 2,800sqft	(258)	0	11	34	81+

PROJECT MAYDAY

COMPONENT 2: Apartment Construction/Occupancy

- When dealing with apartment fires we struggle with …..
  - getting crews in the apartment above the fire
  - working the side with the most exposure
  - working mirrored apartments backside
  - working center enclosed utility chases
  - apartments with center hallways, attempting to make one end with a stairway as smoke free as possible for occupants exit
  - advancing lines over balconies and pulled to the fire floor

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

PROJECT MAYDAY

Commercial MAYDAYS

RISK

HIGH RISK LOW FREQUENCY	HIGH RISK HIGH FREQUENCY
Fall into Hole/Floor collapse Entanglement Falls through roof	Lost/Separated from hose line SCBA issues
LOW RISK LOW FREQUENCY	**LOW RISK HIGH FREQUENCY**
Medical	Communications

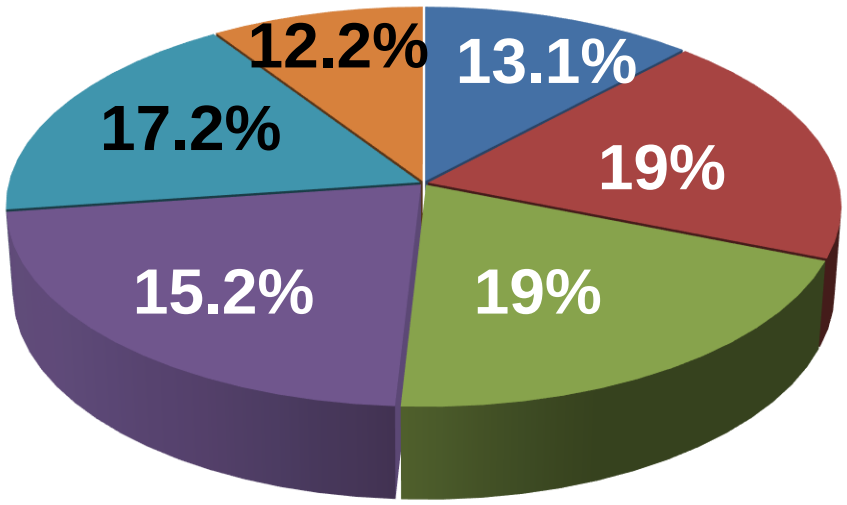
FREQUENCY

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

Commercial Construction / Occupancy

39.8 %



- < 35.000sqft **(288)**
- 35,000 - 50,000sqft **(316)**
- 50,000 - 100,000sqft **(417)**
- 100,000 - 200,00sqft **(334)**
- 200,000 - 350,000sqft **(377)**
- > 350,000sqft **(267)**

2,187

AB/VA 21.7%


Walmart

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

Warehousing:	**277**	
Manufacturing:	**406**	
Churches:	**77**	
School:	**19**	
Storage:	**287**	
Retail:	**1,121**	**(713 - Strip Malls)**

2,187

PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

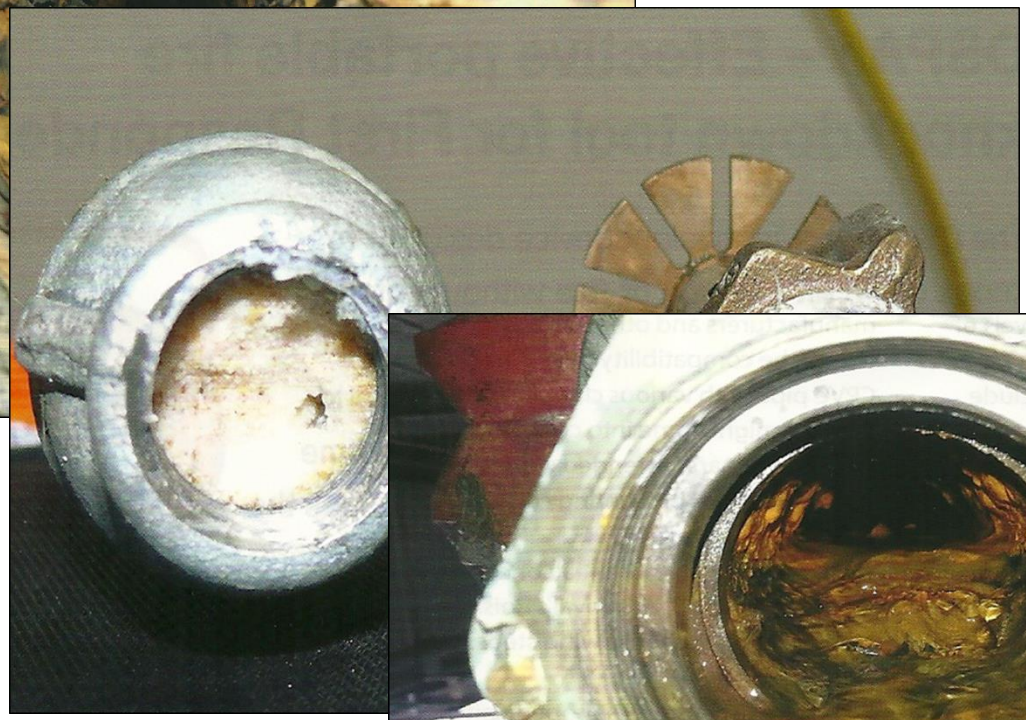
PROJECT MAYDAY

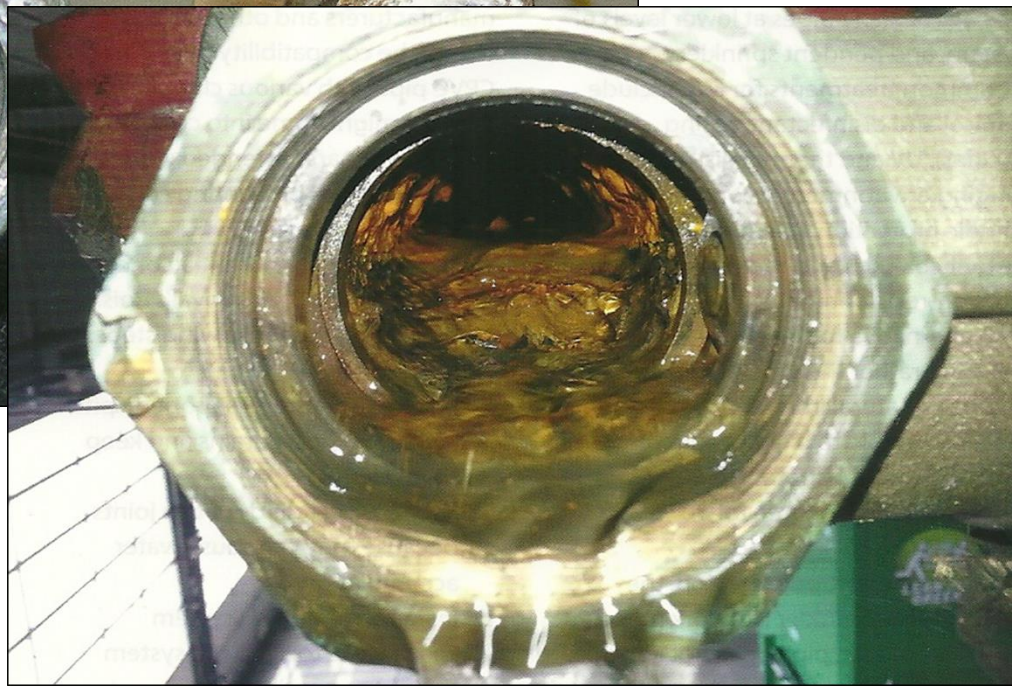
COMPONENT 2: Commercial Construction / Occupancy


Vanity Lighting
Iluminación para tocador
Utility Lighting

PROJECT MAYDAY

COMMERICAL: Fire Protection





PROJECT MAYDAY

COMPONENT 2: Commercial Construction / Occupancy

- Ceiling Collapse, 150ft hose line (3”)
- SCBA Regulator problem, 200ft hose line
- Separated from hose line, 250ft hose line
- Shelving collapse, (2), 200ft hose line
- Flashover, (4) 200ft hose line
- Fell through Roof (2)
- Lost off hose line, 200ft hose line
- Medical (diabetic)
- Separated from hose line, 250ft hose line
- Flashover
- Fell into Pit
- Out of Air, 250ft hose line
- Lost off hose line, 200ft hose line
- Ceiling collapse
- Loss communication
- Separated from hose line, 300ft hose line
- Overhead door came down
- Facepiece problem
- Low alarm, 250ft hose line
- Near electrocution
- Fell down elevator shaft

PROJECT MAYDAY

HIGH RISE MAYDAYS

RISK

HIGH RISK LOW FREQUENCY SCBA issue Communication issues	HIGH RISK HIGH FREQUENCY Fatigue / Stress (fitness) Cardiac Lost/Separated from hose line
LOW RISK LOW FREQUENCY	LOW RISK HIGH FREQUENCY Locked doors

FREQUENCY

PROJECT MAYDAY

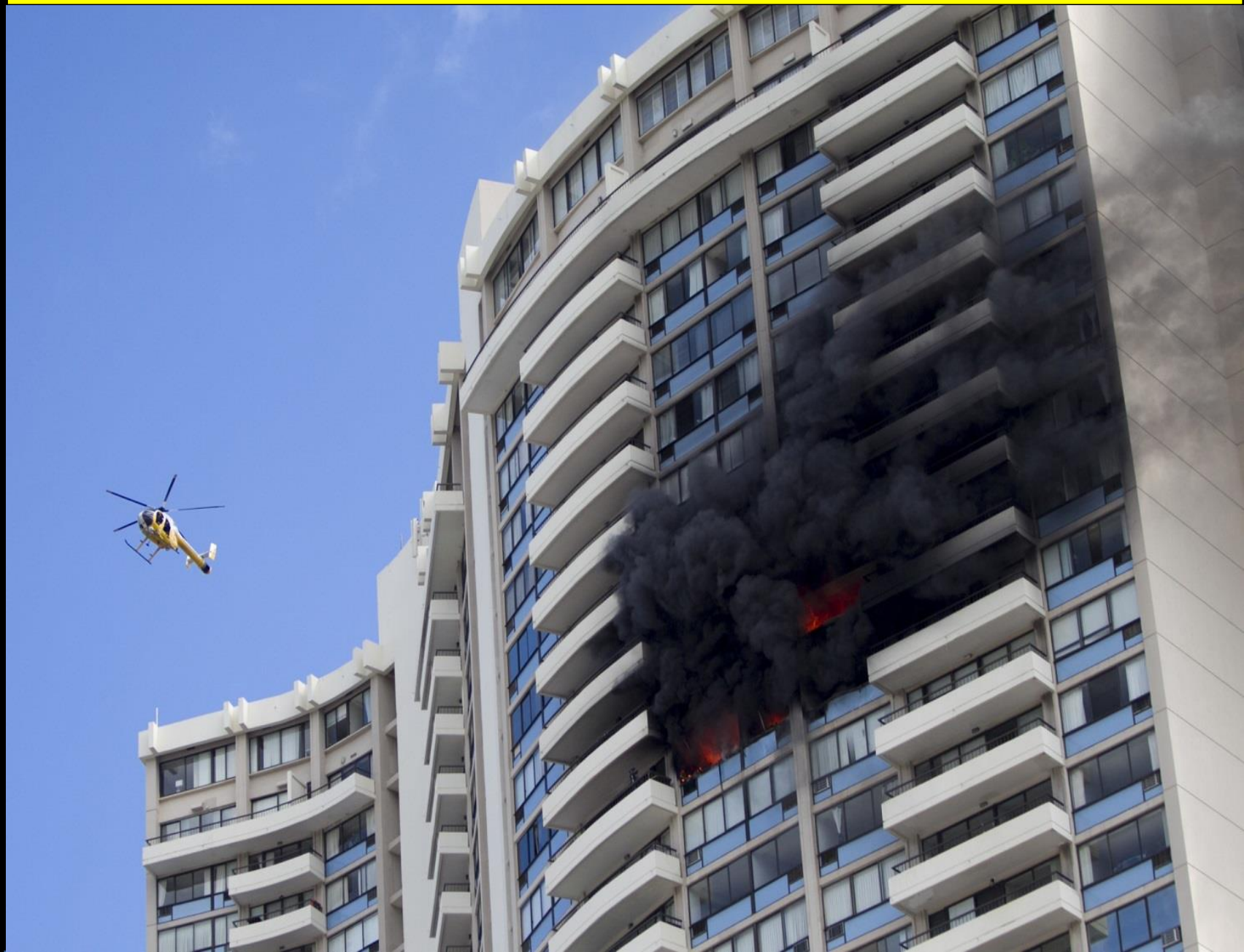
HI-RISE OPERATIONS:

- Mid Rise (1-7 floors)
  Maydays ….. 77
  - Medical - 31
  - Air Problem – 24
  - Lost/Separated from Hose Line – 17
  - Trapped, Unable to Move – 5

- High Rise (8 – 32)
  Maydays ……. 56
  - Medical - 33 (1)
  - Air Problem – 17(2)
  - Lost/Separated from Hose Line – 14 ((1))
  - Communication – 31*

PROJECT MAYDAY

HI-RISE OPERATIONS:



PROJECT MAYDAY

HI-RISE OPERATIONS:

PROJECT MAYDAY

HI-RISE OPERATIONS:

PROJECT MAYDAY

The only way to guarantee a succeesful outcome of a “MAYDAY” is to PREVENT IT !

PROJECT MAYDAY

Everyday Operations:

SOPs:

Normalization of unsafe practices can occur as a result of the fact that other individuals take the fact that other individuals take the same (incorrect or unsafe) actions. If, in general, nothing bad happens as a result of unsafe practice, and if everyone else in the organization participates in the same practices, then these practices become part of the normal and accepted way of accomplishing tasks. As a result, fire organizations history and traditions, can create a culture that is difficult to change

PROJECT MAYDAY

Establish the Common Terminology:

- **Priority Traffic**
- **Urgent**
- **Emergency**
- **Emergency Traffic**
- **MAYDAY**

TERMINOLOGY

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

If you fail to train… you train to fail

NFPA 1001 … does mention much about MAYDAYS, except they happen ….

FIRE DEPARTMENT
TRAINING

The trick is to embed firefighter's behavior in the subconscious, so that it becomes automatic this is only done by repeated and realistic training with measured competencies every six months.

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

PRE – MAYDAY ACTIVITIES

Training:

- Did you participate in Mayday training
  in the last 24 months… YES…49%
  in the last 12 months…YES…31%
  - multi-company: ….. 77%
  - night Mayday exercise: ….. 8%
  - rescue/recovery/packaging/removal: ….. 19%
  - sound effects/obstacle: ….. 30%
  - training/Mayday run by BC: ….. 26%
  - accountability tags/PARs: ….. 33%
  - package handoff to EMS (involvement): ….. 6%
  - does your FD conduct air consummation assessment annually? YES ….. 11%

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Artech365.com

PROJECT MAYDAY

HOW OFTEN DOES YOUR FD, DO LADDER TRAINING and RESCUES with LADDERS

PROJECT MAYDAY

Positive Pressure Ventilation

- Things get better. Keep Going
- Things stay the same. Make adjustments
- Things get worst. Turn OFF PPV

PROJECT MAYDAY

- Wind-Winds as low as 3 MPH can cut temperatures measurements by as much as 50%
- Mois
  bloc
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  between different temperatures of objects at a distance.

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PROJECT MAYDAY

MAYDAY TRAINING

The five “deadly sins” in TIC’s

- **Standing or walking in dangerous environments**
- **Forgetting traditional safety considerations and search techniques**
- **Advancing at an inappropriate speed**
- **Misinterpreting the thermal image**
- **Having unrealistic expectations when using the image**

PROJECT MAYDAY

MAYDAY TRAINING

PROJECT MAYDAY

MAYDAY TRAINING

Residential Structure Fire
RIC Scenario #1
Self-Extrication by Unit Calling the MAYDAY

A first alarm assignment has been dispatched to a working structure fire. The first due Engine arrives, sizes up the fire, gives a report on conditions, establishes Incident Command and initiates their initial Incident Action Plan, engaging in interior fire attack operations with their crew.

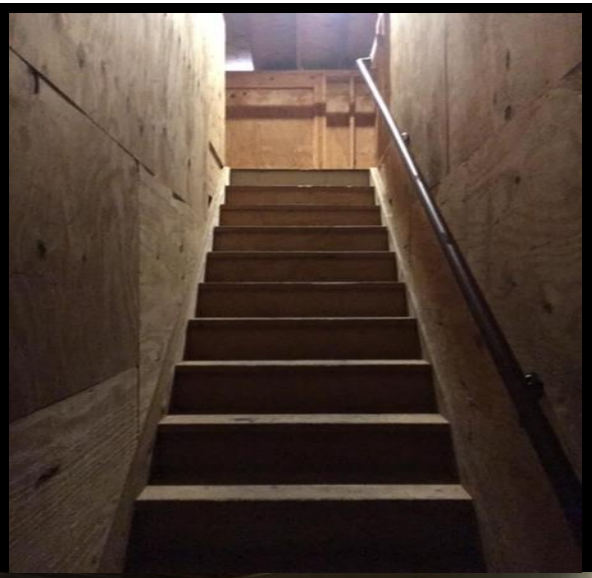
1st Arriving BC

- ❑ Arrive on scene
- ❑ Contact 1st Due Engine IC and obtain transfer of command

  Transfer of Command
  - ○ Situation Status
  - ○ Incident Objectives and Priorities
  - ○ Incident Action Plan (Actions taken)
  - ○ Current Organization
  - ○ Resource assignments
  - ○ Resource needs (en route or ordered)
  - ○ Communications Plan
  - ○ Incident Potential (prognosis, concerns, related issues)
- ❑ Announce the establishment of your command and identify CP location
- ❑ Confirm/Validate incident priorities
  - ○ Life Safety
  - ○ Incident Stabilization
  - ○ Property Conservation
  - ○ Environmental Protection

PROJECT MAYDAY

MAYDAY TRAINING



PROJECT MAYDAY

MAYDAY TRAINING

PROJECT MAYDAY

MAYDAY Radio Call

LUNER

GRAB LIVES

NUCAN

PCA

DCAN

LIP

LAPN

TERMINOLOGY

PROJECT MAYDAY

TRAINING and DISPATCHERS

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

"GO, NO GO"

Recruit training, manageable fires in concrete structures, minimalize any potential of getting worst or a collapse, WHY would a crew ever make a "NO GO" decision. We create automatic habits, with "NO-GO" decisions. BAD SITUATION, They default to "GO" their training, NO thought required.

TRY putting a firefighter in reverse WHY?

We only teach them to go forward!

PROJECT MAYDAY

CHARLESTON FIRE

No one on the scene of the fire heard any of this radio traffic, which I would attribute to the ambient noise and confusion at the scene and the total lack of a command presence. In effect no one at the scene was listening to the radio. The Chief and the Assistant Chief were talking but not listening, which appeared to be a habitual situation in Charleston. In fact, the Chief told us that the firefighters had radios so that they could listen to orders; if they were talking they were not working. They were allowed to use the radio if they got into trouble, *but no one was listening!*

The Fire Chief claimed that he was in command of the incident at that time, but he was on side D toward the rear of the building directly supervising the crews in that area. He had left the Assistant Chief at the front of the building, but the AC became personally involved in the mission to rescue a civilian from the rear of the building right at the time things started going bad (19:27). He went around to the rear to lead that mission.

The dispatchers heard the radio traffic, but they thought it was related to the successful rescue of the civilian that was occurring at the same time at the rear of the building. A Battalion Chief who was in quarters on the opposite side of town also heard it and called the dispatchers on the phone. They told him it was related to the civilian rescue and that they had just received word that the civilian had been rescued.

An off-duty Battalion Chief (303) who was on route to the fire in his personal vehicle heard the radio traffic and interpreted it correctly. He tried to call the Fire Chief using his portable, but did not receive a response. He rushed to the scene and informed the Fire Chief face-to-face. The Chief then called the Assistant Chief who was returning to the front of the building at that moment and asked him if someone was still inside. They went through some additional confusion as both of them were headed toward the front of the building.

It was after arriving at the front of the building and seeing that the building was filled with smoke that the Fire Chief gave the order to take out the front windows, thinking that it would allow some of the smoke to escape and provide visibility. By that time a flashover was virtually inevitable and breaking the windows simply accelerated the pace by allowing fresh air to enter more quickly. At that time they thought that there was only one captain inside; they had no accountability system and therefore no idea that they had at least nine firefighters inside. Three others found their way out just before the windows were being broken. There were attempts to make entry to search for the missing firefighters after the windows were broken, but the searchers were getting burned within 20 feet of the front doors.

The elapsed time from the first indication of a Mayday situation to breaking the front windows was about eight minutes. The radio transmissions ended after seven minutes.

19:27 - First radio transmissions indicating firefighters in distress

19:30 - Battalion Chief 303 on route attempted to reach the Fire Chief

19:31 - Battalion Chief 5 in quarters calls dispatchers

PROJECT MAYDAY

MAYDAY /RIT TRAINING

AFD

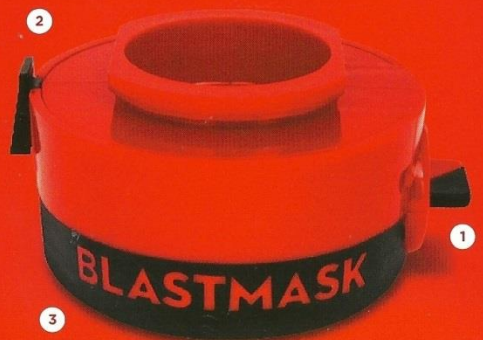
REPORT ON RAPID INTERVENTION OPERATIONS ANALYSIS

2015

PROJECT MAYDAY

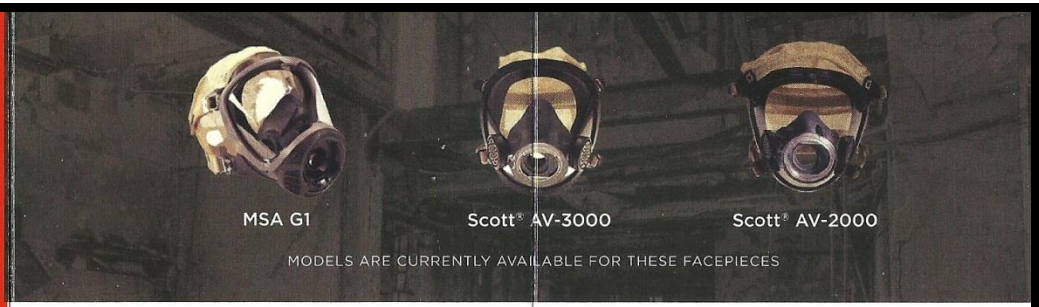
TRAINING TIPS

MAKE EVERY SECOND COUNT.



THE SECOND GEN BLASTMASK
BlastMask is proud to introduce our second-generation Training Regulators with enhanced features designed specifically for firefighter training.

1. **EASY AIR BYPASS VALVE**
   Just like on your SCBA regulator, gain instant access to full air with the turn of a knob.
2. **SLIDE LATCH**
   Rugged, reengineered slide latch attaches BlastMask to facepiece just like an SCBA regulator.
3. **SUPERIOR CONSTRUCTION**
   New and improved polycarbonate resin for high-impact resistance and strength is the same material used in police riot gear and bulletproof glass.



MODELS ARE CURRENTLY AVAILABLE FOR THESE FACEPIECES

PHYSICAL AND MENTAL PREPAREDNESS

- Help prevent line-of-duty deaths; more than 50% can be attributed to stress and overexertion
- Help prevent firefighter injuries; nearly 30% are due to lack of fitness
- Conduct multiple training and fitness exercises with and without SCBA pack
- Confidence and performance from increased familiarity with equipment
- Effective tool for recruitment, physical ability testing, and orientation

BUDGET AND RESOURCE FRIENDLY

- Fire service fitness initiatives have shown a decrease in lost workdays of 28%
- Every dollar spent on uniformed personnel wellness returns over two dollars in occupational injury and illness costs
- Decrease wear and tear on expensive SCBA regulators
- Save manpower and time it takes to refill cylinders
- Keep resources ready to fight fires

TACTICAL TRAINING IS CRITICAL

In the line of duty, an SCBA regulator and pack weight reduce VO_2 max (maximal oxygen consumption) by 14.9% – primarily from the regulator. Additionally, peak power output and SPO_2 (oxyhemoglobin saturation) are decreased by the regulator alone. TRAINING IN A FACEPIECE AND PACK ALONE DOES NOT REDUCE VO_2 MAX, PEAK POWER OUTPUT AND SPO_2.

TRAINING WITH AND WITHOUT BLASTMASK:

	PEAK POWER & SPO_2 REDUCTION	VO_2 MAX REDUCTION
SCBA PACK ONLY	X	4.8%
BLASTMASK (W/O SCBA PACK)	✓	13.1%
BLASTMASK (WITH SCBA PACK)	✓	14.9%
SCBA ON AIR	✓	14.9%

"BEING FIT FOR DUTY IS THE MOST BASIC REQUIREMENT FOR EVERY FIREFIGHTER – BOTH CAREER AND VOLUNTEER."

FIRE ENGINEERING MAGAZINE

PROJECT MAYDAY

TRAINING TIPS

What are Eclipse Blackout Masks?

Eclipse Blackout Masks are the brainchild of four San Diego-area firefighters from the same crew, with more than 40 years of combined experience, that wanted to create a hassle-free mask to better replicate smoky conditions for more effective in-service training.

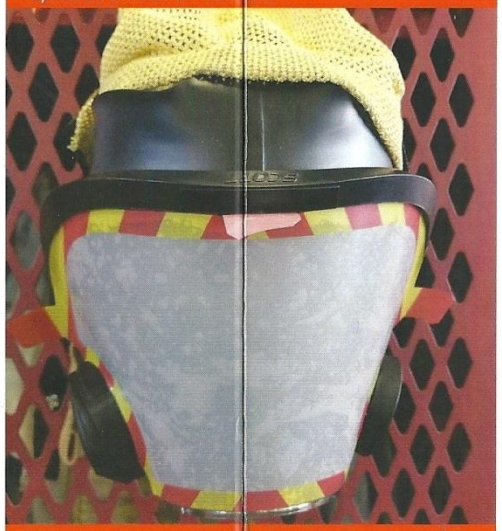
The easy to apply mask is fogged out to create realistic smoke conditions. The reusable, durable static-cling sticker affixes to the mask exterior without leaving any residue or damaging expensive equipment. The red and yellow outline ensures there is no risk of accidentally leaving it on when going to a call.

With the Eclipse Blackout Mask, there is no need for home-made solutions that risk leaving residue, costly smoke machines, or expensive commercial options that require extra parts or affix to the inside of your mask.

Join the countless fire agencies that have switched to using Eclipse Blackout Masks for the most efficient, cost-effective, high quality training mask on the market.

MADE IN USA

Patent Pending.



MSA Ultra Survivair 20/20 Drager Interspiro

Models currently available

(contact us if you are interested in other models)

- *AV3000 (Scott)*
- *G1 Facepiece (MSA)*

Replicates heavy smoke conditions

- *Replicates an IDLH environment*
- *Three fogged out levels*
- *Can see silhouettes*
- *Can use with flashlight*
- *Can use for Thermal Imaging Camera training*

Durable and reusable

- *Sticker affixes with static cling*
- *Use on mask exterior*
- *Easy to apply and remove with pull tabs*
- *Reusable – average of 20 times per mask*
- *Wipe with cloth if gets dirty*
- *Water resistant*
- *Safety border eliminates chance of leaving mask on for actual call*

Contact

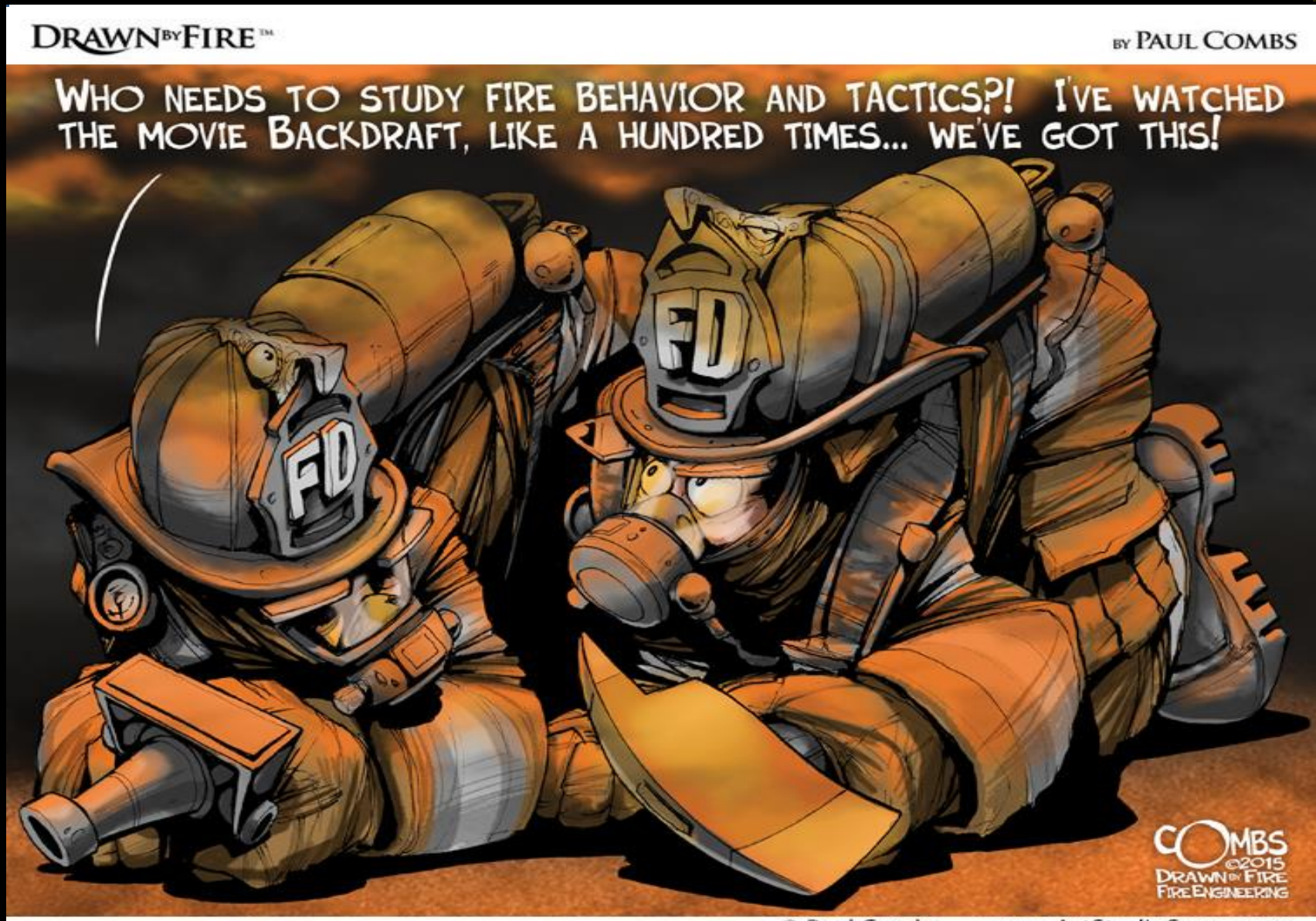
Contact us for a free sample.

PROJECT MAYDAY

TRAINING TIPS

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM



PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

MAYDAY VICTIMS

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

In each individual personal survey – Mayday victim were instructed that the surveys were confidential, department name or victim's name would NOT be shared with anyone. It was requested that all information be factual and honest

A request was made to each fire department for permission, that each mayday-victim complete the *individual personal survey – mayday victim.*

5,491

Male: 5,340 Female: 151

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Psychology of a Mayday

Firefighter involved in the Mayday

- The firefighter in distress will usually revert to what was learned and is “routine”.
- The firefighter’s sole focus will to remove themselves from danger
- Don’t expect a firefighter to accomplish a manipulative skill learned in one hour, especially if the task was learned months ago
- Finally, firefighters in distress will over compensate – they
  will not be able to feel safe enough

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

- Situation Awareness ….. 79%
- Disorientation ….. 65%
- Decision Making ….. 64%
- Human Error/Individual Actions ….. 71%
- Communication ….. 34%
- Not Enough Resources …. 39%
- Structural issues ….. 7%

- **Unsafe Act Performed ….. 65%**

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

#1 Situational Awareness 79%

"Knowing what is going on, so you can figure out what to do"

Factors that reduce Situational Awareness:

- **Task Overload**
- **Deterioring fireground conditions**
- **Fatigue/Stress**
- **Insufficient communications**

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

SA is influenced by, and can be improved by addressing the following:

1. Mental state – be well hydrated, nourished, rested, and possess a "stay-calm" attitude
2. Training – it never ends, a career-long commitment
3. Experience – expand recognition-primed decision-making (RPD) through incidents, vicarious learning, shadowing (professional visitations), and drills.
4. Personal values – improved through education (vs. training) and a personal commitment to reduce LODDs and injuries (caring attitude)

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

- Expansion joints
- Columns
- Suspended ceilings
- Floor joists
- Not style, type furniture each room

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

 # 2 Disorientation 65%

Disorientation is " the loss of direction due to the lack of vision in structure fire."

Types of Hazards that create disorientation:

- Zero visibility conditions - - - _ _ _ PROLONGED ZERO VISBILITY CONDITIONS
- Flashover sequence / Backdraft sequence
- Collapse sequence
- Wind driven fire sequence
- Conversion steam sequence
- SEPARATION OR ENTAGLEMENT of houseline encountered

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

 # 2 Disorientation

Firefighter disorientation:

- Enclosed structure with smoke showing
- Fast and aggressive interior attack
- Deteriorating conditions
- Handlin separation or entangled
- After falling through roof/floor/basement

- Mid-Rise/High Rise
- Commercial structure
- Hoarder structure
- Large residential structures (> 7,200sqft)
- Below grade

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

Northern Star 8 Directional Electronic Compass

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

Northern Star 8 Directional Electronic Compass

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

 # 3 Decision Making 64%

The major problems in interior decision making:

- SLOW to respond to changing/deteriorating conditions
- SLOW to process the information (putting the pieces together)
- Slow in implementing the solution
- Not listening to the radio reports of other crews
- Inexperience (simulations)

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

MAYDAY VICTIMS

UNSAFE ACTS PERFORMED 65%

- "have done it this way for years" (Training/SOP's)
- "have to get the job done"
- "short cuts, to get the task done quicker"
- miss a step in the procedure
- the demands of the task out weight the resources
- **breakdown in communications**

PROJECT MAYDAY

Dr. Allan McCourtee

Sleep Deprivation and Rest

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

YOU

can schedule your departments next Mayday!

It relates to our ability to THINK and DECIDE,
Fatigue is a major factor in making poor decisions (Fact)
When you are tired you miss a lot of important information (Fact)

We wake up from a sound sleep(?) and place people in a life or death environment in five minutes …
it is a recipe for ***disaster.***
It should come as to no surprise when most Maydays occur.
There is NO easy answer for this dilemma.

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

- Did you nap or sleep 3 hours before Mayday:
  YES: … 38%
- Night Sleep, was your sleep interrupted once before your Mayday:
  YES: … 47%
  two times or more before your Mayday:
  YES: … 25%
- When returning from an after midnight run, did you go immediately to bed: YES … 68%
  ….. Did you have anything to drink (that was not water) after your midnight run … YES 45%
  ….. Did you have anything to eat, after your midnight run … YES 34%

PROJECT MAYDAY

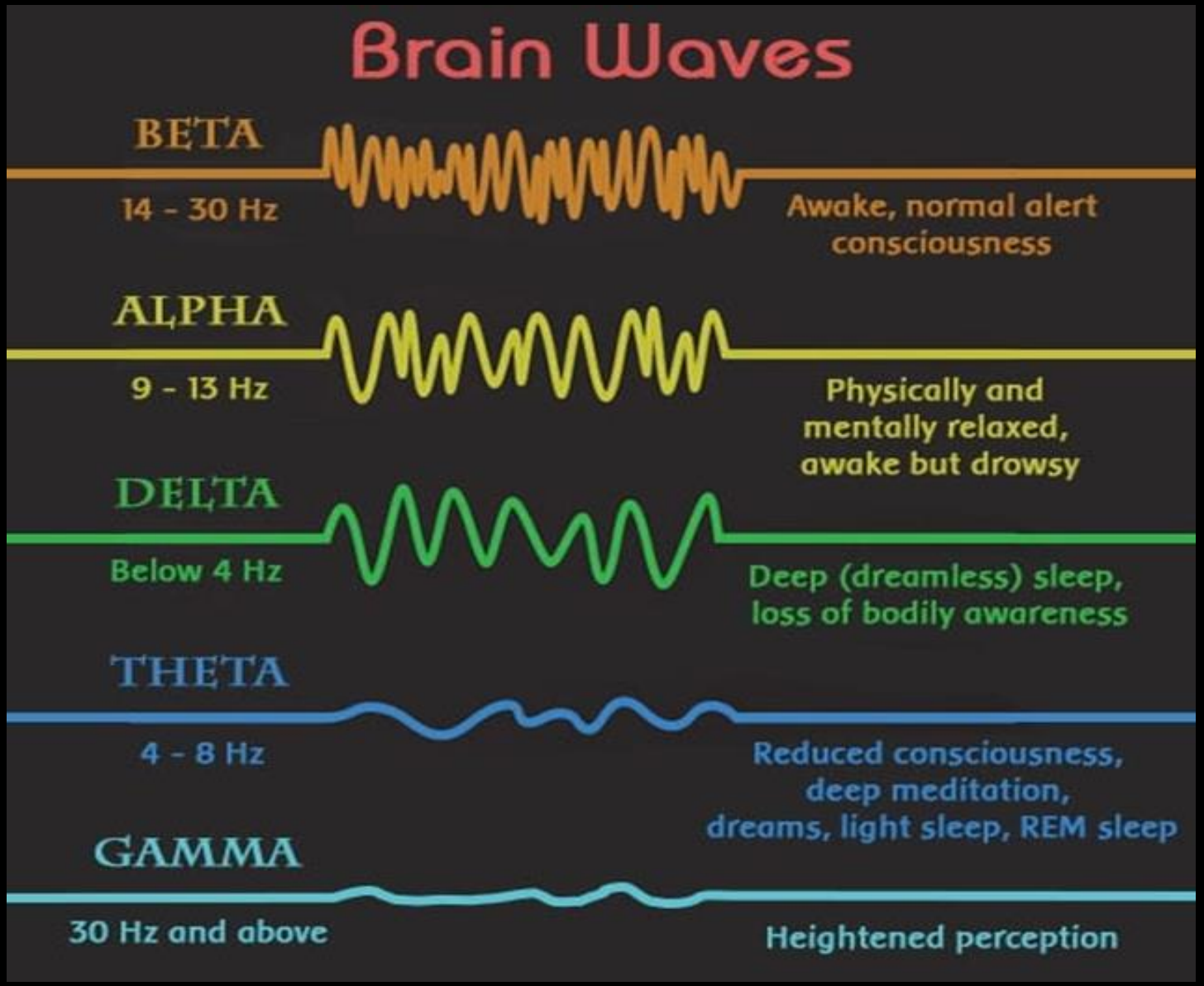
INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

- Does the alarm sound for all units at your station?
  YES … 21%
- Do you snore ? YES … 54%
- Have you ever been tested for a sleep disorder?
  YES … 12%
- Are you using a CPAT machine: YES 39%
  At home: 39% While on duty: 24%

"The Journal for Clinical Sleep Medicine" 2016
"37% of firefighter screened had at least one sleep Disorder, the most obstructive sleep apnea."

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM



PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

1. First, most importantly, FD must recognize that adequate sleep is a wellness and performance issue equal to other priorities such as fitness, diet, and agility.
2. FD should evaluate current logistics for sleep and consider changes. (install fans, white noise) dorms to sleeping pods
3. Do an assessment of the current state of sleep fitness among members, honest data about sleep management, both on and off the job
4. Appropriate naps on duty (30minutes<) can make a positive difference in cognition and reflexes for someone who is exhausted

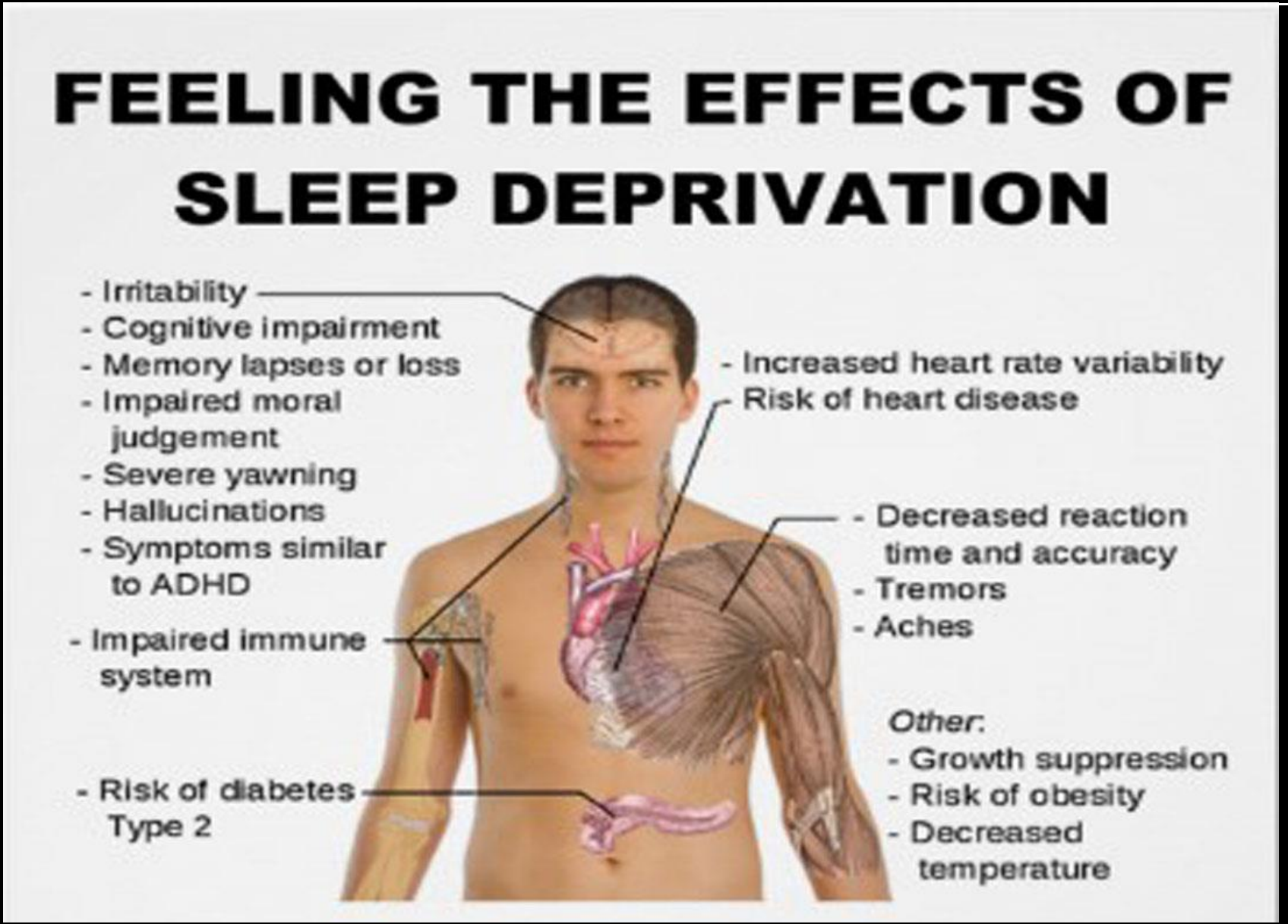
PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays

5. Make resources available for those who are suffering from sleep disorder. Don not stigmatize the use of these resources.
6. Reconsider shift scheduling and overtime rules diminish the effects of sleep deprivation on emergency response
7. Look at new technology to help manage sleep and performance

PROJECT MAYDAY

MAYDAY - Contributing Factors to Maydays



PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Sleep deprivation/restriction research is showing us that there is both a mental effect and physical effect.

The recent information about sleep duration influences firefighter's activity level, lower the body's ability to recovery from some activities by as much as 50%.

Some research shows during duty periods when sleep is disrupted, when a call occurs, also suggest that sleeping with "one ear open" may disrupt sleep even more if no call occurs, this leads to some of the same problems, performance impair-ment and adverse health outcomes.

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Firefighters being awake for prolonged periods, 12hrs + , then awaken during the night, impairs performance, in many cases impairment equal to a blood alcohol concentration 0.05. Repeated sleep interruption, creates chronic sleep lost, resulting in decreased ability to think clearly, handle complex mental tasks and solve problems.

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Nutrition: (Dr. Sara Jahnke)

- Did you have more than 12oz of caffeine based drink, 3hrs before your Mayday:
  YES … (61%)
- Did you have eat, 3hrs before your Mayday:
  YES … (23%)
- Did you have a snack w/sugar 3hrs before your Mayday:
  YES … (47% a 7lb weight change + or – in the six months:
  YES … (23%)
- Do you presently smoke or chew tobacco ?
  YES … (19%)

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

- Did you have any high energy drinks, 12hrs before, your "mayday": YES … 24%
- Did you have any high energy drinks, after your first run after midnight, prior to your "mayday": YES … 21%
- How many high energy drinks do you drink a day? (i.e. Monster, NOS, 5hr ED, etc.)
  1 … 23% 2 … 16% 3 or more … 10%

Remember, the body always needs WATER regardless of the weather/temperature.

PROJECT MAYDAY

MAYDAY - Cardio / Physical Assessment

Dr. Matthew Walker

Cardio / Physical Assessment

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Cardiac Assessment: (Dr. Matt Walker)

- do you have a family history of cardiac disease:
  YES: … (26%)
- did you feel fatigued prior to your Mayday:
  YES: … (26%)
- are you on blood pressure or blood thinner medicine:
  YES: … (14%)
- are you a confirmed borderline diabetic:
  YES: … (15%)
- are you on any medicine for stress:
  YES: … (16%)
- are you on any sexual support medicine?
  YES … (10%)

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Cardiac Assessment:

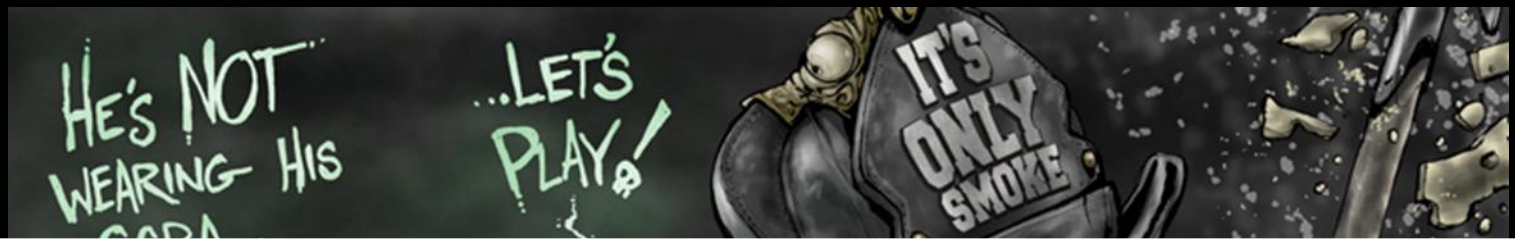
- On any run after midnight (sleeping) did you have hand or leg cramps: YES … 39%
- Has serious fatigue occurred after a run after midnight: YES … 21%
- Have you had any swelling of your legs or ankles after going to bed, after a midnight run? YES … 11%

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM



ANY FF INVOLVED IN A

M CE

IS OR

SHOULD BE DONE WITHIN THREE HOURS OF THE MAYDAY

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

HYDROGEN CYANIDE IN FIRE OPERATIONS
ACUTE CYANIDE POISONING

- Hydrogen cyanide is a cellular asphyxiant
  - **Inhaled HCN inhibits enzyme system responsible for cell respiration (oxygen utilization by cell)**
  - **Cessation of cell respiration makes normal cell function impossible, leading to cell mortality**
- There is no quick test that allows on-site confirmation of HCN toxicity
- There are some signs that can lead to assumption of HCN exposure and administration of countermeasures
  - **Disorientation and weakness/Drowsiness**
  - **Shortness of breath and chest tightness(Tachypnea, Dyspnea Tachycardia)**
  - **Headache**
  - **Bright red discoloration in skin**
  - **Smell of almonds on breath**
  - **Soot around mouth and nose/burns**
  - **Carbonaceous sputum**

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Toxic Smoke "Anatomy"

- Particulates (dust, soot)
- Irritants
  - Hydrochloric acid
  - Sulfur dioxide
  - Nitrogen oxides
  - Ammonia
  - Formaldehyde
  - Benzene
- Asphyxiants/Toxicants
  - Carbon dioxide
  - Hydrogen cyanide
  - Carbon monoxide
  - Hydrogen sulfide
  - Acrolein Aldehyde
  - Phosgene

- Structural fires often involve polyvinyl chloride, used to make upholstery, wire, pipes & wall coverings
- Burning pvc creates hydrogen chloride & phosgene
- Polyethylene & pvc more dangerous when smoldering than during the high heat of a working fire, emitting carbon monoxide, hydrogen cyanide, hydrochloric acid & other toxins

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

HYDROGEN CYANIDE IN FIRE OPERATIONS
ACUTE CYANIDE POISONING

- Recently there has been the first FDA approved cyanide treatment, Hydroxocobalamin, that can safely be administered at a fire scene
  - Detoxifies CN by binding it to form cyanocobalamin (B_{12})
  - Marketed as Cyanokit®
  - Used in France for 10 years
  - Previously, only supportive measures were available on site
    - 100% oxygen application
    - Sodium bicarbonate to counter metabolic acidosis
    - Cardiopulmonary support and anticonvulsants
  - Existing antidote involved nitrates that needed to be monitored under hospital care to avoid lethality when combined with CO

Taylor Kit Lilly Kit Pasadena Kit

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

Observations and Remarkable Lab Findings

Observations

- Time exposed to smoke* — 20–30 min
- Time without SCBA† — 10–15 min
- Time elapsed between blood draw and fire — 2 hours

Lab Findings

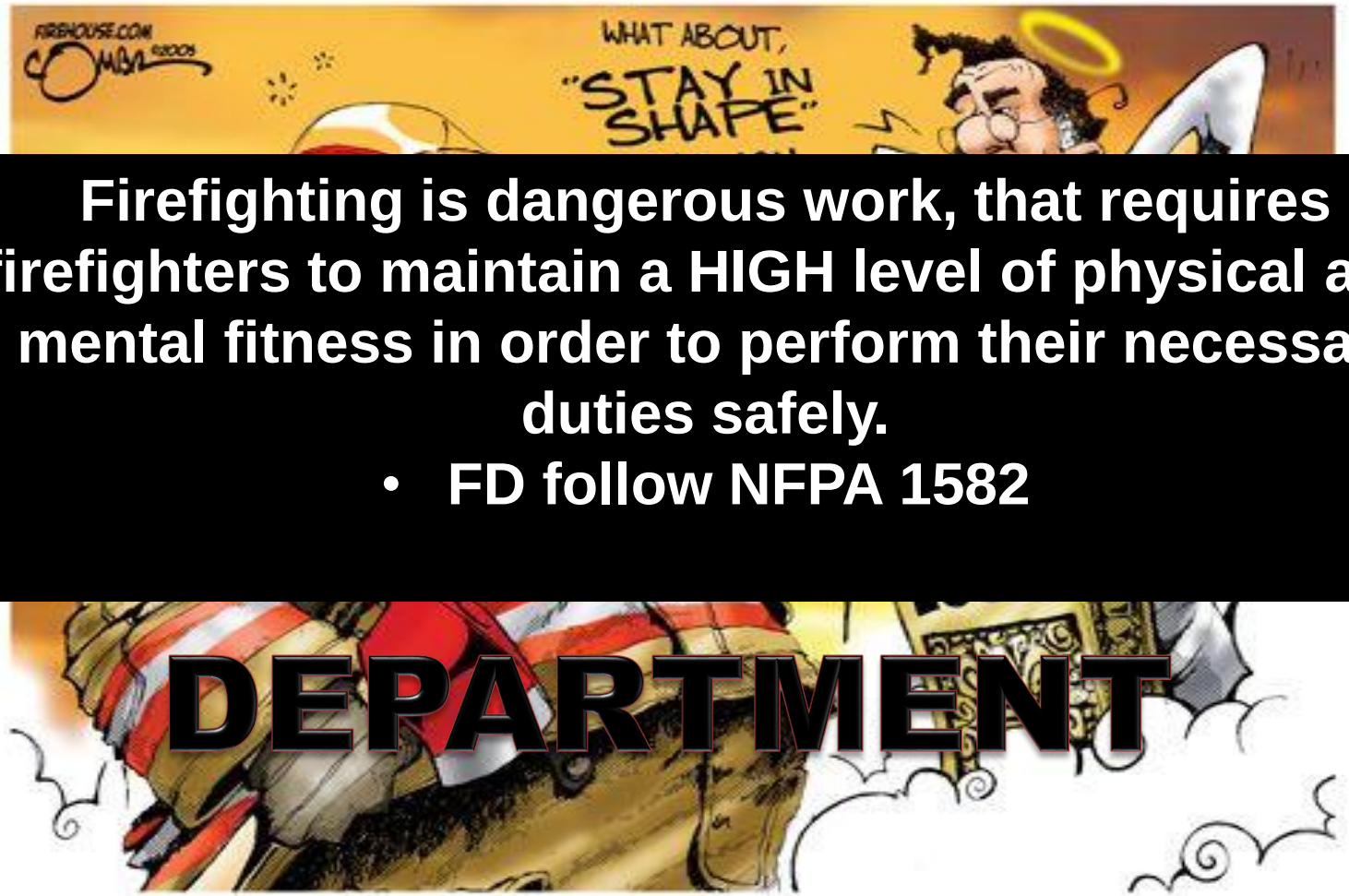
- Lactate — 1 mEq/L
- Carbon monoxide‡ — 3%
- Cyanide — 0.57 mg/L

*Includes intermittent exposures and exposures to light smoke.
†SCBA, self-contained breathing apparatus.
‡Carboxyhemoglobin.

Varone C, et al. *Report of the Investigation Committee into the Cyanide Poisonings of Providence Firefighters*. May 2006.

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM



Firefighting is dangerous work, that requires firefighters to maintain a HIGH level of physical and mental fitness in order to perform their necessary duties safely.

- **FD follow NFPA 1582**

PROJECT MAYDAY

INDIVIDUAL PERSONAL SURVEY – MAYDAY VICTIM

PROJECT MAYDAY

COMPONENT 2: EN ROUTE

Enroute to Incident involved in the MAYDAY

- Did you wear your seatbelt? NO … 55% (working fire dispatch…88%)
- Did a discussion take place amongst the crew about the incident prior to arrival? YES … 19%
- Was specific orders given to crew members by the CO ?… 51%
- Was there a pre-plan for your "mayday" (commercial building) ? YES … 5%
- Did each member of the crew have a radio? YES … 68%

PROJECT MAYDAY

COMPONENT 2: On Scene

- Did you enter standing-up? … YES … 89%
- How long after your entry, did you go to your knees? … average 5/7 minutes …
- How often do you leave your hoseline by more than 10 feet, in near zero visibility? … Most of the time … 87%
- Was there an effort to control the entry door in regards to air flow? … YES … 21%

PROJECT MAYDAY

COMPONENT 2: The MAYDAY COMMUNICATION

L **ocation**
U **nit number**
N **ame**
A **ssignment**
R **esources needed**

What's missing?

PROJECT MAYDAY

COMPONENT 2: The MAYDAY COMMUNICATION

WHO
WHAT
WHERE

We make the VICTIM work

PROJECT MAYDAY

COMPONENT 2: SEARCH/FIRE ATTACK

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

- During your mayday, did you …
  … make noise … YES … 26%
  … wave/turn off/on your flashlight … YES … 34%
  … moved to an outside wall/door … YES … 35%
  … don't remember what I did … 17%
- How were you handle by your rescuers?
  Good … 35% Roughly … 57%
- Did rescuers have the proper equipment for your rescue? … YES … 51%
- If packaging was required, did they proper package you, before exiting? … YES … 27%
- Did you have on all your PPC on? … YES … 83%
  if NO: hood … 68% gloves … 9%

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

Did you have confidence in your…

- Company Officer ….. 90%
- Incident Commander ….. 84%
- RIT ….. 19%

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event ALERT

- Be alert, when multi crews enter through one entry point
- Crews should be alert when air is being drawn in rapidly in ZVC and the heat is banking down
- Interior crews can hear the fire burning above them, but can't see it
- Crews feel "uncomfortable" with the situation they are in
- Crews "low air alarm" is going off, but they are still trying to find the seat of the fire
- Interior crews flow water for several minutes but make no progress
- Crews are unable to communicate with command

PROJECT MAYDAY

MAYDAY VICTIM – PERSONAL ACTIONS

- Collect your thoughts and control your breathing
- Call the MAYDAY
- Advise the IC of your intentions
- Make noise without wasting air
- It's difficult to hear and talk (PASS alarm / Low air alarm)
- Monitor distance into the structure
- Always be accountable to someone

AIR + TIME = SURVIVAL

MANY MAYDAYS (36%) OCCUR BEFORE A FORMAL RIT TO IS ESTABLISHED

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

Why do we wait?

Underestimation of conditions

Fear

Denial

Intimidation

Disorientation

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

multitasking and short term memory overload

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

don't think you are the "exception" to the rule

PROJECT MAYDAY

YOUR COMMENTS

- Deteriorating conditions;
  - came faster than expected
  - couldn't react fast enough
  - crew passing on situation awareness was slow or never came to all crew members
  - moved faster than we should have
  - got off hose line, farther than I should have
  - spacing off the hose line was too far
  - when we fell into the basement, someone should have passed us a line
  - TIC didn't work as expected on the first floor with fire in the basement
  - There should have been ladders at a third floor window for escape, instead of jumping

PROJECT MAYDAY

Considerations / Recommendation

31%
of Mayday situations,
were
NOT
reported as Maydays

PROJECT MAYDAY

Considerations / Recommendation

YOU HAVE CALLED A MAYDAY …

you have done everything you have been trained to do.

NOW

develop a plan, as what are you going to do if you run OUT OF AIR

don’t want it will be to late

PROJECT MAYDAY

Company Officer

- Company Officers must monitor the air supply status of their crews.
- CO must recognize DELAYS or loss of “time recognition”
- CO must apply the “Risk Management System”

PROJECT MAYDAY

PRECEPTION

PREDICTABLE Is PREVENTABLE

Gordon Graham

PROJECT MAYDAY

Your Comments

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer

Survey

RIT
Rescue Team
Mayday Officer
Crew

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer
Survey

Captain JC Ford
Charotte County FD
RIT Leader of a LODD Incident

"Personally, perhaps the most important issue brought to light through this incident is the realization that my expectations and assumptions concerning the deployment of a RIT team were both inaccurate and unrealistic. While my previous assumptions were totally born out of a commonly held perspective from training, they were nonetheless ineffective and tragic."

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer
Survey

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer Survey

Rescue Team Officer, RIC Officer,
Mayday Officer
Personal Survey

477 / 346

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer Survey

Psychology of a Mayday

Firefighter involved in the Mayday

- The firefighter in distress will usually revert to what was learned and is “routine”.
- The firefighter’s sole focus will to remove themselves from danger
- Don’t expect a firefighter to accomplish a manipulative skill learned in one hour, especially if the task was learned months ago
- Finally, firefighters in distress will over compensate – they will not be able to feel safe enough

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer
Survey

The essence of training is to allow *error* without *consequence*

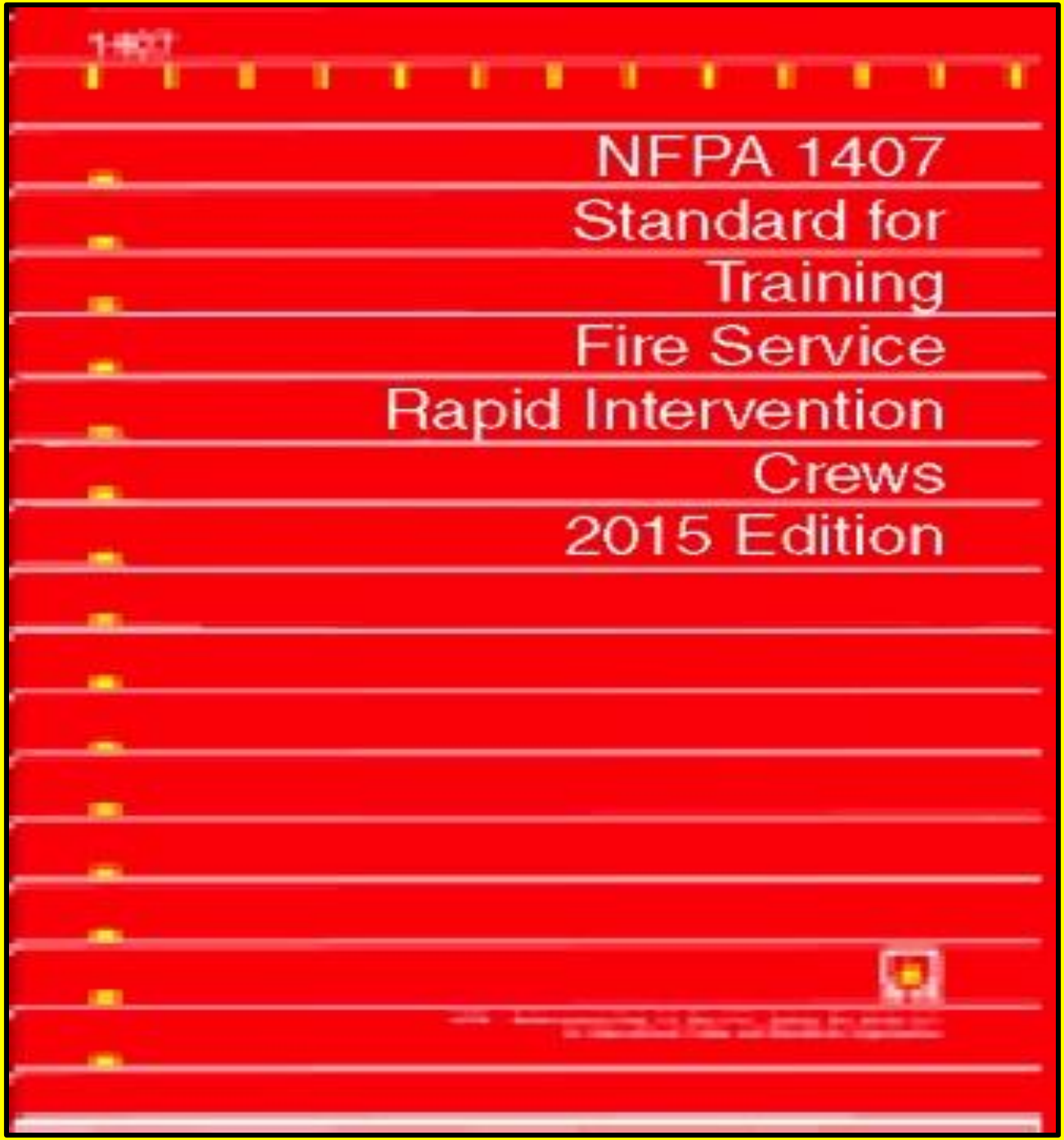
PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer Survey

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer
Survey

PROJECT MAYDAY



PROJECT MAYDAY

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer

Survey

Rescue Incident Team

PROJECT MAYDAY

Rescue Team, RIC, Mayday Officer Survey

Lapse Times

- Rescue Crew Ready State……...2.50 Min
- Mayday to RIC Entry……...3.03 Min
- RIC Contact Down FF……..5.82 Min
- Each RIC Total Time Inside…….....12.33 Min
- Total Time for Rescue.....(Approx)21:00Min
- **12 FFs to rescue 1** **1 in 5 experienced a mayday**

88%
of successful rescues
come
from within the
structure

PROJECT MAYDAY

IRIC, RIC, RIT Operations

1 out of 9 IRIC/RIC/RIT has a MAYDAY

PROJECT MAYDAY

Component 2: Rescue Team, RIT, Mayday Officer

RIC used 21% more AIR than normal crews

PROJECT MAYDAY

IRIC, RIC, RIT Operations

2 in / 2 out

Our research, based on Victims, ICs, IRIC/RIC DOES NOT WORK …

It has not produced any desired results …

- **to few people**
- **not properly dressed**
- **NO RIC bag**
- **mentally unprepared**
- **NO plan**
- **NO back-up plan or team**

PROJECT MAYDAY

IRIC, RIC, RIT Operations

PROACTIVE RIT TASKS

- Perform RIT Size-Up
- Monitor fireground, structure, companies and communication
- Preparing the fireground
  - Provide secondary egress/access location
  - Remove any hazards and/or obstacles

MONITORING THE FIREGROUND:

- Note building construction, size, number of floors, basement, type roof and fire behavior effect on construction.
- Crew location and assignment
- CONDITION OF CREWS as they EXIT the structure
- Things getting better of worst
- TIME / monitor radio channel(s)

PROJECT MAYDAY

IRIC, RIC, RIT Operations

ID the RIC

E-6 RIC … E-11 RIC

PROJECT MAYDAY

Component 2: Rescue Team, RIC, Mayday Officer

REMEMBER THE BASICS:

- **HAVE A PLAN … fragmented RIC/RIT/IRIC**
- **Monitor interior conditions**
- **Monitor air supply**
- **DON'T BECOME PART OF THE PROBLEM**

YOU FIND THE FIREFIGHTER (Mayday Victim)

- **Assess the victim, room conditions, RIT members**
- **Secure the FF air supply, turn off PASS unit**
- **Develop rescue plan**
- **Determine best removal techniques**
- **Do FF know how to remove FF'ers PPC/PPE**

RIT COMMUNICATION BENCHMARKS:

- **RIT Enter**
- **Location changes, first floor, second floor**
- **FF located / Air Supply secured / EXITING w/victi**

PROJECT MAYDAY

Component 2: Rescue Team, RIT, Mayday Officer

RIT Bag Useage:

- Air …… 263
  - low air ….. 194
  - out of air ….. 52
- Facepiece replacement…… 134 (83)
- Regular replacement …….. 10
- Wire Cutters …… 329
- Bolt Cutters …… 47

- Stoke Basket/Mega Mover, etc …… 423
- Folding ladder …… 367

PROJECT MAYDAY

Component 2: Rescue Team, RIT, Mayday Officer

PROJECT MAYDAY

Component 2: Rescue Team, RIC, Mayday Officer

- Report findings
- Ensure firefighter has air
- NO freelancing
- Everyone should monitor changing fireground conditions

PROJECT MAYDAY

Component 2: Rescue Team, RIC, Mayday Officer

DID YOUR RIC, RESCUE HAVE A "MAYDAY"

YES ….. 134 (1,439)

WHY ?

- **Had NO real plan before entering.**
- **Rush into things without thinking them out.**
- **Did not follow original hose line, took short cut.**
- **Used way to much air!**
- **Too much radio traffic and suggestions**
- **(CO) did not process incoming information well**
- **Took too long to package victim.**
- **Crew became physical exhausted quick.**

Did your RIT/Rescue have any injuries? YES … 9%

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

- **Locating a firefighter in distress:**
  - **stop, listen, at times cease all activities**
  - **look for discarded tools and equipment, hose**
  - **check ceiling for beams of light**
  - **use a TIC**

Rapid Rescues are NOT rapid ….

slow down, do it RIGHT the first time, be aware of your environment, don't be surprised by anything. Be calm and reassuring, take the time to think through anything that you have never done before or hadn't been trained to do. There is a first time for everything.

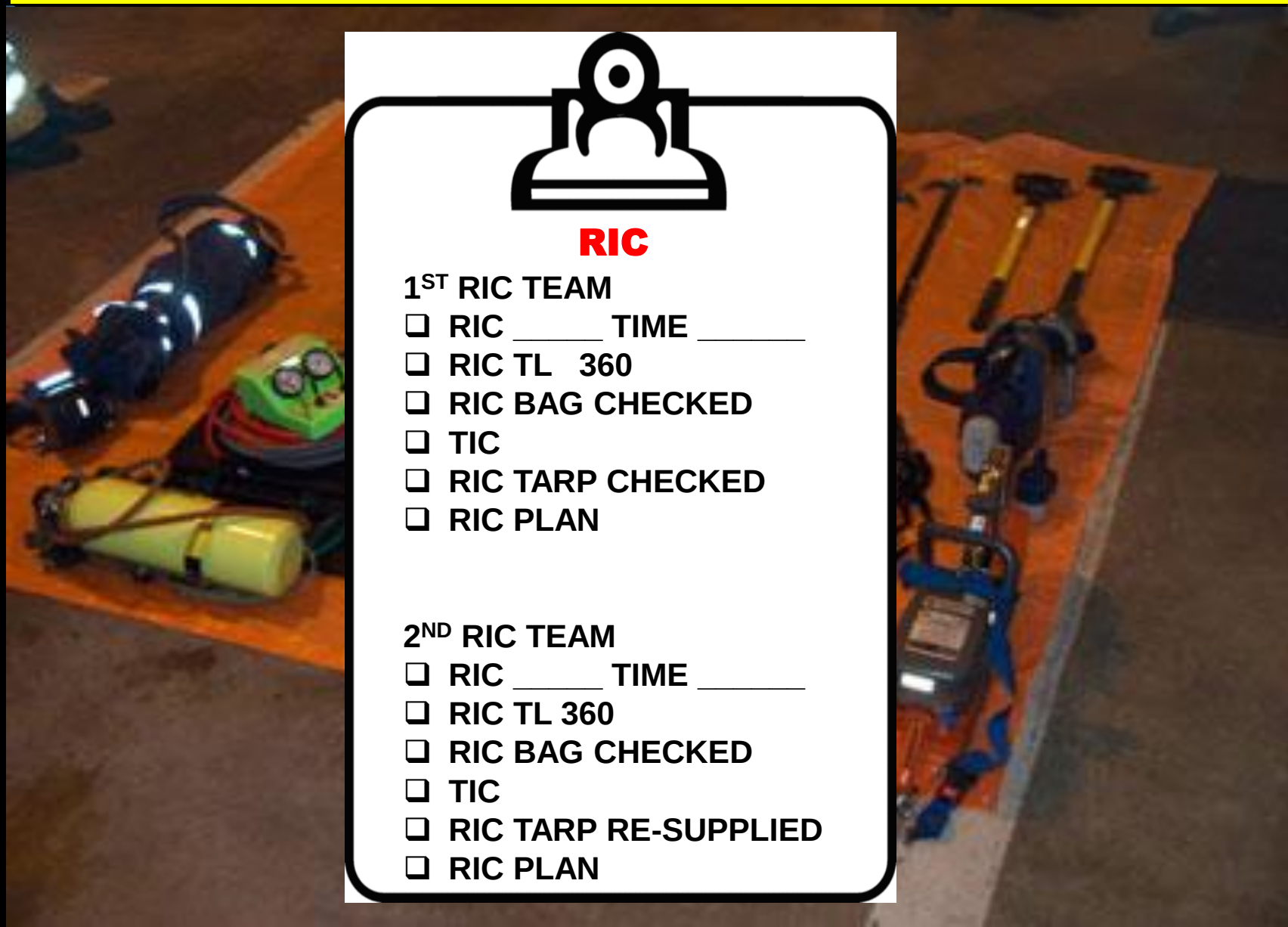
PROJECT MAYDAY

COMMENTS / RECOMMENDATION

- Equipment for a IRIC/RIT/FAST can be divided into two categories:
  - personal gear carried by a RIT member
  - team resources staged and ready
- Have a tarp, pre-marked with equipment location, everything that may be required for a RIC rescue (it will be noted what's needed, missing or being used for the next RIT.

PROJECT MAYDAY

COMMENTS / RECOMMENDATION



RIC

1ST RIC TEAM

- ❑ RIC _____ TIME _____
- ❑ RIC TL 360
- ❑ RIC BAG CHECKED
- ❑ TIC
- ❑ RIC TARP CHECKED
- ❑ RIC PLAN

2ND RIC TEAM

- ❑ RIC _____ TIME _____
- ❑ RIC TL 360
- ❑ RIC BAG CHECKED
- ❑ TIC
- ❑ RIC TARP RE-SUPPLIED
- ❑ RIC PLAN

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

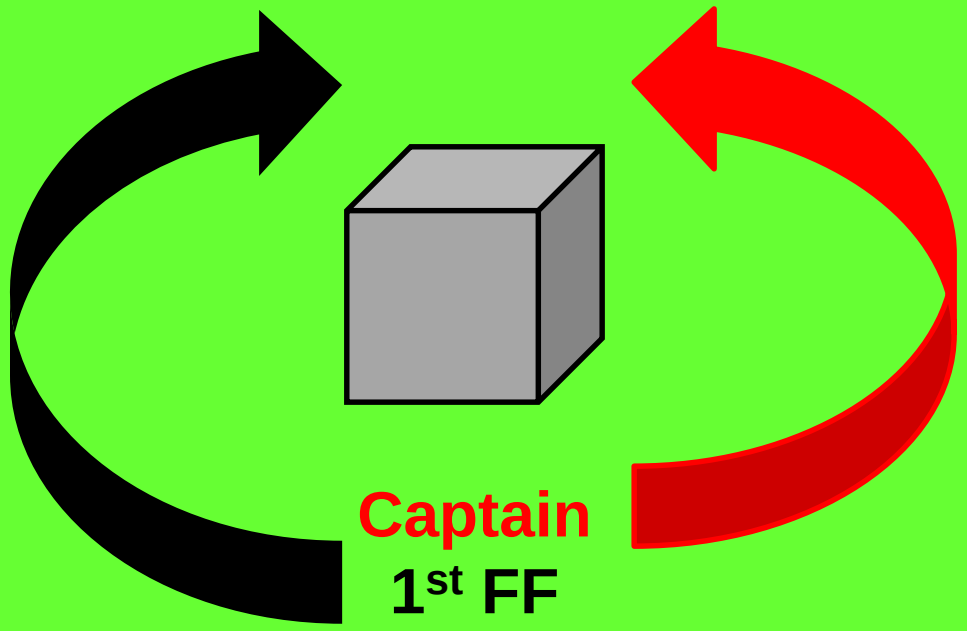
- Listen to radio communication as what may be required for rescue, more air cylinders, special equipment.
- Don’t take short cuts and become another mayday
- RIT officer should know the strength and weakness of crew members, making sure each person has the right assignment.

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

PROJECT MAYDAY

COMMENTS / RECOMMENDATION



Captain

1st FF

2nd FF

Checks out RIT bag

3rd FF

Sets tarp, retrieves stokes, saw, folding ladder, etc.

PROJECT MAYDAY

RECOMMENDATIONS

RIT / RIT Officers:

- RIT officers conducts a 360 of the structure (if possible) and develop a plan
- Check-out RIT bag and other equipment
- Maintain air / time / conditions and situational awareness
- Make sure each member of the RIT knows the plan and their piece of the plan.
- BE PREPARED for anything
- Be realistic with the problem and the rescue

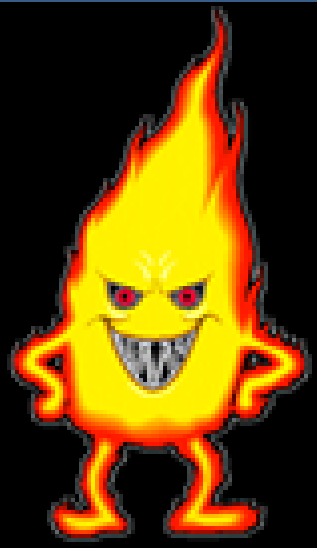
PROJECT MAYDAY

MAKE A DIFFERENCE

PROJECT MAYDAY

“The Life YOU save could be your OWN


INCIDENT
COMMANDER



Why do firefighters die in the “line of duty”?

They most often are in offensive positions during defensive conditions

PROJECT MAYDAY

Company Offices Roles and Responsibilties In Maydays

COMPANY OFFICERS

PROJECT MAYDAY

Company Offices Roles and Responsibilties In Maydays

The Company Officer is responsible for *Mayday* prevention through crew development, communications and practice. This includes setting a consistent attitude, accountability and expectation regarding crew *Mayday* readiness.

Ensure CO responsibilities and expectations are clear to the entire crew

- Practice crew communications
- Instill that FF stay on hose lines
- Rover / Engineer integration into crew

PROJECT MAYDAY

MAYDAY READINESS

Preventing *Mayday* situations involve multiple factors. Firefighters, Company Officers, and Command Officers must reinforce the prevention of scenarios that lead to a Mayday. The most important factors for Mayday prevention begin with the following operational standards.

- Working within a FD IMS and SOPs that are continually revised and ENFORCED
- Working within the IAP for the incident
- Always being accountable to someone within IMS
- Maintaining individual and crew air management and integrity
- Manage work cycle
- Monitor distances traveled into structure
- Layering of resources and providing tactical reserve
- Planning and acting out an exit plan

It is better to get out 5 minutes too early...

that 5 minutes too late

PROJECT MAYDAY

IC Personal Survey

MAYDAY

IC

Cool Command

Preventing MAYDAYS

- FOLLOW SOP's
- Identify and forecast resources requirements
- Control the Problem
- Manage air and work cycles
- Maintain tactical reserves

PROJECT MAYDAY

IC Personal Survey

4,854

Male: 4,751

Female: 103

PROJECT MAYDAY

IC Information

AVERAGE YEARS OF SERVICE:

15.7 years

AVERAGE YEARS OF IC EXPERIENCE:

6.5 years

AVERAGE AMOUNT OF IC LEVEL CE TRAINING A YEAR:

4 hrs

PROJECT MAYDAY

Functions of Command – 1. Deployment

Number of Apparatus on Initial Response:

1- Engine	100%	1- Ladder	98%
2- Engines	100%	1- Rescue	88%
3- Engines	95%	1- BC	98%

Staffing on Apparatus on Initial Response:

2 Person(s) on Engine	12%
3 Person(s) on Engine	32%
4 Person(s) on Engine	64%
2 Person(s) on Ladder	17%
3 Person(s) on Ladder	36%
4 Person(s) on Ladder	44%
5 Person(s) on Ladder	3%

PROJECT MAYDAY

Functions of Command – 1. Deployment

Staffing on Apparatus on Initial Response:

2	Person(s) on Rescue	98%
1	Person on BC vehicle	72%
2	Person(s) on BC vehicle	28%

PROJECT MAYDAY

Functions of Command – 1. Deployment

Average Response Time of Initial Response Apparatus: (Average)

1st Engine	5 minutes, 23 seconds
2nd Engine	7 minutes, 31 seconds
3rd Engine	9 minutes, 7 seconds
1st Ladder	8 minutes, 47 seconds
1st BC	7 minutes, 39 seconds

PROJECT MAYDAY

Functions of Command – 1. Deployment

DISPATCH – INCIDENT DESCRIPTION

Smell of smoke, reporting a fire, etc.	91%
Report of Smoke Alarm	17%
Alarm Company	13%

DISPATCH – SWITCH CHANNELS TO TACTICAL CHANNEL

YES	41%

PRE-PLANS AVAILABLE:

Multi-Occupancy	11%
Commercial	15%

PROJECT MAYDAY

Functions of Command – 1. Deployment

How many runs did you make prior to your to your Mayday?

Average of ….. 5

Were you able to hear all the radio traffic while enroute?

64 %

How often was command transferred?

Once ….. 61% Twice ….. 35% Three times….. 6%

PROJECT MAYDAY

Functions of Command – 2. Situational Awareness

PROJECT MAYDAY

Functions of Command – 2. Situational Awareness

PROJECT MAYDAY

Functions of Command – 2. Situational Awareness

PROJECT MAYDAY

Functions of Command – 2. Situational Awareness

TACTICAL TARGETS

Rescue
Fire Control
Property Conservation
Customer Stabilization
Personal Decon

JOB DESCRIPTION

Deployment
Assume-Confirm-Position
Situation Evaluation
COMMUNICATION
Strategy – IAP
Organization
Review – Revision
Continue - Demob

CRITICAL FIREGROUND FACTORS

- ✓ Customer Profile
- ✓ Life Hazard
- ✓ Exposures
- ✓ Time
- ✓ Building
- ✓ Occupancy
- ✓ Arrangement – Access
- ✓ Non-Fire Problems
- ✓ Resources
- ✓ Special Circumstances
- ✓ Actions

PRODUCES

RISK MANAGEMENT PLAN

WE'LL RISK OUR LIVES A LOT, if neccessary, TO PROTECT SAVABLE LIVES

WE'LL RISK OUR LIVES A LITTLE, in a HIGHLY calculated manner, TO PROTECT SAVABLE PROPERTY

We will NOT RISK OUR LIVES AT ALL, for what is already LOST (people or property)

The OFFENSIVE STRATEGY is utilized when the IC determines firefighters can operate on the interior of the structure in order to complete the tactical priorities, to SAVE lives and savable property. Whenever possible, the OFFENSIVE STRATEGY should commence with water application from an external position.

MARGINAL STRATEGY has been eliminated. It was designed to Allow for rescue operations under DEFENSIVE conditions. Some defensive fires are NOT survivable.

TRANSITIONAL ATTACK is a tactic. It is NOT a strategy Transitional attack indicates flowing water from the Exterior, may or may NOT operate on the interior.

Acknowledge YOU Have BLIND SPOTS

- Acknowledge the MAYDAY
- Communicate to victim " remain calm and control your breathing"
- Report "Mayday" to dispatch
- Have victim activate their "PASS Unit" and shut the PASS unit OFF when talking to command
- Mayday victim may become more difficult/clear, once they activate PASS unit

Command Supporting MAYDAY Victim

- NO RADIO PAR will take place
- TAKE strong control of the communication
- Assign a BC to RESCUE
- Expand command organization
- Establish treatment / medical support

Command Responsibilities

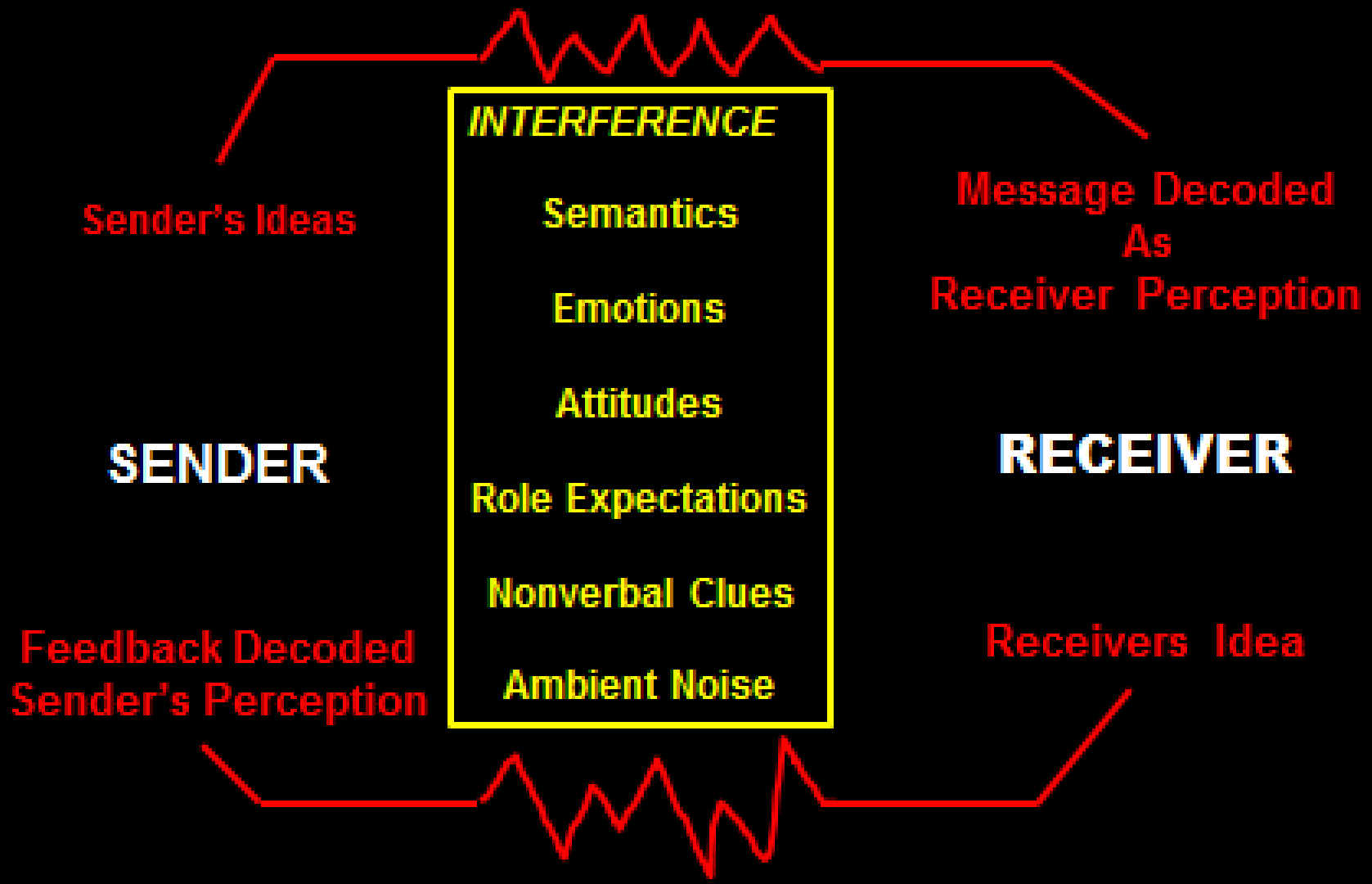
PROJECT MAYDAY

Functions of Command – 3. Communications

COMMUNICATIONS

PROJECT MAYDAY

Functions of Command – 3. Communications



PROJECT MAYDAY

Functions of Command – 3. Communications

"E-1 to Command"

"Command, go ahead"

CONNECT

"E-1, moving to the Second Floor for S,R & FA"

CONVEY

"Command copied, E-1 moving to the 2nd Floor for S, R & FA"

CONFIRM

PROJECT MAYDAY

Functions of Command – 3. Communications

DO YOU CHANGE RADIO CHANNELS AFTER BEING DISPATCH:

YES 41%

DO YOU HAVE TACTICAL BENCHMARKS:

YES 88%

ARE THESE BENCHMARKS, TRANSMITTED BY RADIO, WHEN ACHIEVED:

(All Clear, Fire Under Control, Fire Out, etc.)

YES 73%

PROJECT MAYDAY

Functions of Command – 3. Communications

WERE YOU ABLE TO HEAR ALL THE RADIO TRAFFIC WHILE ENROUTE:

YES 46%

DOES YOUR FD HAVE A SOP DEALING WITH SPECIAL RADIO TRAFFIC / TONES:

Priority Traffic	77%
Emergency Traffic	82%
"Mayday" Tone	97%
Evacuation Tone	65%
Changing Channels	14%

PROJECT MAYDAY

Functions of Command – 3. Communications

35.6% of Maydays were MISSED on their 1st CALL

- **67% Sidewalk Command** (portable)
- **26% Outside Vehicle** (rear)
- **7% Inside Vehicle**

(4% NO headphones)

PROJECT MAYDAY

Functions of Command – 3. Communications

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PROJECT MAYDAY

Functions of Command – 3. Communications

ONLY 37%
of the time was radio communications verified or repeated for confirmation

CO must confirm radio communications

- Company cannot complete the assignment … 39%
- Company needs help in carrying out assignment … 44%
- Assignment is complete and company needs to re-cycle or be reassigned … 35%

PROJECT MAYDAY

COMMUNICATION ISSUES

BE UNDERSTOOD

first time

EVERYTIME

E-16 .... Engine One Six
A side .... Alpha Side

PROJECT MAYDAY

PROTABLE RADIOS

Portable 5W

5 > 4 > 3> 2W

Vehicle

Hard Charger

Replace Battery

PROJECT MAYDAY

BODY MASS
BUILDING/STRUCTURE

PROJECT MAYDAY

RANGE OF RECEPTION 70 DEGREES

CLEAN

PROJECT MAYDAY

PROJECT MAYDAY

Considerations / Recommendation

- Emergency Stress …
  Normal – 75hpm – you will react clearly and manage complex motor skills…
  after 145 hpm
  most people begin to deteriorate voice command, volume , begin shakes, lower motor kills, vision, hearing, and depth perception can also decline, if stress intensifies people will usually experience a form of amnesia after the event.

PROJECT MAYDAY

Considerations / Recommendation

The IC's tone of voice is going to set the rest of the Mayday

- Volume
- Quality
- Speed
- Feedback

PROJECT MAYDAY

Considerations

COMMUNICATIONS:

2018: 1,217

Effective/Ineffective Communications

Average:

47 messages…pace 2.4 per minute

31 effective (66%) …. 16 ineffective (34%) 2missed messages (39 minutes) PACE

There is a 15%effcienty drop when FF used SCBA's

Command Effect: distractions

Face-to-face messages, too many people in command environment, many messages garbled (SCBA facepiece) multi-distractions (switching channels) relabeling crews, sensory overload is a major contributing influence in restricting effective communication flow.

PROJECT MAYDAY

Considerations

COMMAND WITH AIDE:

Most effective only missing 1 message, effective command communication (91%)

However, Aides can also be distraction, talk allot This holds true with aide's that our not normally assigned or working out of their environment.

Most effective team has nonverbal glances, confirming nods, hand gestures, use of post-it's.

"Effective command communications relies on the quality of communications, based on imperfect information"

PROJECT MAYDAY

Considerations

Multi demands impose simultaneously sensory overload, impairs communications. Volume of inputs exceeds the capability of critical decision, creating multiple layers of complexity
Usually the quality of communications decreased In proportion to the amount and type of stimuli and distractions of radio traffic. The critical factor for calm and controlled communications is of major importance in reducing sensory overload.

PROJECT MAYDAY

Considerations

REASONS FOR MISSED RADIO TRAFFIC

NO Apparent Reason	38%
Switching channels	19%
Talking in Person to others	19%
Garbled	14%
Feedback squeal	5%
Background noise	5%

1,217


PROJECT MAYDAY
MOTOROLA

PROJECT MAYDAY

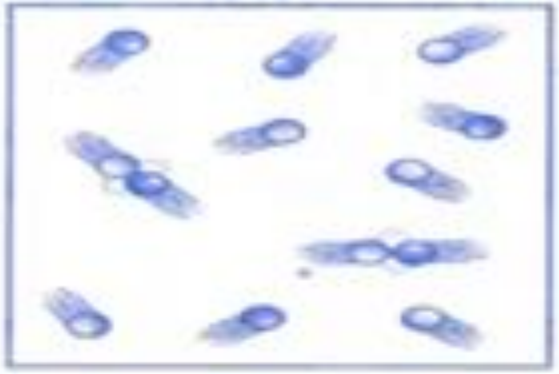
Portable handheld radios are widely used during firefighting operations, and these radios are often exposed to the elevated temperatures that are typically present in a fire environment. Radios, like other electronic equipment, can be vulnerable to elevated temperatures. Previous investigations have shown that radios may suffer physical damage, such as melting and deforming, as well as operational difficulties when exposed to elevated temperature environments [1]. Performance problems with portable radios have been identified by the National Institute for Occupational Safety and Health (NIOSH) as contributing factors in some fire fighter fatalities [2]. To investigate the impact of elevated temperatures on radio operations, experiments were conducted to measure the performance of portable radios exposed to elevated temperatures. The goal of this investigation is to develop scientifically based performance standards for fire fighter portable radios.

PROJECT MAYDAY

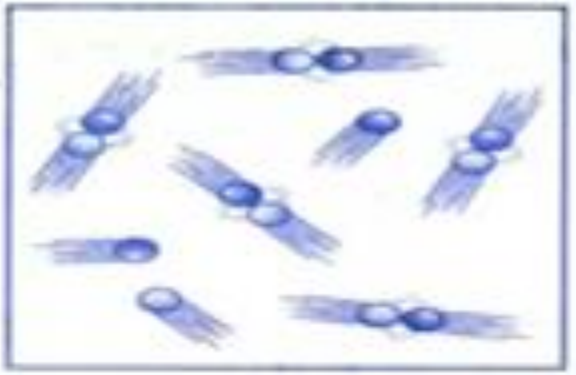
To address the lack of performance standards for fire fighter portable radio equipment, the NFPA Technical Committee for Electronic Safety Equipment has proposed the development of a standard for portable radios used by emergency service personnel. The information in this paper provides data and performance measurements relevant to the development of the new standard.

Because of the lack of standards for portable radios, operation guidelines and performance criteria have been left to the radio manufacturers. Many of the manufacturers list maximum operating temperatures of 60 °C for the radios to be used by fire fighters. This temperature falls well below temperatures that a fire fighter could encounter while operating in a fire environment. Previous work studying the performance of electronic equipment used by first responders in elevated temperature environments led to the development of a Thermal Class system for categorizing the operation of electronic equipment exposed to thermal conditions [4].

PROJECT MAYDAY



The temperature of the reaction increases

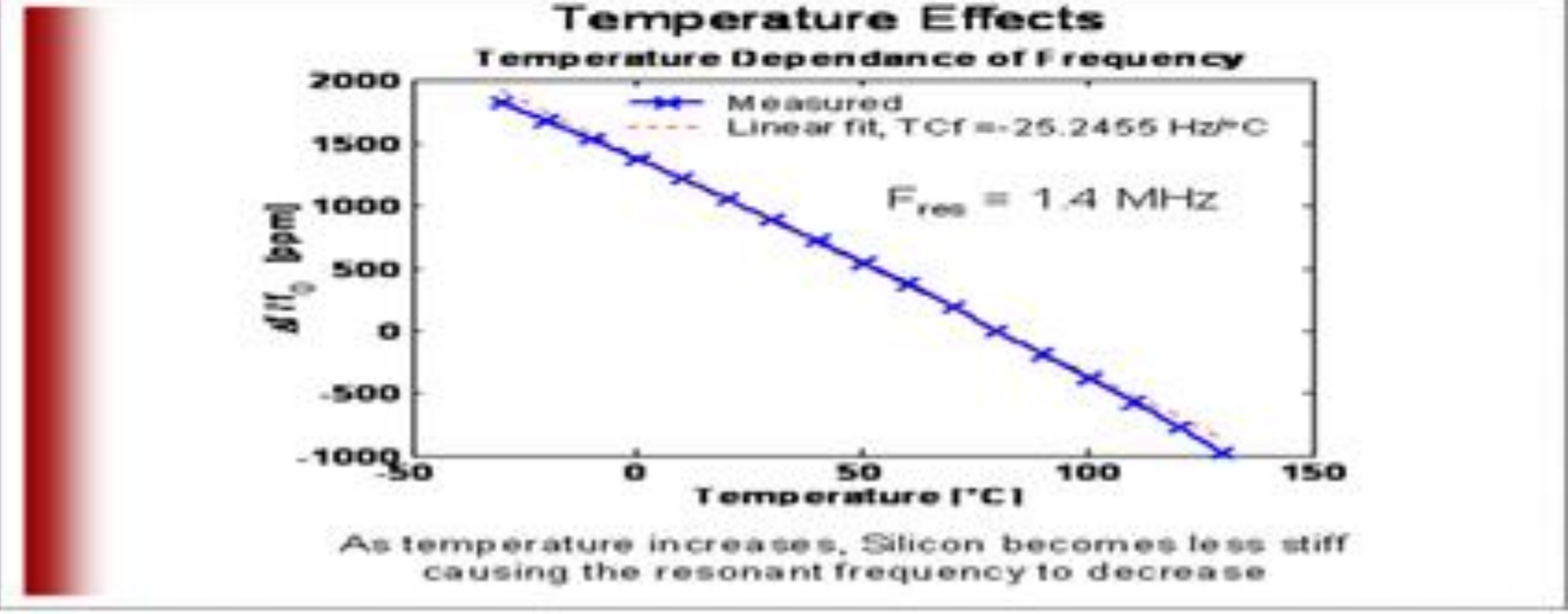


- At a lower temperature, the particles move slower.
- Frequency of collision is lower.

- At a higher temperature, the particles move faster.
- Frequency of collision is higher.

Temperature of a reaction controls the frequency of collision

FREQUENCY DRIFT



As temperature increases, Silicon becomes less stiff causing the resonant frequency to decrease

PROJECT MAYDAY

Radio	Thermal Class II Exposure 160 °C for 15 min
A1	No transmitting at 15 min. Signal drift of more than 5 ppm post-test.
A2	Signal drift of more than 5 ppm during test.
A3	Stopped transmitting at 12 min + 10 s (730 s).
B1	No transmitting at 15 min. Did not transmit post-test.
C1	No transmitting at 15 min. Did not transmit post-test.
D1	Signal drift of more than 5 ppm during test.
E1	Signal drift of more than 5 ppm during test.

PROJECT MAYDAY

NFPA 1802:

STANDARD ON TWO-WAY, PORTABLE RF VOICE COMMUNICATION DEVICES FOR USE BY EMERGENCY SERVICES PERSONNEL IN THE HAZARD ZONE

NFPA 1802

- Devices ONLY!
  - Not the operating system
- LMR - Fire Service Radio
- New Devices
  - First Net

Industry is already:

- Well Established
- Highly Regulated

PROJECT MAYDAY

Functions of Command – 3. Communications

Heat creates RD attenuation drifting, which cases portable radios to go OFF frequency, heat absorbs the signal. Portable radio should be worn in pockets, if in a sling, it needs to be under the coat.

PROJECT MAYDAY

PROJECT MAYDAY

Do you know how your Fire Department EA button works and what is your Fire Department policy regarding its use

71% of *Mayday* victims DID NOT

PROJECT MAYDAY

- Different system provide different functions of response: a) transmit to your current talk group b) directs call to emergency talk group Regional Standardization

Other features:

a) Some mics become temporarily "hot" enabling brief transmission w/o PTT, b) the "silent alarm" disables audio/visual clues, c) other programing may prevent changing channels after activation.

Another issue interoperability channels

New radios have alert motion transceivers

The presence of a EA button does NOT guarantee that it works

Barry Furey

- Is the EA recessed?
- Can it be activated with gloves on?
- Is the button tucked into a difficult position?

PROJECT MAYDAY

USFA
Voice Radio Communications Guide for the Fire Service

June 2016

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

- Changing channels causes problems with:

  - Miscommunication
  - People not changing channels when they should, they want to listen to the mayday
  - Important communications is missed

- ALL radio should be set-up so when you turn the channel knob, the first and last channel are the same.

- Make sure future radios have a EA button that can be easily activated.

- If you have lapel mics, make sure they have a EA button, If so, what does it do to the radio, when activated?

PROJECT MAYDAY

COMPONENT 2: The MAYDAY Event

DON'T
CHANGE
CHANNELS

PROJECT MAYDAY

YOUR COMMENTS

"When calling a "MAYDAY", do NOT give up the radio button, until a complete "PCAN" report is given... Then acknowledge

PROJECT MAYDAY

Functions of Command – 3. Communications

WHY ARE WE MISSING MAYDAYS?

MAYDAY VICTIM

- WHO, TYPE *MAYDAY*, LOCATION, IF ANY INJURIES, CONDITIONS, ACTIONS, AIR
  (E-14,FF Abbott, Fallen through a Hole into the Basement, I believe I have broken my ankle, I'm crawling to the "B" side away from the fire lots of fire in the basement, my air is 1100p)
- Key Mic (don't give up the radio) 79 seconds
- Speak NORMAL, slow breathing
- Speak through Exhaust Ports
- LISTEN – THINK – DEVELOP A PLAN
- Consider turning OFF / PASS device when speaking

PROJECT MAYDAY

HEARING

The

In the Room

PROJECT MAYDAY

Hearing & Listening

PROJECT MAYDAY

Hearing & Listening

HOW CRITICAL IS HEARING

- Good hearing is necessary
- Sound can be heard…
  - In darkness and inclement weather
  - 360 degrees, come from every direction
- Collect intelligence
  - 50 to 60 of Situational Awareness is hearing, % increases when visibility is limited

PROJECT MAYDAY

Hearing VS Listening

HEARING vs LISTENING

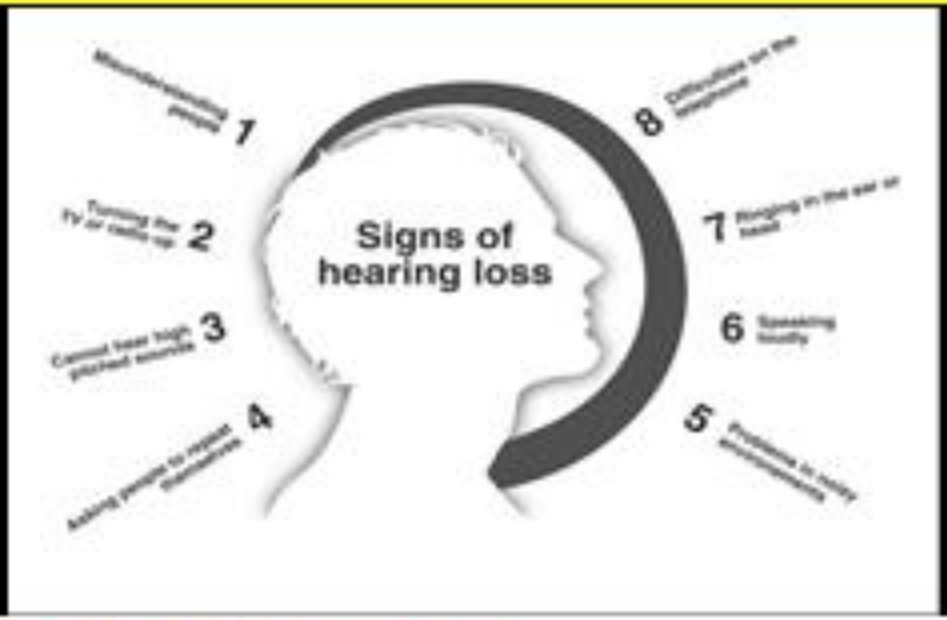
- Do you think there is a difference between hearing and listening?

YOUR are RIGHT, there is!

- Hearing is simply the act of perceiving sound by ear. If your hearing impaired, hearing just simply happens.
- Listening, however, is something you consciously choose to do. Listening requires concentration so that your brain processes meaning from words and sentences. Listening leads to learning

PROJECT MAYDAY

HEARING - LISTENING



SOUND AND HEARING

Source: www.2hear.com

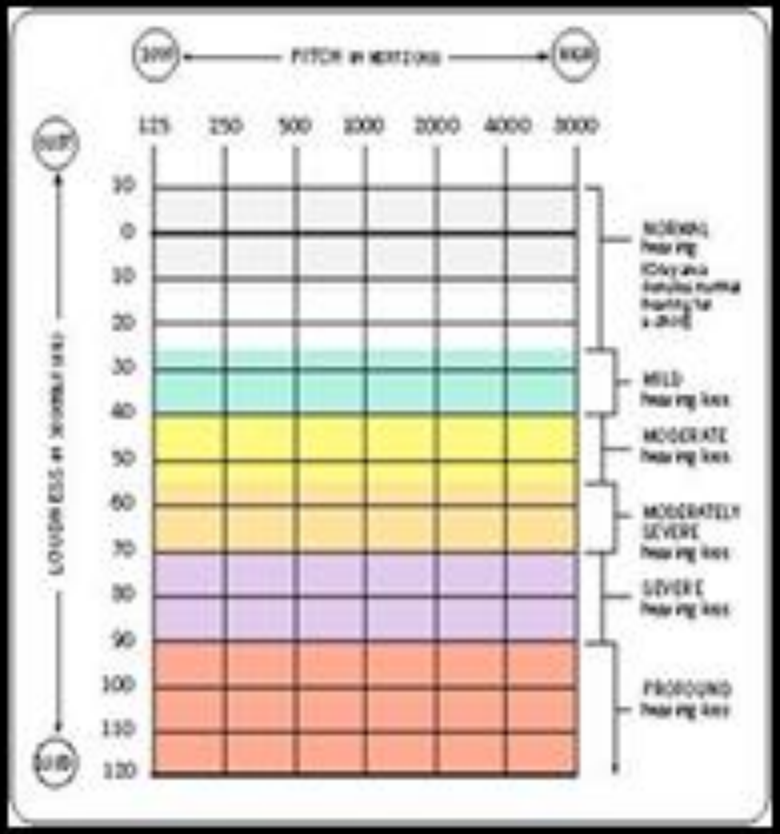
PROJECT MAYDAY

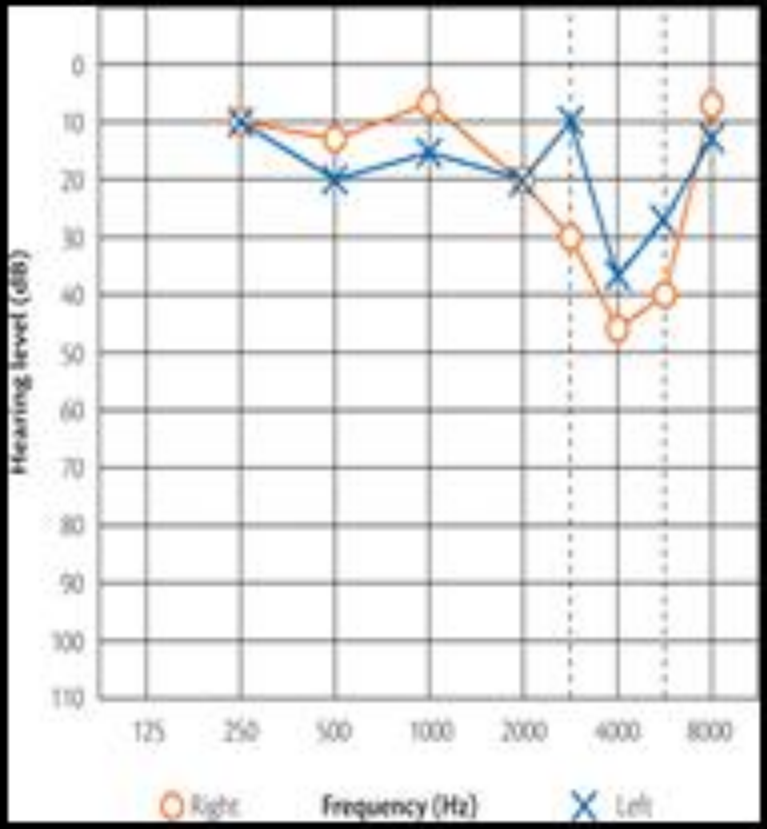
Why Operational Hearing?

	Word Understanding	
	GOOD Hearing	POOR Hearing
	20seconds	40 seconds
Hearing *letters and numbers*	*74%*	*36%*
Hearing and comprehending orders or information of more than 30 seconds	83%	23%
Multi-bench marks given at the same time	92%	34%
When low air alarm goes off	66%	19%
Calling a MAYDAY	88%	35%

PROJECT MAYDAY

HEARING TEST





PROJECT MAYDAY

Functions of Command
4. Assumption, Confirm and Position of Command

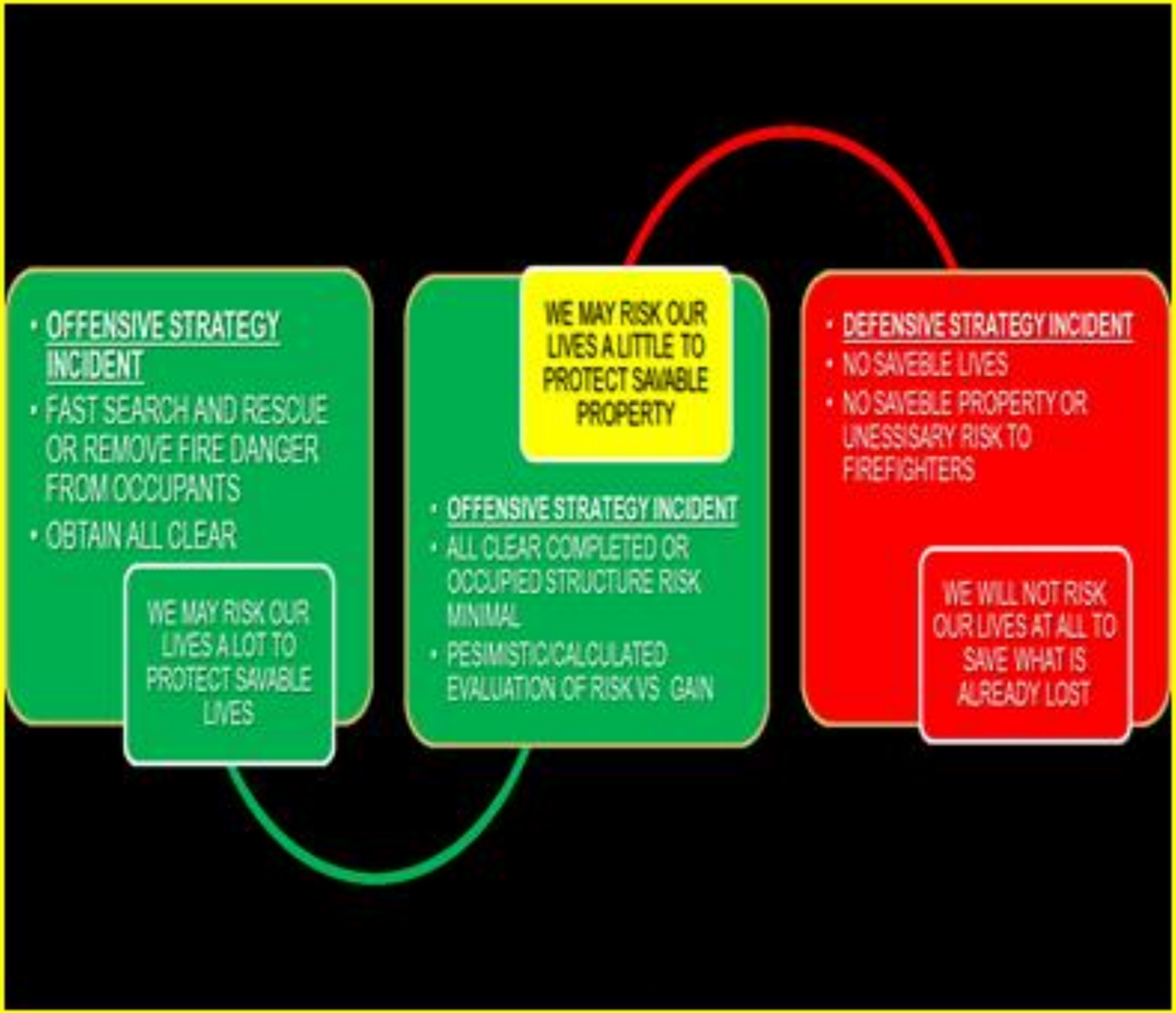
BC-IC Initial Priorities

- Verify strategy, positions and functions
- Evaluate effectiveness of initial attack
- Forecast fire behavior / building construction
- Prioritize assignments for arriving companies and chiefs
- Evaluate needed resources
- Strong focus on tactical controls and firefighter safety
- Benchmarks (A/C, U/C, L/S, etc.)

PROJECT MAYDAY

Functions of Command
4. Assumption, Confirm and Position of Command

PROJECT MAYDAY



PROJECT MAYDAY

Functions of Command
5. Strategy and Incident Action Plan

Placing the IC in a Strategic Command position and having them Properly Manage the

CORRECT STRATEGY

has THE

BIGGEST

Safety Impact…Period!

Make sure you pick a Competent RIT TEAM

PROJECT MAYDAY

Strategic Decision Making Model

PROJECT MAYDAY

Functions of Command
5. Strategy and IAP

All firefighter safety is rooted in task level competence, tactical control and operating in the correct strategy.

PROJECT MAYDAY

Functions of Command
6. Organization

The IC cannot outperform the entire response. This set of organizational rules provides the system we use to develop & manage a single IAP for the incident, including our safety.

- **Strategy driven by risk management**
- **Resource determination (tactical reserve)**
- **Level 1 staging**
- **Assignment by the IC**
- **Standard Company work cycle:**
  Working~On deck~Recycle
- **Single tactical radio channel**
- **Tactical level managed by warm zone bosses**

PROJECT MAYDAY

How well command manages the "Mayday" and how well crews interact with one another will determine the success or failure of the toughest types of incidents we will ever work

- Activate the RIT
- Get a RIT for the RIT
- Start another alarm assignment
- Add another Chief Officer
- Ensure everybody stays on task
- Ensure accountability is accurate
- Call for medical resources

PROJECT MAYDAY

MAYDAY … resolved

"Mayday" resolved :

- The MAYDAY victim is removed from the hazard zone
- All members involved in the rescue are accounted for and are out of the hazard zone
- Hazard Zone accountability is conducted
- The IC has PAR for the entire hazard zone.

PROJECT MAYDAY

Returning to Normalcy

- After the firefighter rescue, Command should conduct another *PAR*.
- After the *PAR*, reestablish strategy
- As soon as possible, send additional crews to the scene for relief and reassign on-scene crews to necessary assignments.
- As soon as relief crews are assigned, get the original on-scene crews to a debriefing. This should be required before they are allowed to leave the scene.

Upon termination of the "Mayday" event,
Announce "Resume Normal Radio Traffic"
On the affected channel.

MAYDAY PROJECT

Your Comments

- Control radio communication, yelling and screaming becomes epidemic, confirm all radio reports.
- BIGGER the structure = more MAYDAYs
- Don't make every Mayday drill a rescue event have a body recovery, pull everyone out, do a PAR, regroup.
- Most IC's knew who the firefighter would be that would call a Mayday, they had a attitude, training, or experience deficiencies prior to the fire, it was predictable.

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

- As the IC enforce fire ground SOPs/SOGs
- As the IC conduct tailboard debriefings after each structure fire. When there is a problem or things don't go as expected, re-walk each companies actions in the fire structure.
- Listen to audio dispatch/fire alarm reports, re-visit the communications and seek improvements as necessary.

PROJECT MAYDAY

COMMENTS / RECOMMENDATION

IC Worksheet

MAYDAY
Command Team Checklist

(Report of a Lost, Trapped, or Downed Firefighter)

Ascertain from Mayday Caller:

- Name: _____
- UNIT: _____
- Location: _____
- Assignment: _____
- RESOURCES NEEDED FOR RESCUE

Activate Grab-lives procedures

GRAB-LIVES

Gauge (CHECK AIR)
Radio (CALL for Help)
Activate (Pass)
Breathing (control)

Low (Stay Low)
Illuminate (Flashlight)
Volume (Make Noise)
Exit (Find Exit)
Shield Airway

Air Level:_____

Radio Transition and Alert

Emergency Traffic Declaration, Alert Fireground
That A Mayday Has Been Declared
If Needed Move Non Affected Units to Secondary Radio Channel

- Support Officer/Runs ongoing operations
- Fireground Channel/Command directs rescue

☐ PAR conducted by Operations on Secondary Channel
☐ Immediately Request Additional Alarm(s)

Deployment Considerations

☐ Deploy Rescue
- Commit additional resources to the Rapid Intervention Team

Change Plan to a High Priority Rescue Effort
Consider Withdraw Companies from Affected Areas
Re-enforce Firefighting Positions
Open / Unlock All Doors
Ventilate - Maintain Tenability
Provide Additional Lighting
Closely Coordinate and Control Search Efforts
Special Call for TRT Teams if needed
Monitor Structural Stability
Maintain Strong Supervision and Control of Crews
Assign Additional Chief Officers to Area of Rescue

Build out command and Control

Use chief Officers is Critical Location, Fill out Command Team
Build/Effective Rehab
Control the Media
Put Medical Sector in Place

MAYDAY PROJECT

Individual Personal Survey - Incident Commander

Behavioral Reactions:

- Abnormal fatigue
- Muscle tremors
- Twitches
- Headaches
- Guilt
- Panic
- Uncertainty
- Irritability
- Feeling isolated
- Sleep problems
- Withdrawal/Isolation
- Inability to Rest/Relax
- Change in Eating Habits
- Loss of emotional control
- Reacting to Criticism (attack)
- Poor Concentration
- Drugs/Alcohol

IC

Need Rehab Too

PROJECT MAYDAY

While operating the nozzle near the Charlie/Delta corner of the retail store, the remaining FF also ran low on air and told the Lt. and Capt. That he had to go outside. He immediately tried to exit but quickly became disoriented in the near-zero visibility conditions within the retail store. The FF returned to the hoseline near the nozzle and the Lt. and Capt. tried to calm him down. The Lt. was low on air and told the Capt. That he would take the FF outside but the FF broke away and disappeared into the thick smoke toward Side Charlie, the rear of the store.

The Lt. began to follow the hoseline out. He heard the missing FF yelling for help off to his right and tried to make his way toward the missing FF but became entangled in a display rack. After freeing himself, the Lt. briefly located the missing FF who stated he was completely out of air and had to get out. The FF again disappeared, moving toward the rear of the store. The Lt. also ran out of air and had to remove his helmet and facepiece because his facepiece was fogging up. The Lt. activated his PASS device and was soon located by E-16 crew and helped outside. The Lt. told rescuers that the FF was missing inside the store. A Mayday was transmitted by the E-20 Capt. At the front door for a missing FF.
E-3 FF was located about 2 minutes later, transported to the hospital and was pronounced dead, Lt. was treated for smoke inhalation.

PROJECT MAYDAY

YOUR COMMENTS

- Deteriorating conditions;
  - came faster than expected
  - couldn't react fast enough
  - crew passing on situation awareness was slow or never came to all crew members
  - moved faster than we should have
  - got off hose line, farther than I should have
  - spacing off the hose line was too far
  - when we fell into the basement, someone should have passed us a line
  - TIC didn't work as expected on the first floor with fire in the basement
  - There should have been ladders at a third floor window for escape, instead of jumping

PROJECT MAYDAY

CONPONENT 2: Post Mayday Incident

look for patterns of behavior "TRIGGERS"

If you have 1 / 3 / 5 of the following triggers, consider changing strategy

The following triggers from audio radio reports were reported in at least 86% of the Maydays

PROJECT MAYDAY

FIREHOUSE: Mayday Article

"Predictable is preventable" is a comment often made by risk-management specialist Gordon Graham. The same remark could be made related to some of the radio communication heard on the fireground by the incident commander (IC) just minutes before a mayday occurs—except it's too late in many cases to prevent the mayday.

Project Mayday

PROJECT MAYDAY

1 "We have zero – visibility conditions"

39 % occurrence

A crew reports that they have zero – visibility conditions – and then reports the same conditions 10 – 15 later. The IC should review what the structure looked like now. Have things gotten worst? Has the crew located the fire? If not, the IC should consider a change in strategy because what they have been doing for the last 20 -30 minutes isn't working. ZVC / PZVC

PROJECT MAYDAY

2 "We have fire above our heads"

81 % occurrence

When a crew reports that they have fire above their heads (basement, first, floor, attic, etc.) could they see it or with a TIC. The IC needs more than where the fire is located. If the report, needs to obtain conditions If fire above our heads occurs within 15 – 2- minutes, after first engine arrives and cannot provides answers to the questions. IC needs to reconsider strategy and IAP.

PROJECT MAYDAY

3 "We have fire below us"

56% occurrence

Fire located in a basement, 1st floor, 2nd floor. In many cases the follow-up communications, "reports floor collapse or hole in the floor". 33% floor collapse … 26% hole in the floor… 28% stairway collapse. This is why 360 are very important, and need to be performed by the 1st unit on the scene.

PROJECT MAYDAY

4 "We need more line to reach the fire, extend our line"

36% occurrence

This report is usually heard at commercial structure fires. Size hose vs water requirements. NO water, when line extended. Review our resources and revisit the IAP

PROJECT MAYDAY

5 "We have NOT found the seat of the fire"

67% occurrence

This report is a major concern, particularly when we have been in the structure for 15 – 20 minutes, and it appears from the outside the conditions are deteriorating. The IC needs to reconsider the issues.

PROJECT MAYDAY

6 "We are running out of air" (or indications of "low – air alarm")

73% occurrence

This alert becomes most critical when it involves multi – units at one time. Is it low-air, out of air, or an SCBA unit issues, it needs to be addressed.

PROJECT MAYDAY

7 "This is a hoarder structure"

54% occurrence

The IC needs to consider everything about the the incident and review their Risk Management Plan. These incident can become a major problem even without fire (weight-floor collapse, health concerns, and fire load.

PROJECT MAYDAY

8 "We have had a flashover"

37% occurrence

Be Prepared! Is the crew safe? How much has the Environment changed? Wet PPC?

PROJECT MAYDAY

9 "We have had a ceiling/ roof collapse"

35% occurrence

When we hear the report of a ceiling or roof collapse, we need to think about the "why" factor. How large of an area is involved? How much fire is involved? Always maintain situational awareness, could a further collapse occur?

PROJECT MAYDAY

10 "We have lost multiple windows"

29% occurrence

Losing windows can create a flow path problem. when performing a 360, note the size and types of windows, higher windows may fail first.

PROJECT MAYDAY

11 "It's really getting hot in here, we are backing out"

44% occurrence

In most cases, crews experiencing this problem found that they either did not recognize the situation fast enough to fully react (situational awareness) or did not move far enough to be safe. 23% were burned.

PROJECT MAYDAY

12 "Our exit has been blocked"

21% occurrence

A blocked exit creates multiple problems (27% of the time when this condition exist, its not Reported as a mayday. In many cases, the crew size will dictate what actions can be taken.

PROJECT MAYDAY

13 "Interior: We are sending a firefighter out with a problem"

32% occurrence

This is a tough call to make for any company officer, depending on the problem and the time it will take to exit. There should be a SOP for this situation, follow it.

PROJECT MAYDAY

14 "We have a hole in the floor or we have had a floor collapse"

56% occurrence

Often time this problems are not recognized for many reasons, smoke conditions, fire conditions, and a unstable structure. Remember, the base-ment holds the structure up.

PROJECT MAYDAY

15 "Command has lost communications with multiple crews"

19% occurrence

This situation occurs most often in commercial structures and high-rises. In most cases where this occurred the portable radios had low batteries.

PROJECT MAYDAY

16 "We have a lot of sprinkler heads going off in here"

54% occurrence

The worst situation is a commercial building, With high rack storage, materials stored on those Shelves get wet (soaked) containers disintegrate And fall to the floor with their contents.

PROJECT MAYDAY

IAFF Fireground Survival Training Program

PROJECT MAYDAY

PROJECT MAYDAY

I Chose to Look the Other Way

I could have saved a life that day,
But I chose to look the other way.
It wasn't that I didn't care,
I had the time, and I was there.
But I didn't want to seem a fool,
Or argue over a Safety Rule.
I knew he'd done the job before,
If I called it wrong, he might get sore.
The chances didn't seem that bad,
I've done the same, he knew I had.
So I shook my head and walked on by,
He knew the RISK as well as I.
He took a chance, I closed my eyes,
And with that act, I let him die.
But, I chose to look the other way.
Now every time I see his wife,
I'll know I should have saved his life.
That guilt is something I must bear,
But it isn't something you need to share.
If you see a risk that others take,
That puts their health or life at stake,
The question asked, or the thing you say,
Could help them live another day.
If you see a risk and walk away,
Then hope you never have to say,
I could have saved a life that day,
But, I chose to look the other way.

- Don Merrell, August 2003