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From: Fleming, Jay [JayF.bfd@ci.boston.ma.us]
Sent: Wednesday, July 27, 2011 3:07 PM
To: NIOSH Docket Office (CDC)
Cc: rparis@local718.org; president@pffm.org; nick@local718.org; mmullane@iaff.org
Subject: 063-B - Stakeholder Comment on the National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program (FFFIPP)-2011
Attachments: Stakeholder Comment - NIOSH Docket 063-B.doc

Dear NIOSH,

Please accept the attached comments regarding NIOSH Docket Number 063-B. As requested, the document is formatted as a Microsoft Word documents and every page makes reference to Docket Number NIOSH-063-B.

Respectfully,

Joseph M Fleming

Writing on behalf of Boston Fire Fighters Local 718 (IAFF) and the Professional Fire Fighters of Massachusetts (IAFF)

(Currently serving as a Deputy Chief on the Boston Fire Dept.)

This is also being faxed to NIOSH.

Stakeholder Comment on the National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program (FFFIPP)-2011

The National Institute for Occupational Safety and Health (NIOSH) is seeking stakeholder input on the progress and future directions of the Fire Fighter Fatality Investigation and Prevention Program (FFFIPP). Since its initiation in 1998, NIOSH has sought public input to help plan and direct the goals and objectives of the FFFIPP. NIOSH received public comments on the FFFIPP in 1998, March 2006, and November 2008. NIOSH is again seeking input on the progress and future directions of the FFFIPP to ensure that the program is meeting the needs and expectations of the U.S. fire service and to identify ways in which the program can improve its impact on the safety and health of fire fighters across the United States. NIOSH will compile and consider all comments received and use them in making decisions on how to proceed with the FFFIPP.

There are several resources that may be useful to individuals and groups who would like to comment on the FFFIPP:

- [The NIOSH Fire Fighter Fatality Investigation and Prevention Program Progress \(FFFIPP\) Report and Proposed Future Directions – 2011](#). This document includes specific topics for stakeholder input.
- [The Strategic Plan for the NIOSH Fire Fighter Fatality Investigation and Prevention Program that was finalized in 2009 after public input](#).
- [The FFFIPP web site that includes an overview of the FFFIPP, fatality investigation reports and other publications](#).

Related Dockets

- [NIOSH Docket number 063](#)
- [NIOSH Docket number 063-A](#)

Public Comment Period

Written comments on the document will be accepted through July 29, 2011 in accordance with the instructions below. All material submitted to NIOSH should reference Docket Number NIOSH-063-B. **All electronic comments should be formatted as Microsoft Word documents and make reference to docket number NIOSH-063-B.**

Comments will be accepted until 5:00 p.m. EDT on July 29, 2011

To submit comments, please use one of these options:

- Send NIOSH comments using this [online form](#)
- Send comments by [email](#).
- Fax comments to the NIOSH Docket Office: 513-533-8285
- Send by Mail to:
NIOSH Mailstop: C-34
Robert A. Taft Lab.
4676 Columbia Parkway
Cincinnati, Ohio 45226

All information received in response to this notice will be available for public examination and copying at the ...
NIOSH Docket Office
4676 Columbia Parkway, Room 111
Cincinnati, Ohio 45226.

A complete electronic docket containing all comments submitted will be available on the [NIOSH docket home page](#), and comments will be available in writing by request. NIOSH includes all comments received without change in the docket, including any personal information provided.

Contact persons for technical information

- Paul Moore
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Stakeholder Comment on the National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program (FFFIPP)-2011

July 26, 2011

John Howard, MD, *Director*
395 E Street, S.W. - Suite 9200
Patriots Plaza Building
Washington, DC 20201
(202) 245-0625
By fax – **513-533-8285**
By e-mail - **nioshdocket@cdc.gov**

Dear Dr. Howard


Since 1998 NIOSH has been investigating fire fighter fatalities with the goal of using lessons learned to reduce the risk faced by our nation's firefighters. However, according to the USFA, "Each year in the United States and its protectorates, approximately 100 firefighters are killed while on duty and tens of thousands are injured. Although the number of firefighter fatalities has steadily decreased over the past 20 years, **the incidence of firefighter fatalities per 100,000 incidents has actually risen.** Despite a downward dip in the early 1990's, the level of firefighter fatalities is back up to the same levels experienced in the 1980's."

<http://www.usfa.dhs.gov/fireservice/fatalities/statistics/history.shtm>

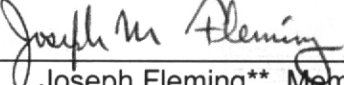
The NFPA has also noted the following, "The lowest number of fire ground deaths since the study began in 1977 occurred in 2010 but, as detailed in the 2009 firefighter fatality study, **firefighter death rates while operating inside at structure fires continue at levels higher than those observed through the 1970s and 1980s.** <http://www.nfpa.org/assets/files//PDF/osfff.pdf>

Local 718 and the PFFM recognize that the NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) has helped the fire service highlight and address many issues affecting firefighter safety. In addition, we recognize that the FFFIPP program has accomplished this with limited resources. However, we feel that some changes to the FFFIPP program may make the "lessons learned" even more effective at reducing firefighter deaths in the future.

Regarding **NIOSH Docket 063-B**, we are attaching a proposal that Local 718 sponsored for the IAFF. In addition we would like to expand upon one of the proposals, for the purpose of this submittal, dealing with NIOSH's use of Subject Matter Experts (SMEs).

Submitted by:  6/27/2011 on behalf of Local 718
Richard Paris, President Date

Submitted by:  6/27/2011 on behalf of PFFM*
Edward Kelly, President Date

Submitted by:  6/27/2011 member of Local 718 and PFFM
Joseph Fleming**, Member Date

* "PFFM" represents Professional Fire Fighters of Massachusetts.

** Joseph Fleming is currently serving as a Deputy Chief on the Boston Fire Dept.

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NIOSH DOCKET NUMBER 063-B

**COPY OF IAFF RESOLUTION APPROVED AT SAN DIEGO CONVENTION
(This was submitted by– Boston Firefighter’s, IAFF Local 718.)**

NIOSH Fire Fighter Fatality Investigation Program

WHEREAS, the NIOSH Fire Fighter Fatality Investigation and Prevention Program (FFFIPP) is a major improvement over what we have had in the past, and the program has led to improvements and fire fighter lives being saved; and

WHEREAS, NIOSH personnel do have some fire service expertise, including fire fighting experience, but they are not required to have fire fighting expertise, and

WHEREAS, the mission of the FFFIPP is divided between two teams: one to investigate cardiovascular and medically-related fatalities and the other to investigate traumatic fatalities. The FFFIPP cardiovascular fatality team has the appropriate skills and qualifications to analyze deaths resulting from heart attacks and other medical conditions; and

WHEREAS, the FFFIPP traumatic fatality team is based in Morgantown and it has limited resources given the complex circumstances and varied scenarios that result in traumatic firefighter deaths. Some members of the traumatic fatality team have fire service backgrounds or fire service training but most of the members of the team come from an occupational safety or occupational forensics background. The traumatic fatality program’s products could be improved by more fire service involvement in directing the work of the team and through direct participation in the work of the team; and

WHEREAS, the FFFIPP traumatic fatality team needs to be enhanced to include fire service subject matter experts (SMEs). These SMEs should be involved at all levels of an investigation to include: initial investigation and interview of witnesses, examination of physical evidence, analysis and review of findings, and development of the investigation report; and

WHEREAS, the presence of fire service SMEs in the NIOSH investigative effort would improve communication between professional NIOSH investigators and local fire department members, provide context information for the NIOSH investigators, and lend additional credibility to the NIOSH team. The SMEs can “speak” the firefighter language and act as a facilitative interpreter between the parties; and

WHEREAS, NIOSH is attempting to increase outreach to the fire service and make recommendations, “more straightforward and practical,” and

WHEREAS, for non-firefighter fatalities NIOSH allows certain states (9) to conduct investigations on its behalf as part of the Fatality Assessment and Control Evaluation (FACE) Program; and

WHEREAS, other federal Agencies, e.g. OSHA, offer courses in accident investigation to employers; therefore be it

(1) RESOLVED, That the IAFF propose and support the mandate that every NIOSH FFFIPP traumatic fatality team include at least two SMEs with **extensive** (*added by Local 718 after approval by IAFF*) experience in firefighting.. These SMEs should have experience on a department of a similar size with similar characteristics (including region of country) to the one being investigated. These SME's should accompany NIOSH investigators to the department where the fatality occurred

(2) RESOLVED, That the IAFF propose and support the mandate that when developing recommendations based on current literature that NIOSH primarily rely upon "nationally recognized" documents and/or books and/or information from national trade journals and that if the source is an individual, as opposed to a consensus opinion from an organization, that NIOSH weigh this as a factor when deciding to use it as a basis for a recommendation.

(3) RESOLVED, That the IAFF propose and support the mandate that NIOSH investigate the effectiveness of all active and passive fire protection in the structure involved in the incident.

(4) RESOLVED, That the IAFF propose and support the mandate that, the IAFF will select 2-4 firefighters from every IAFF District (Total = 32-64) to act as a pool of qualified SME's that NIOSH can select from. Every effort should be made to insure a diverse group of experts so that all types and sizes of departments are represented.

(5) RESOLVED, That the IAFF propose and support a mandate that NIOSH allow states to conduct "NIOSH approved" investigations in the same manner that NIOSH allows certain states to conduct FACE Investigations.

(6) RESOLVED, That the IAFF propose and support the mandate that NIOSH should develop training programs, similar to those developed by the NTSB & OSHA to train these SME's in firefighting related accident investigation, utilizing the FACE methodology, as well as fire investigation. This would insure that team members will be able to combine their work experience with the skills needed to identify the direct and indirect cause of fire fatalities in order to identify methods to prevent them in the future.

COMPARISON OF SME'S EXPERIENCE VS. DEPT. BEING REVIEWED (2007-2010)

RECENT STRUCTURE FIRE NIOSH REPORTS				
NIOSH #	STATE	DATE	DEPT INVESTIGATED	EXPERT'S DEPT.
F2010 - 25	IL	8/9/2010	4,314 Uniformed Members	Active chief – Large Metro FD NFA Fire Protection Div (Fire Experience Unknown)
F2010 - 18	CT	6/1/2011	292 Uniformed Members	Fire Chief – Small Paid Dept. Instructor NFA (Fire experience 2 yrs paid 8 yrs vol?) NFA Fire Protection Div (Fire Experience Unknown)
F2010 -14	NY	5/25/1011	65 Volunteers	Expert on Agricultural Safety and NFA Fire Protection Div (Fire Experience Unknown)
F2010 - 13	KS	1/18/2011	55 Uniformed Members	Instructor NFA (Fire experience 2 yrs paid 8 yrs vol?) NFA Fire Protection Div (Fire Experience Unknown)
IAFF Convention – San Diego (08/2010)				
F2009 - 23	NY	8/24/2009	675 Paid	Retired Chief – Major Metropolitan Dept.
F2009 - 13	MD	5/7/2009	800 Paid – 1100 Volunteer	Consultant – Volunteer Experience (SFPE Member)
F2009 - 11	TX	04/12/2009	3,605 Paid	Fire Chief (Very Small Dept.) & Consultant
F2009 - 07	WV	02/19/2009	Volunteers	Fire Chief (Volunteer FF & Book Author)
F2008 - 34	AL	10/29/2008	Volunteer (21 members)	Retired Chief - Large Metro Chief – Consultant
F2008 - 03	CO	02/22/2008	Combination (69 Paid & 80 Vol)	Retired Chief – Major Metropolitan Dept.
F2008 – 26	IL	07/22/2008	Volunteer (Mutual Aid)	Fire Chief – Small Paid Dept.
F2008 – 37	MI	11/15/2008	1,326 Paid	Retired Chief – Major Metropolitan Dept.
F2008 - 07	NC	03/07/2008	67 Paid	Fire Chief (Medium Size dept./ 120 Members)
F2008 - 09	OH	04/04/2008	60 Paid 150 (Part-time)	Fire Chief (Volunteer FF Book Author)
F2008 - 08	PA	03/05/2008	Volunteer (20 members)	Retired Chief - Large Metro Chief – Consultant
F2008 - 06	PA	02/29/2008	Volunteer (25 – 32 members)	Fire Chief – Small Paid Dept.
F2008 - 01	PA	01/06/2008	150 Paid	NFA Expert - ??????
F2008 - 21	TX	07/05/2008	Volunteer (30 members)	Fire Chief – Small Paid Dept.
F2007 - 28	CAL	07/21/2007	344 Paid	Fire Chief (Medium Size– 6 FH's) & Consultant -2
F2007 - 16	GA	05/28/2007	400 Paid	Retired Chief - Large Metro Chief – Consultant
F2207 - 35	DC	10/29/2007	1,463 Paid	Deputy Chief – Large County Dept.
F2007 - 32	MA	08/29/2007	1500 Paid	Fire Chief (Paid – 120 Members) - 2
F2007 - 19	NY	06/21/2007	11,500 Paid	Deputy – Large Urban City
F2007 - 08	PA	02/04/2007	18 Paid	Battalion Chief – (435 Paid 492 Volunteers)
F2007 - 18	SC	06/18/2007	240 Paid	Multiple Chiefs

1. Many SME's are also consultants. – **Isn't there a possible conflict of interest?**
2. Only 7 different Retired or Active Chiefs used in a 2 year period (2008 to 2009 with 14 structural investigations). – **Are they the only ones qualified? Are they the only ones who volunteered?**
3. Retired Fire Chiefs from large cities were asked to review small combination departments while Fire Chiefs from small, sometimes very small departments were asked to review very large departments. – **WHY?**
4. In 2008 – 2009, there were no active members of Large Fire Department and in 2007 – 2009 no non-Chiefs were considered experts. – **WHY?**
5. Since the IAFF adopted Local 718's resolution it appears that NIOSH has attempted to broaden its number of SMEs by having reports reviewed by staff at the National Fire Academy and the NFA. However, in most cases it does not appear that NIOSH has used multiple SME's **from similar sized departments, as suggested by the IAFF.** If an SME, whether as an individual or organization, is going to be brought in as an expert in firefighting then the specific firefighting background of the reviewer(s) should be mentioned (years and type of service). In addition, it would be helpful if these SME's could assist in the on-site investigation.

REASONS WHY NIOSH SHOULD USE SME'S WITH SIMILAR FIRE FIGHTING EXPERIENCE TO THE FIRE DEPT. BEING REVIEWED

NIOSH DOCKET 063-B

NFPA 1500 requires that Training and Operating Guidelines be appropriate for the staffing and conditions faced by that particular fire department. This will necessitate different training and different guidelines as Fire Departments vary in size and region. However, NIOSH too often adopts a "one size fits all" approach when making recommendations that fail to take into account contextual issues.

Adoption of these resolutions by NIOSH would insure that a large urban fire dept. is not critiqued by an SME from a small rural dept. This would also insure that a small rural dept. is not critiqued by an SME from a large urban dept. In addition, requiring a "non-chief" to participate, when appropriate, would increase the probability that NIOSH would get multiple perspectives on any incident.

In many cases, NIOSH, using investigators with relatively little firefighting experience, is analyzing the decisions made by experienced firefighters. Since in many cases decisions on the fireground are made using experienced-based intuition, **it is critical that SME's be chosen who have similar backgrounds to the personnel whose decisions are being analyzed.** Here are some author's/researcher's opinions.

*Gary Klein has found that the most critical decisions we make are based on intuition. Although sometimes difficult to explain, intuition is important in making decisions and is based on the ability to recognize patterns and interpret cues, i.e., **it develops through experience.***
http://www.ara.com/Capabilities/c_related_powerofintuition.htm

*Consistent with this finding that experience pays, a battalion chief with the New York fire department urged from his own 25-years experience that managers pay particular attention to their own inner voice when taking decisions under stress. For "making the right call when the heat is on", he writes, "**intuition is really your subconscious trying to offer up the benefits of a lifetime's worth of experience.**" (Salka, 2004).*
http://www.fireleadership.gov/toolbox/staffride/downloads/lsr9/lsr9_leaders.pdf

*According to Klein, fire ground commanders will make 80% of their decisions in less than one minute (Klein, 1998. p. 1, p.4). Applying this information to our emergency scene decision-making, **we can expect individual's experiences to be a major factor in determining the selected course of action when faced with time-pressure situations.***
<http://www.firehouse.com/topic/training/incident-review-instructional-method-part-ii>

*Apparently, the FGCs had so many similar firefighting experiences that these became merged in memory, with no specific cases standing out. **A fire could be spoken of as typical, which suggested our next category: prototype. For example, they have been through hundreds of house fires. When they encounter one, they view it as typical of their prototype, which would include some standard layouts, some standard approaches, and so on.***
<http://edm.sagepub.com/content/4/3/186.full.pdf+html>

The ultimate goal of most investigations is to identify basic or root causes. Addressing such higher order causes offers the greatest potential return in terms of prevention. **The identification of basic root causes almost always involves an element of judgment and absolute certainty is a rare commodity in such analyses** (Sklet, 2004; U.S. Department of Energy, 1992)

<http://www.sciencedirect.com/science/article/pii/S0001457510004070>

Another benefit of using SME's who have been in similar situations to the firefighters whose decisions are being critiqued is that it will help prevent "hindsight bias," i.e. the tendency to define errors by their consequences.

http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20020063485_2002103814.pdf

One set of researchers took the following position.

*Sometimes people, even experts, make decisions that turn out badly. To what degree are these bad outcomes a function of inadequate decision making processes? The National Transportation Safety Board (NTSB, 1994) has identified tactical decision "errors" in 25 of 37 aircraft accidents in which the flight crew's behavior contributed to the accident. What are we to make of these cases? Were they all events in which the crew was "unlucky" and overtaken by situations beyond their control? **Were the decision errors simply a function of hindsight bias, in which the crews' decision processes were judged to be in error after the fact, when things turned out badly, despite similar decisions in similar situations that turned out OK?** Were the crews trapped in organizational contexts that predisposed them to err? Were the tools and automation available to them designed in ways that invited decision error?*

*There are two major problems in identifying decision errors in naturalistic contexts. First, errors typically are defined as deviations from a criterion of accuracy. However, no clear standard of "correctness" may exist in naturalistic contexts. The "best" decision may not be well defined, as it often is in a highly structured laboratory task. Second, there is a loose coupling of event outcome and decision process, so that outcomes cannot be used as reliable indicators of the quality of the decision. Redundancies in the system can "save" a poor decision or error. Conversely, even the best decision may be overwhelmed by events over which the decision maker has no control, resulting in an undesirable outcome, e.g. in windshear conditions where one aircraft may land safely but the next be affected by windshear. These occasions may be labeled as decision error, but as Fischhoff (1975), Hawkins and Hastie (1990), Woods, Johannesen, Cook, and Sarter (1994), and others point out, there is always the danger of hindsight bias - the tendency to define errors by their consequences. **The problem is that the observer does not know how often exactly the same decision process was used or the same decision was made with no negative consequences. Were those prior decisions also "errors"?***

According to the IAFF Line of Duty Investigation Manual,

*"A comprehensive LODD investigation typically requires a team of at least three to five members to gather and process all of the necessary information and develop the report. The LODD Investigation Team should include members **who have the necessary expertise and perspective to examine all of the aspects that are pertinent to the occurrence** - the specific requirements will vary depending on the nature and circumstances of the situation.*

To insure that investigators have the expertise and, just as importantly, the perspective to properly analyze an incident, NIOSH should include members with appropriate fire fighting experience.

Here are some examples in which having an SME with similar experience to the members of the department being reviewed might have proved helpful

NIOSH “Lessons Learned” Regarding a 360 Degree Size Up

Example from NIOSH Report 2009 -11 & NIOSH Report 2007- 32: The size-up should also include assessments of risk versus gain during incident operations. *Retired Chief Alan Brunacini recommends that the arriving IC drive partially or completely around the structure whenever possible to get a complete view of the structure.*

In both cases, NIOSH, with the concurrence of their SME’s, cited the failure to conduct a 360 degree size up as a contributing factor. However, in both cases structural issues would have made “*driving partially or completely around the structure*” impractical. In addition, NIOSH does not identify definitively how the information gained would have altered the outcome. On a smaller fire department with fewer resources and longer response times the IC may have the time to conduct a 360 survey and still get to the front of the building in time to assign the next arriving companies. (Note: Both SME’s appear to come from rural departments.) In larger cities where companies can arrive every 1-2 minutes after the initial companies it would not be prudent for the IC to be in the back of the building when companies are arriving at the front. In addition, in some cities the IC has an incident command technician, who can observe the conditions remote from the command post. While adequate size up is critical NIOSH does not make it clear why a 360 degree drive around the building, by the IC is required to accomplish this goal.

Klein et al (<http://edm.sagepub.com/content/4/3/186.full.pdf+html>) talk about how real life size up is actually conducted. *“Part of the skill of an FGC is in knowing when to obtain more information. The term they use is “size-up.” Theoretically, a size-up must be done at every incident prior to acting. However, for practical reasons, it is not always possible to complete the size-up. **Valuable time can be lost continuing a size-up while a fire spreads out of control.** For example, in Case 26, a fire in a factory, the FGC began to walk around the factory, saw a fire burning through the wall, and immediately ordered his crew to train their hoses on it. He recognized that it was a good place to use his resources and did not want to let it burn further while he kept walking. His experience allowed him to judge what a good place to hit a fire looked like. A novice would not be able to make such a judgment. In this domain, time is critical and actions must be initiated without the benefit of complete information analyses.*

The need to view the 360° size up from the perspective of the local fire dept would appear to be supported by a document that NIOSH has referenced as “authoritative, the IAFC “Rules of Engagement.” http://www.iafcsafety.org/Rules_of_Engagement_v8_7.10.pdf

- *To keep firefighters safe, the complete fireground must be rapidly assessed before a safe action plan can be developed. This requires a quick walk around of all sides of the building by the first arriving company officer (the initial Incident Commander), OR, the Incident Commander must rapidly obtain radio reports from officers on all sides of the fireground.*
- *Obtaining a 360 degree size up is about time versus risk. It will take some element of time for the incident commander to obtain a complete size up and during. During that time period the incident commander should be cautious in assignments for any crews.*
- *The initial arriving officer may have enough time to rapidly conduct a 360 degree size up before additional crews arrive on scene while an attack crew is entering a building and while complying with the two in, two out rule.*
- ***In the rural environment,** it may be many minutes before a second due company arrives of the scene providing even more time to conduct a 360 degree size up. Until other companies are on Scene, there are no other companies to command.*

- **In the urban environment,** multiple companies will be arriving on scene in a relative rapid manner and it may be more effective to quickly assign fire crews to various locations and obtaining a size up report from company officers.
- In some cases, the first arriving chief officer assuming command can drive around the incident building to obtain a complete 360 degree assessment of the fireground while assuming command.
- If barriers prevent a walk around, or drive around, of the fireground, the Incident Commander **MUST** next assign a fire officer to conduct the 360 degree size up. This may also require the assignment of crews to each side of the incident in order to obtain critical size-up information.

NIOSH “Lessons Learned” Regarding Appropriate Hose Line Size

Here is a quote from NIOSH Investigation 2007-32

“In this incident, the initial crew stretched an uncharged 1 ¾ inch handline into the kitchen. The delay in charging the hoseline and the reduced reach, volume, and penetration of the initial 1 ¾ inch handline was not sufficient to control the fire which was seated in the void spaces of the cockloft.⁹ The fire conditions continued to grow rapidly and build up smoke and fire gases within the cockloft area which was over 8,000 cubic feet. As hot smoke radiates it heats other combustibles, increases pyrolysis and adds more flammable fuel to the gas layer. The larger 2 ½ inch handline may have been able to penetrate into the void spaces with adequate volume to cool down the hot gas layer, reducing the chance of these gases igniting or a rapid fire event occurring.” (Note: The fire in the cockloft was not immediately apparent.)

Here is a quote from NIOSH Investigation 2010-10

*During this incident, **arriving fire departments were faced with a large volume of fire and an entrapped civilian.** Prior to the flashover, the fire was burning uncontrolled at the rear of the house (house addition and garage) and spreading into the house. FF1, the victim, and injured fire fighter/paramedic were tasked with advancing a charged 2½-inch hoseline into the house to assist with the search and for fire suppression. They were able to advance this hoseline approximately 12 feet into the house, but advancing and operating a large-diameter hoseline within tight quarters may be extremely cumbersome even if adequate staffing is available to accomplish this task. Fire fighters and officers need to understand that while a 2½-inch hoseline provides a greater flow, fire fighters need to be able to move the line quickly and efficiently interiorly, especially when performing a search and experiencing deteriorating fire conditions. An alternate decision to advancing the 2½-inch hoseline into the small house could have been to deploy and advance a 1¾-inch hoseline(s), which would have been easier to maneuver within the house.*

It appears that regardless of the choice made in the hoseline selection (1 ¾ vs. 2 ½) that NIOSH may, and probably will, describe it as a “bad decision.” It would appear that this is a classic example of “hindsight bias.” (This was discussed earlier.)

http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20020063485_2002103814.pdf

*The only way to test one's decisions is to judge the response from the environment.” Sometimes one will be correct; sometimes one will be wrong. Thus, the failure is in the **system**, not in the individual. Errors are always contingent on the context and method of analysis. Moreover, to the extent that naturalistic decision **making** is “hedge clipping” rather than “tree felling” (Connolly, 1988), the decision maker him- or herself uses outcomes as a basis for gathering information about the situation and for evaluating decisions that have*

*been made. This perspective suggests that a more productive approach to identifying decision errors is to examine **error-inducing contexts**.*

http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20020063485_2002103814.pdf

It would seem that this type of analysis error would be less likely if appropriate SME's were involved in the investigation. We agree with the IAFC who stated, "*The presence of fire service SMEs in the NIOSH investigative effort would improve communication between professional NIOSH investigators and local fire department members, provide context information for the NIOSH investigators, and lend additional credibility to the NIOSH team. The SMEs can "speak" the firefighter language and act as a facilitative interpreter between the parties*".

http://www.iafcsafety.org/Safety%20PDFs/Final%20FFFIPP%20TF%20Report_7.11.07.pdf

NIOSH Statements from a Recent Investigation (F2010 – 18)

Here is a quote from NIOSH Investigation F2010-18

Fire fighters must understand that as temperatures increase in the initial stages of a fire, plastics begin to give off large quantities of various gases. This is called quantitative decomposition, and it happens long before materials reach their ignition temperatures.²⁶ The two principal toxins in smoke—carbon monoxide and hydrogen cyanide—act to deprive the brain of oxygen, and their effects would be enhanced due to the lower levels of oxygen in the air.²⁷ Hydrogen cyanide is a colorless, odorless gas that is released from plastics, natural and synthetic building components, and household items like carpet fibers and polyurethane foam cushions—all of which were present in the structure. Symptoms of hydrogen cyanide exposure include confusion, involuntary muscle movement, vertigo, shortness of breath, or coma.²⁸

While this is useful information in general, it is hard to understand why it is relevant to this investigative report. Here is another quote from this investigation.

The room and contents fire was determined to have originated in a bedroom on the 2nd floor, A/B corner; it was quickly knocked down by E3 (see Photo 2). It is believed that the fire got into the eaves when it was lapping out the A/B corner windows, and then spread within the large void spaces in the ceiling and walls of the 3rd floor.

If the majority of the fire was in the void space and the original fire was knocked down (1551) a long time before the mayday (1613) then why is the burning behavior of plastics a critical factor in this fire?

Here is a recommendation from F2010 – 18. - #6: *Fire departments should ensure that a rapid intervention team (RIT) is readily available and prepared to respond to fire fighter emergencies.*

Once again, while this is useful information in general it is hard to understand why it is in this investigative report. According to the timeline, the 2nd RIT Company was on scene (1609) at least 4 minutes before the mayday (1613).

In this report, NIOSH did recommend that, "*dispatch centers should also be constantly monitoring fireground communications for critical radio reports,*" and this item does appear to have been a contributing factor. Despite this, NIOSH states that, "*NIOSH investigators did not have an opportunity to interview the actual dispatcher(s) who worked the 9-1-1 console or the supervisor(s) on duty the day of the incident.*"

So it would appear, in this case at least, that several items highlighted by NIOSH, while important in a general sense, were not relevant to the fatalities that occurred. At the same time items that appear to have been a contributing factor were not fully investigated. It would appear to be common that inexperienced investigators may focus on general procedural violations as opposed to items relevant in a specific case.

According to Klein, *"During an accident investigation, if someone finds that a procedure wasn't followed, even if it didn't directly cause the accident, there is a good chance that "Procedural violation" will be trumpeted as one of the contributing factors. I once participated in an aviation accident investigation. The flight data recordings showed pretty clearly that the pilots hadn't done everything exactly by the book. The senior pilot next to me pointed out that pilots violate some procedures on almost every flight. There are so many procedures that pilots are bound to violate some minor ones. No one pays attention to that unless there is an accident; then "procedural violations" become part of the story."* ("Streetlights and Shadows, Klein, MIT Press, Cambridge, MA 2009)

NIOSH "Lessons Learned" Regarding Risk vs. Gain Analysis

Perhaps the area in which "hindsight bias" is most likely to occur involves risk vs. gain decisions.

Here is a quote from NIOSH Investigation 2010-10

The size-up should also include a risk-versus-gain assessment during incident operations, especially after primary searches have been conducted¹⁻⁶, situational awareness, and a survivability profile.

Another tool that the IC should consider using is survivability profiling. Survivability profiling uses the knowledge learned of fire behavior and spread, smoke (i.e., color, condition, movement), and building construction to examine a situation and make an intelligent decision of whether to commit fire fighters to life saving and/or interior operations.⁹ In other words, survivability profiling involves assessing the probability that a trapped occupant is still alive and can safely be rescued with the current or impending conditions.

According to reference 9, which is cited by NIOSH

"1) A fire in a rear bedroom of a house, with smoke throughout the house, may allow a survivable environment if a search and rescue effort is initiated quickly. We may extend risk, in a calculated manner, in these conditions. 2) A significant fire in a residence with dense smoke under pressure to floor level throughout the building likely means victims could not survive. A very cautious, calculated rescue and fire control operation would be warranted. 3) A well-involved building would likely represent a zero survivability profile."
[http://www.fireengineering.com/index/articles/display/5854199752/articles/fire-engineering/survival-zone/2010/07/Survivability Profiling How Long Can Victims Survive in a Fire.html](http://www.fireengineering.com/index/articles/display/5854199752/articles/fire-engineering/survival-zone/2010/07/Survivability%20Profiling%20How%20Long%20Can%20Victims%20Survive%20in%20a%20Fire.html)

Regarding #2, what if the victim is behind a closed door of a bedroom? If an occupant followed this strategy isn't the underlying assumption in #2, that the "victims could not survive," highly questionable? According to the USFA, *"Keep your child's bedroom door closed. If a hallway fire occurs, a closed door may hinder the smoke from overpowering your baby or toddler, giving firefighters extra time for rescue."* <http://www.usfa.dhs.gov/campaigns/usfaparents/escape/>

Regarding the concept of risk it important to note the following

"We may make risk as small as we like by increasing the safeguards but may never, as a matter of principle, bring it to zero. Risk is never zero, but it can be small. Included under the heading "safeguards" is the idea of simple awareness. That is, awareness of risk reduces risk. Thus, if we know there is a hole in the road around the corner, it poses less risk to us than if we zip around not knowing about it. Connected to this thought is the idea that risk is relative to the observer. We had a case in Los Angeles recently that illustrates this idea. Some people put a rattlesnake in a man's mailbox. Now if you had asked that man: "Is it a risk to put your hand in your mailbox?" He would have said, "Of course not." We however, knowing about the snake, would say it is very risky indeed. Thus risk is relative to the observer. It is a subjective thing- it depends upon who is looking."

<http://josiah.berkeley.edu/2007Fall/NE275/CourseReader/3.pdf>

As a consequence, even if the IC concludes correctly that the risk is small and the gain is large, there will be a certain % of times that the firefighters may get seriously injured. It seems likely that in this type of case that NIOSH would tend to "define errors by the consequences" and conclude that an incorrect "risk vs. gain" decision was made. We recognize that sometimes a poor risk vs. gain analysis can lead to a firefighter fatality but the people who are passing judgment should be people who have been in a similar position.

According to the USFA here are statistics on firefighter fatalities by "type of duty," for 2004 – 2009.

http://www.usfa.dhs.gov/downloads/pdf/publications/ff_fat09.pdf

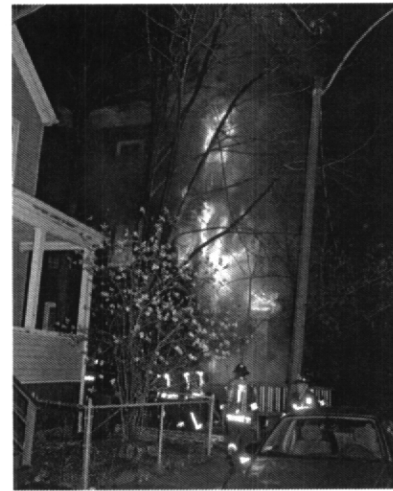
http://www.usfa.dhs.gov/downloads/pdf/publications/ff_fat08.pdf

<http://www.usfa.dhs.gov/fireservice/fatalities/statistics/history.shtm>

YEAR	# FF FATALITIES DURING SEARCH AND RESCUE	# FF FATALITIES FOR ALL STRUCTURAL FIRES	FF FATALITES / 100,000 FIRES
2009	4	26	2.97
2008	2	21	3.86
2007	15	35	3.53
2006	4	22	2.98
2005	6	19	2.81
2004	4	22	3.42
TOTAL	35	145	-----

Despite the tragic fact that some fire fighters die each year conducting "search and rescue" operations when one considers that each year thousands of "search and rescue" operations occur and that hundreds, possibly, thousands, of victims are rescued each year, it would appear that in the vast majority of instances that an adequate "occupant survivability profile" has been made. In addition, it appears that this has been true for many years.

A “Real Life” Risk vs. Gain Analysis



In the fire depicted in this picture the fire had extended into every floor and on the 2nd floor it had traveled through all of the room in the front of the apartments. All floors were heavily charged with smoke. There were water supply problems and the volume of fire and closeness of adjacent structure made rescue over ladders problematic. Several occupants had already jumped out of 2nd and 3rd floor windows. Experienced firefighters later told me that they assumed anyone left inside would probably die. Nevertheless 5 occupants were rescued by 3 firefighters. All were close to death and needed immediate emergency medical care and several needed to spend time in a hyperbaric chamber.

The firefighters were inside conducting search and rescue operations at the time these photos were taken. Since all of the rescues were made without the benefit of a charged line and all firefighters had to operate individually due to the number of occupants that needed to be rescued, it is fair to assume that if anyone of them had died that NIOSH might criticize them for not following the “rules.” What they did instead was utilize their experience and intuition as well as their trust in knowing that their fellow firefighters would be right behind them with additional resources. As a consequence, 5 people are alive today. Perhaps firefighters with less experience or firefighters working on a department without the resources of the Boston Fire Dept. would have reached a different “risk vs. gain” conclusion. But that is the point – every fire department is different and every fire is different. Utilizing SME’s from similarly sized department to the one being reviewed might provide more insight into the root causes of accidents and as a consequence lead to more insightful recommendations as well as a more “balanced” and “fair” critique of the fire dept. involved in the incident.

Local 718 and the PFFM are strong supporters of the NIOSH FFFIPP program and we hope that our comments assist it in helping all of us protect firefighters lives.