

Rules of Engagement Project

Increasing Firefighter Survival

**Developed by the Safety, Health and Survival Section
International Association of Fire Chiefs**

Project Overview

July 2010

Introduction

The International Association of Fire Chiefs (IAFC) is committed to reducing firefighter fatalities and injuries. As part of that effort the nearly 1,000 member Safety, Health and Survival Section of the IAFC has developed DRAFT “Rules of Engagement of Structural Firefighting” to provide guidance to individual firefighters, and incident commanders, regarding risk and safety issues when operating on the fireground. The intent is to provide a set of “model procedures” for Rules of Engagement for Structural Firefighting to be made available by the IAFC to fire departments as a guide for their own standard operating procedure development.

In August, 2008, following a year of discussion, the Section moved to develop a set of “Rules of Engagement for Structure Firefighting”. A project team was created consisting of Section members and representatives of other several other interested fire service organizations. These included the Fire Department Safety Officer Association (FDSOA), the National Fallen Firefighter Foundation (NFFF), the National Volunteer Fire Council (NVFC), the National Institute of Occupational Safety and Health (NIOSH) and other organizations. All draft material has also been shared with representatives of the International Association of Fire Fighters (IAFF) who developed a joint IAFF/IAFC “**Fire Ground Survival Project**”. Three Section members also participated in the IAFF project.

The direction provided the project team by the Section leadership was to develop rules of engagement with the following conceptual points;

- Rules should be a short, specific set of bullets
- Rules should be easily taught and remembered
- Rules should define critical risk issues
- Rules should define “go” or “no-go” situations
- A companion lesson plan/explanation section should be provided

Early in development the Rules of Engagement, it was recognized that two separate rules were needed – one set for the firefighter, and another set for the incident commander. Thus, the two sets of Rules of Engagement described in the attached document. Each set has several commonly shared bullets and objectives, but the explanations are described somewhat differently based on the level of responsibility (firefighter vs. incident commander).

The attached document (draft 7) reflects nearly two years of public comment and feedback from several presentations at fire service conferences, including the National Fallen Fire Fighters Safety Summit held at the National Fire Academy this past March. The “Rules” are expected to be formally adopted by the IAFC Health, Safety and Survival Section at the Fire Rescue International Conference to be held in Chicago this coming August.

The project team is still accepting public comment until the Fire Rescue International conference. The reader may direct comments to Chief Gary Morris, the project lead, at mercurymorris@hotmail.com

SECTION ONE

Rules of Engagement for Structural Firefighting

Increasing Firefighter Survival

**Developed by the Safety, Health and Survival Section
International Association of Fire Chief**

Introduction and Background

DRAFT 8

June 25, 2010

Document Description

Section One includes introduction statements and background regarding the Rules of Engagement project.

Section Two acknowledges the Project team members and others that assisted in the project.

Section Three contains the individual “Bullets” for both the Rules of Engagement for Firefighter Survival as well as the Incident Commanders Rules of Engagement for Firefighter Safety.

Section Four describes the objectives attached to each of the individual “bullets” for both set of Rules.

Section Five provides an introduction and overview of the lesson plans for the Rules of Engagement.

Section Six includes the lesson plan for the Rules of Engagement of Firefighter Survival.

Section Seven contains the lesson plans for the Incident Commanders Rules of Engagement for Firefighter Safety.

Section Eight serves as appendixes and contains full investigation reports of several significant firefighter fatality incidents.

Introduction and Background

The law enforcement and military communities long ago developed “rules of engagement” regarding the use of deadly force. These rules are described in short, specific terms that are easily taught and remembered. The rules define critical rapid assessments necessary to justify firing their weapons or the use of deadly force. The rules have proven to be highly successful for both of these disciplines. It is believed that a similar concept in designing rules of engagement for the fire service would prevent firefighter fatalities.

The Safety, Health and Survival Section of the IAFC was created in 2004, an expansion from the existing smaller safety committee. Presently, the Section has nearly 1,000 members, and growing. The members include chief officers and company officers from all types of fire departments, many of them safety officers, who are committed to reducing firefighter fatalities and improving all areas of firefighter safety. This large number of members brings a broad depth of expertise to assist in improving firefighter safety and survival.

In August, 2008, following a year of discussion, the Section moved to develop a set of “Rules of Engagement for Structure Firefighting”. A project team was created consisting of Section members and representatives of other interested fire service organizations. These included the Fire Department Safety Officer Association (FDSOA), the National Fallen Firefighter Foundation (NFFF), the National Volunteer Fire Council (NVFC), the National Institute of Occupational Safety and Health (NIOSH) and other organizations. All draft material has also been shared with representatives of the International Association of Fire Fighters (IAFF) who developed a joint IAFF/IAFC “**Fire Ground Survival Project**”. Three Section members also participated in the IAFF project.

Early in development the Rules of Engagement, it was recognized that two separate rules were needed – one set for the firefighter, who is at the greatest risk, and another set for the incident commander who is responsible for keeping all members on the fireground safe. Thus, the two sets of Rules of Engagement described in this document. Each set has several commonly shared rules and objectives, but the explanations are described somewhat differently based on the level of responsibility (firefighter vs. incident commander).

A brief overview of an earlier draft of the “Rules” was published in the IAFC newsletter “On Scene” in the June and July, 2009, issues and readers were directed to the Sections website to review the complete document that included the bullets, objectives and explanation/lesson plans. That resulted in numerous public comments. The “Rules” were updated at the Section meeting at the annual Fire Rescue International conference in Dallas in August 2009 and again at the Sections mid-year meeting in January at the IAFC Headquarters based on public comments received to date. That was followed by presentations at the Firehouse and FDIC conferences and the National Fallen Firefighters Foundation Safety Summit held at the Fire Academy in March, 2010. Public comment from these conferences has been inserted in the now 8th draft of the document.

The Need for Rules of Engagement

Firefighter safety must always be a priority for every fire chief and every member. Over the past three decades, the fire service has applied new technology, better protective clothing and equipment, implemented modern standard operating procedures, and improved training. According to National Fire Protection Association (NFPA) data during this same period the fire service has experienced a 58 percent reduction in firefighter line of duty deaths. **But, the country has also seen a paralleling 54 percent drop in the number of structural fires over the same period – thus, reducing firefighter exposure to risk.** With a continued annual average of more than 100 firefighter fatalities, the question remains; have we really made a difference with all these technology improvements? Or, is there more that we can do to improve the safety culture of the American fire service?

The U.S. Firefighter Disorientation Study, conducted by Captain Willie Mora, San Antonio, Texas, Fire Department, conducted a review of 444 firefighter fireground deaths occurring over a recent 16 year period (1990-2006). The project broke out traumatic firefighter fatalities occurring in “open structures” and “enclosed structures”. Open structures was defined as smaller structures with an adequate number of windows and doors (within a short distance) to allow for prompt ventilation and emergency evacuation. Enclosed structures were defined as large buildings with inadequate windows or doors to allow prompt ventilation and emergency evacuation. Research determined that 23 percent occurred when a fast and aggressive interior attack was made on an “opened structure”. When fast, aggressive interior attacks occurred in “enclosed structures” the fatality rate rose to 77 percent. Many occurred in “marginal” or rapidly changing conditions in which the firefighter should not have been in the building.

The fireground creates a significant risk to firefighters and it is the responsibility of the incident commander and command organization officers to minimize firefighter exposure to unsafe conditions and stop unsafe practices. The fire service has always been a para-military organization when it comes to fireground operations. In most cases, the Incident Commander makes a decision, sends the order down to through supervisors to the company officer and crew. Fire crews generally view these orders as top down direction. There is often little two-way discussion about options. Where this culture exists, crews have been trained to accept the order and do it – generally without question. While these orders may be viewed as valid when issued they may involve inadequate risk assessment.

There has been little national development of basic “rules” that the incident command should use in defining risk assessment process and what is too high risk that may result in a “no-go” decision. Furthermore, for the individual firefighter who is exposed to the greatest risk, we have not defined “rules” for them to follow in assessing their individual risk and when and how to say “no” to unsafe conditions or practices. The “Rules of Engagement” changes that.

The “Rules of Engagement” have been developed to assist both the incident command (as well as command team officers) in risk assessment and “Go” – “No-Go” decisions. Applying the rules will make the fireground safer for all and reduce injuries and fatalities.

The development of the rules integrated several nationally recognized programs and principles. They included risk assessment principles from NFPA Standards 1500 and 1561. Also included were concepts and principles from Crew Resource Management (available from iafc.org) and data and lessons from the National Near-Miss Reporting System (firefighternearmiss.com). The development process also included review of lessons learned from numerous firefighter fatality investigations conducted by the National Institute of Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program.

It's incumbent that the fire chief and the Departments management team insure the safety of all firefighters working at structural fires. All command organization officers are responsible for their own safety and the safety of all personnel working with them. All officers and members are responsible for continually identifying and reporting unsafe conditions or practices. The Rules of Engagement allows both the firefighter and the incident commander to apply and process these principles.

One principle applied in the Rules of Engagement is firefighters and the company officers are the members at most risk for injury or death. The Rules integrate the firefighter into the risk assessment decision making process. These members should be the ultimate decision maker as to whether it's safe to proceed with assigned objectives. The "Rules" allow a process for that decision to be made while still maintain command unity and discipline.

It is well known that firefighting is hazardous with varying levels of risk to the firefighter. **However, firefighting is not a military campaign where lives are lost to establish a beach head.** No firefighter's life is a building that eventually will be rebuilt.

Keep all members safe so "Everyone Goes Home"!

SPECIAL NOTE: The explanation/lesson plan section of this document contains numerous NIOSH firefighter fatality investigation reports. In all the reports, two or more of the Rules of Engagement were violated. Had the "Rules" existed at the time, AND been appropriately applied, the incident may not have resulted in a firefighter fatalities.

SECTION TWO

Rules of Engagement Project Team

RULES OF ENGAGEMENT PROJECT TEAM

Project Lead:

Gary Morris, Retired Fire Chief, Phoenix and Seattle Fire Departments

Team members:

Billy Golfeder, Deputy Chief, Loveland-Symmes Fire Department, Ohio

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Dave Fischler, Retired Fire Commissioner, Suffolk County Department Fire Rescue and Emergency Services, New York

Scott D. Kerwood, Fire Chief, PhD., Hutto Fire Rescue, Texas

Dave Daniels, Fire Chief, Woodinville Fire and Life Safety District, Washington

Danny Kistner, Assistant Chief, Garland Fire Department, Texas

Brett Bowman, Assistant Chief, Prince William County Department of Fire and Rescue, Virginia

Scott Goodwin, Division Chief, Santa Fe Department of Fire Rescue, New Mexico

John Sullivan, Deputy Chief, Worcester Fire Department, Massachusetts

Robert Dube', Fire Chief, Louisa County Fire & EMS, Virginia

Ed Nied, Deputy Chief, Tucson Fire Department, Arizona

Keith Pagett, Deputy Chief, Fulton County Fire Department

Randall Telifarro, Fire Chief, East Lansing Fire Department, Michigan

Liaison Organization Reviewers:

Jeff Cash, Fire Chief, Cherryville Fire Department, **National Volunteer Fire Council**

Mike Gurley, Battalion Chief, Virginal Beach Fire Department, Virginia. **Fire Department Safety Officer Association**

Gordon Routely, Fire Chief retired, Shreveport Fire Department, Louisiana. **National Fallen Firefighters Foundation**

Ron Dennis, Deputy Chief retired, Avondale Fire Department, Arizona. Executive Director, Arizona Fire Chiefs Association. **National Fallen Firefighters Foundation.**

Tim Merinar, Safety Engineer. **National Institute for Occupational Safety and Health, Fire Fighter Fatality Investigation and Prevention Program**

Bill Troup, **United States Fire Administration**

William R. Mora, Fire Captain retired, San Antonio Fire Department. **U.S. Firefighter Disorientation Study**

Derek Alkonis, Los Angeles County Fire Department. International Association of Fire Fighters, **IAFF Fireground Survival Project**

Steve Austin, **Cumberland Valley Volunteer Fireman's Association as well as Responder Safety Institute**

Frank Montone, Fire Chief, Naval Air Station Key West, **Department of Defense**

Thanks, also, to the many other fire service professionals who took the time to review the several drafts of the Rules of Engagement document and provided public comment. Public comment was essential to producing a quality product

SECTION THREE

Rules of Engagement Bullet List

Rules of Engagement for Firefighter Survival

- Size-Up Your Tactical Area of Operation.
- Determine the Occupant Survival Profile.
- **DO NOT** Risk Your Life for Lives or Property That Can Not Be Saved.
- Extend **LIMITED** Risk to Protect **SAVABLE** Property.
- Extend **Vigilant** and **Measured** Risk to Protect and Rescue **SAVABLE** Lives.
- Go in Together, *Stay Together*, Come Out Together
- Maintain Continuous Awareness of Your Air Supply, Situation, Location and Fire Conditions.
- Constantly Monitor Fireground Communications for Critical Radio Reports.
- You Are Required to Report Unsafe Practices or Conditions That Can Harm You. Stop, Evaluate and Decide.
- You Are Required to Abandon Your Position and Retreat Before Deteriorating Conditions Can Harm You.
- Declare a May Day As Soon As You **THINK** You Are in Danger.

The Incident Commanders Rules of Engagement for Firefighter Safety

- Rapidly Conduct, or Obtain, a 360 Degree Size-Up of the Incident.
- Determine the Occupant Survival Profile.
- Conduct an Initial Risk Assessment and Implement a **SAFE ACTION PLAN**.
- If You Do Not Have The Resources to Safely Support and Protect Firefighters – Seriously Consider a Defensive Strategy.
- **DO NOT** Risk Firefighter Lives for Lives or Property That Can Not Be Saved – Seriously Consider a Defensive Strategy.
- Extend **LIMITED** Risk to Protect **SAVABLE** Property.
- Extend **Vigilant** and **Measured** Risk to Protect and Rescue **SAVABLE** Lives.
- Act Upon Reported Unsafe Practices and Conditions That Can Harm Firefighters. Stop, Evaluate and Decide.
- Maintain Frequent Two-Way Communications and Keep Interior Crews Informed of Changing Conditions.
- Obtain Frequent Progress Reports and Revise the Action Plan.
- Ensure Accurate Accountability of All Firefighter Location and Status.
- If, After Completing the Primary Search, Little or No Progress Towards Fire Control Has Been Achieved - Seriously Consider a Defensive Strategy.
- Always Have a Rapid Intervention Team in Place at All Working Fires
- Always Have Firefighter Rehab Services in Place at All Working Fires.

SECTION FOUR

Rules of Engagement Bullets and Objectives

Rules of Engagement for Firefighter Survival

Size-Up Your Tactical Area of Operation.

Objective: To cause the company officer and firefighters to pause for a moment and look over their area of operation and evaluate their *individual* risk exposure and determine a safe approach to completing their assigned tactical objectives.

Determine the Occupant Survival Profile.

Objective: To cause the company officer and firefighter to consider fire conditions in relation to possible occupant survival of a successful *rescue event* as part of their initial and ongoing *individual risk assessment* and action plan development.

DO NOT Risk Your Life for Lives or Property That Can Not Be Saved.

Objective: To prevent firefighters from engaging in high risk search and rescue and firefighting operations which may harm them when fire conditions prevent occupant survival and significant or total destruction of the building is inevitable.

Extend *LIMITED* Risk to Protect *SAVABLE* Property.

Objective: To cause firefighters to limit risk exposure to a reasonable, cautious and conservative level when trying to save a building.

Extend *Vigilant* and *Measured* Risk to Protect and Rescue *SAVABLE* Lives.

Objective: To cause firefighters to manage search and rescue and supporting firefighting operations in a calculated, controlled and safe manner, *while remaining alert to changing conditions*, during high risk primary search and rescue operations where lives can be saved.

Go in Together, Stay Together, Come Out Together

Objective: To ensure that firefighters always enter a burning building as a team of two or more members and *no firefighter is allowed to be alone at any time* while entering, operating in or exiting a building.

Maintain Continuous Awareness of Your Air Supply, Situation, Location and Fire Conditions

Objective: To cause all firefighters and company officers to maintain constant situational awareness their SCBA air supply and where they are in the building and all that is happening in their area of operations and elsewhere on the fireground that may affect their risk and safety.

Constantly Monitor Fireground Communications for Critical Radio Reports.

Objective: To cause all firefighters and company officers to maintain constant awareness of *all* fireground radio communications on their assigned channel for progress reports, critical messages or other information that may affect their risk and safety.

You Are Required to Report Unsafe Practices or Conditions That Can Harm You. Stop, Evaluate, and Decide.

Objective: To prevent company officers and firefighters from engaging in unsafe practices or exposure to unsafe conditions that can harm them and *allowing any member to raise an alert about a safety concern without penalty* and mandating the supervisor address the question to insure safe operations.

You Are Required to Abandon Your Position and Retreat Before Deteriorating Conditions Can Harm You.

Objective: To cause firefighters and company officers to be aware of fire conditions and cause an early exit to a safe area when they are exposed to deteriorating conditions, unacceptable risk and a life threatening situation.

Declare a May-Day As Soon As You THINK You Are in Danger

Objective: To insure the firefighter is comfortable with, and there is no delay in, declaring a May Day when a firefighter is faced with a life threatening situation and the May Day is declared as soon as they THINK they are in trouble.

The Incident Commanders Rules of Engagement for Firefighter Safety

Rapidly Conduct, or Obtain, a 360 Degree Size Up of the Incident

Objective: To cause the incident commander to obtain an early 360 degree survey and risk assessment of the fireground in order to determine the safest approach to tactical operations as part of the risk assessment and action plan development *and before firefighters are placed at substantial risk.*

Determine the Occupant Survival Profile.

Objective: To cause the incident commander to consider fire conditions in relation to possible occupant survival of a successful *rescue event* before committing firefighters to high risk search and rescue operations as part of the initial and ongoing *risk assessment* and action plan development.

Conduct an Initial Risk Assessment and Implement a SAFE ACTION PLAN

Objective: To cause the incident commander to develop a safe action plan by conducting a thorough size-up, assess the occupant survival profile and completing a thorough risk assessment *before* firefighters are placed in high risk positions on the fireground.

If You Do Not Have the Resources to Safely Support and Protect Firefighters – Seriously Consider a Defensive Strategy

Objective: To prevent the commitment of firefighters to high risk tactical objectives that cannot be accomplished safely due to inadequate resources on the scene.

DO NOT Risk Firefighter Lives for Lives or Property That Can Not Be Saved – Seriously Consider a Defensive Strategy.

Objective: To prevent the commitment of firefighters to high risk search and rescue and firefighting operations that may harm them when fire conditions prevent occupant survival and significant or total destruction of the building is inevitable.

Extend *LIMITED* Risk to Protect SAVABLE Property.

Objective: To cause the incident commander to limit risk exposure to a reasonable, cautious and conservative level when trying to save a building that is believed, following a thorough size up, to be savable.

Extend *Vigilant* and *Measured* Risk to Protect and Rescue SAVABLE Lives.

Objective: To cause the incident commander to manage search and rescue, and supporting firefighting operations, in a highly calculated, controlled, and cautious manner, *while remaining alert to changing conditions*, during high risk search and rescue operations where lives can be saved.

Act Upon Reported Unsafe Practices and Conditions That Can Harm Them. Stop, Evaluate and Decide.

Objective: To prevent firefighters and supervisors from engaging in unsafe practices or exposure to unsafe conditions that will harm them and *allowing any member to raise an alert about a safety concern without penalty* and mandating the incident commander and command organization officers promptly address the question to insure safe operations.

Maintain Frequent Two-Way Communications and Keep Interior Crews Informed of Changing Conditions

Objective: To insure that the incident commander is obtaining frequent progress reports from command organization officers and all interior crews are kept informed of changing fire conditions observed from the exterior by the incident commander, or other command officers, that may affect crew safety.

Obtain Frequent Progress Reports and Revise the Action Plan

Objective: To cause the incident commander, as well as all command organization officers, to obtain frequent progress reports, to continually assess fire conditions and any risk to firefighters, and to regularly adjust and revise the action plan to maintain safe operations.

Ensure Accurate Accountability of All Firefighter Location and Status

Objective: To cause the incident commander, and command organization officers, to maintain a constant and accurate accountability of the location and status of all firefighters within a small geographic area of accuracy within the hazard zone and be aware of who is presently in or out of the building.

If, After Completion of the Primary Search, Little or No Progress Towards Fire Control Has Been Achieved - Seriously Consider a Defensive Strategy.

Objective: To cause a benchmark decision point, requiring the incident commander to determine if it's safe to continue offensive interior operations if there is no progress in controlling the fire and there are no lives to be saved following the completion of the primary search.

Always Have a Rapid Intervention Team in Place at All Working Fires.

Objective: To cause the incident commander to have a rapid intervention team in place ready to rescue firefighters at all working fires.

Always Have Firefighter Rehab Services in Place at All Working Fires.

Objective: To insure all firefighters who endured physically strenuous activity at a working fire are rehabilitated and medically evaluated for continued duty.

SECTION FIVE

Introduction and Overview of Explanation of Lesson Plans

The following two sections provide explanation and lesson plan information regarding the intent and justification of the Rules of Engagement for Firefighter Survival and The Incident Commanders Rules of Engagement for Firefighter Safety. They are intended to be the foundation for the development of lesson plans to deliver training on the “Rules”. The project team has processed a great number of public comments received over the past 6 drafts and inserted appropriate updates in these documents.

In the Explanation-Lesson Plan Section, each of the “bullet” items of the Rules has an explanation of the intent of the bullet and how it is intended to be applied on the fireground.

Each Rule “bullet” and “objective” also has at least one National Institute for Occupational Safety and Health (NIOSH) Fire Fighter Fatality Investigation and Prevention Program report assigned to it to further illustrate the purpose of each individual bullet statement. Each report is a summary of the full investigation. A report number is provided that will allow the instructor to obtain more information if desired to expand instruction capability.

Also included with each bullet statement are reports from the National Near Miss Reporting System that provide additional supporting case histories for each bullet statement.

The reader should be advised that the “Bullets and Objectives” have undergone extensive public review over the last two years including presentations at several major fire service conferences. As a result, there is now broad general agreement on those items. Little change is expected for these items.

The explanation and lesson plan sections remain under development by the project team. The project team welcomes additional public comment on these sections

SECTION SIX

Rules of Engagement for Firefighter Survival Explanations

Explanations

And

Lesson Plans

Rules of Engagement for Firefighter Survival

Size-Up Your Tactical Area of Operation.

Objective: To cause the company officer and firefighters to pause for a moment and look over their area of operation and evaluate their *individual* risk exposure and determine a safe approach to completing their assigned tactical objectives.

NO GO. If your assigned objective cannot be achieved because existing conditions prevent success, stop and report the situation to the incident commander and revise the objective.

All firefighters are responsible for their own safety and the safety of other firefighters working with them.

The company officer and firefighter, by the nature of their work, are the persons at greatest risk during offensive firefighting operations. They are also the people “on location” that can best see what’s happening on their side of the fireground and what the risk may be.

The company officer and firefighter must size-up their side of the fireground, or operational area, to determine risk and selected the safest approach to achieving objectives assigned by command.

The company officer and firefighter must not tunnel vision on the task at hand- such as focusing only on the sidewalk leading to the door. It’s necessary to take a few seconds to size up the total situation within line of sight viewing.

Each side of the fireground has its own unique fire conditions and risk that must be assessed by all members from their assigned positions.

There are visual factors that are both present and not present. Evaluating these factors can allow the firefighter to forecast future conditions and risk.

The first company officer, or team leader, to each side of the incident must provide a progress report about significant findings and risk.

The firefighter must consider all interior conditions as part of the size up and before entry.

Firefighters must know what is burning, where it is, and where it’s likely to progress.

Abandoned and dilapidated buildings are a special consideration for a no-go decision. Where an active and progressing fire is present, a defensive strategy should be seriously considered from the outset.

If the size up looks unsafe, “feels” unsafe, DON’T DO IT! Communicate it up, down and across. Sometimes the gut is a good indicator for a no-go decision.

The first company officer or team leader to reach an assigned work location must notify the incident commander of arrival and provide a size-up radio report of significant findings.

The company officer and firefighter must also listen closely to radio communications or reports related to fire operations. Fire conditions, or hazards elsewhere on the fireground, may quickly increase risk to firefighters in their operational areas.

If significant risks are identified or other important information is observed that will affect safety or the action plan that must be reported to the incident commander or other supervising command officer.

Ongoing progress reporting from company officers or other command organization officers are necessary to keep the incident commander informed and the action plan current.

Resources must match the assigned objectives – proper sized and number of hose lines, staffing, etc.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which company officers and fire fighters may not have adequately sized-up their tactical area of operation or evaluated their individual risk exposure to determine a safe mode of operation, including:

Career Probationary Fire Fighter and Captain Die as a Result of Rapid Fire Progression in a Wind-Driven Residential Structure Fire – Texas

<http://cdc.gov/niosh/fire/reports/face200911.html>

Shortly after midnight on Sunday, April 12, 2009, a 30-year old male career probationary fire fighter and a 50-year old male career captain were killed when they were trapped by rapid fire progression in a wind-driven residential structure fire. The victims were members of the first arriving company and initiated fast attack offensive interior operations through the front entrance. Less than six minutes after arriving on-scene, the victims became disoriented as high winds pushed the rapidly growing fire through the den and living room areas where interior crews were operating. Seven other fire fighters were driven from the structure but the two victims were unable to escape. Rescue operations were immediately initiated but had to be suspended as conditions deteriorated. The victims were located and removed from the structure approximately 40 minutes after they arrived on location.

Key contributing factors identified in this investigation include: **an inadequate size-up prior to committing to tactical operations**; lack of understanding of fire behavior and fire dynamics; fire in a void space burning in a ventilation controlled regime; high winds; uncoordinated tactical operations, in particular fire control and tactical ventilation; failure to protect the means of egress with a backup hose line; inadequate fireground communications; and failure to react appropriately to deteriorating conditions.

Career Fire Fighter Dies After Being Trapped in a Roof Collapse During Overhaul of a Vacant/Abandoned Building—Michigan

<http://www.cdc.gov/niosh/fire/pdfs/face200837.pdf>

On November 15, 2008, a 38-year-old male fire fighter (the victim) died **after being crushed by a roof collapse in a vacant/abandoned building. Fire fighters initially used a defensive fire attack to extinguish much of the fire showing from the second-floor windows on arrival.** After the initial knockdown, fire crews entered the second floor to perform overhaul operations. During overhaul, the roof collapsed with several fire fighters still inside, on the second floor. The victim and two other fire fighters were trapped under a section of the roof. Crews were able to rescue two fire fighters (who self-extricated), but could not immediately find the victim. After cutting through roofing materials, the victim was located by fire fighters, unconscious and unresponsive. He was removed from the structure and transported to a local hospital where he was pronounced dead.

Career Fire Captain Dies When Trapped by Partial Roof Collapse in a Vacant House Fire - Texas

<http://www.cdc.gov/niosh/fire/pdfs/face200509.pdf>

On February 19, 2005, a 39-year-old career fire Captain (the victim) **died after being trapped by the partial collapse of the roof of a vacant one-story wood frame dwelling.** The house was abandoned and known by residents in the area to be a “crack house” at the time of the incident. The victim was the captain on the first-arriving engine crew which was assigned to perform a “fast attack” – to take a hoseline into the house, locate the seat of the fire, and begin extinguishment. The one-story wooden ranch-style house was built in the 1950s and additional rooms had been added at the rear in at least two phases following the initial construction. **Crews arriving on scene could see fire venting through the roof at the rear of the house.** The victim and a fire fighter advanced the initial attack line through the front entrance and made their way toward the rear of the house. **Visibility was good in the front of the house but conditions quickly changed as they advanced toward the rear. The fast attack crew had just begun to direct water onto the burning ceiling in the kitchen and den areas when the roof at the rear of the structure (over the building additions) collapsed, trapping the captain under burning debris.** The collapse pushed fire toward the front of the house which quickly ignited carbon and dust particles suspended in the air along with combustible gases, sending a fireball rolling toward the front of the structure. Prior to the time of the collapse, two other crews had entered through the front entrance. The rapidly deteriorating conditions following the collapse quickly engulfed the other crews with fire. Crew members became disoriented and crews became separated as they attempted to find their way out. Five fire fighters received burns requiring medical attention.

Volunteer Fire Lieutenant Killed While Fighting a Basement Fire - Pennsylvania

<http://www.cdc.gov/niosh/fire/pdfs/face200808.pdf>

On March 5, 2008, a 35-year-old male volunteer Fire Lieutenant (the victim) died while fighting a basement fire. **About 30 minutes after the fire call had been dispatched and the crews had been evacuated from the structure and accounted for, a decision was made to re-enter the structure to try and extinguish the fire.** The victim, an Assistant Chief (AC), and a Captain had made their way down an interior stairway to the basement area where the victim opened a 1 ¾-inch hoseline. Shortly thereafter, the Captain told the AC that he had to exit the basement stairs. A few seconds later, the AC told the victim to shut down the line and evacuate the basement because the fire was intensifying. The AC was second up the stairs and told a fire fighter at the top of the stairway landing that the victim was coming up behind him. The AC exited the structure while the fire fighter stayed at the top of the stairway and yelled several times to the victim, but received no response. The fire fighter exited the structure and informed the AC that the victim had not come up from the basement. The AC then notified the Incident Commander who activated a rapid intervention (RIT) team. The RIT made entry into the structure but was repelled by the intensity of the fire. After several more rescue attempts, the victim was removed from the building and later pronounced dead at the hospital. Four other fire fighters were treated for minor injuries and were released from the hospital. The following factors were identified as contributing to the incident: an absence of relevant standard operating guidelines; lack of fire fighter team continuity; suboptimal incident command and risk management; and lack of a backup hose line.

Two Career Fire Fighters Die While Making Initial Attack on a Restaurant Fire –Massachusetts

<http://www.cdc.gov/niosh/fire/pdfs/face200732.pdf>

On August 29, 2007 a 55-year-old male career fire fighter (Victim #1) and a 52-year-old male career fire fighter (Victim #2) died while conducting an interior attack to locate, confine, and extinguish a fire located in the cockloft of a restaurant. Upon arrival, fire was showing through the roof with negligible smoke and heat conditions in the main dining area. Victim #1 was on the nozzle flowing water on the fire in the ceiling area above the exhaust hood and duct work for the stove/broiler in the kitchen. His officer and the officer from the first arriving ladder company provided back-up on the 1 ¾-inch handline. Victim #2 was in the main dining area searching for fire extension above the suspended ceiling. **Approximately five minutes after the first crew arrived on the scene, a rapid fire event occurred.** Victim #1 was separated from his crew and was later found on the handline under debris with trauma to his head. Victim #2 had a lapel microphone with an emergency distress button which sounded a minute after the rapid fire event, likely from fire impingement. He was found in the area of the dining room where he was operating just before the rapid fire event occurred.

NEAR MISS REPORTS

Report #06-111

Our department was called out to a double wide mobile home fire. There were 3 of us that responded. I was Chief at the time. We found the structure involved in the front with flames coming out of the front windows. We charged a 1 3/4" line and began to knock down the fire. We had been in the defense attack mode about 15 minutes, when I decided to walk around to the rear while the two firefighters continued to battle the blaze in front.

At the rear of the structure about 6 ft. from the rear wall, was an 8 ft. propane tank. What we did not know was that the fire had burned through the rear wall and was rapidly heating up the propane tank to the point that the water that had fallen into the valve containment bowl on top of the tank was boiling like a tea kettle. I had no idea why the pressure relief valve had not functioned, but I knew that we were very close to leaving this world. Needless to say we immediately began to forget about the structure and started to cool the tank. At that time I had attended two classes from the state fire academy that amounted to introduction to basic firefighting. However, **my instructors had repeatedly stressed how important it was to do a walk around size-up. I had failed to do that and it almost cost our lives.**

I am now a state Fire Academy certified Level 2 entry firefighter with 23yrs. experience. As Training Officer for our department, I tell our firefighters that unless they have the ability to see through structures, they had better be doing a walk around size-up. In my opinion, one of the most important aspects of any kind of emergency is situational awareness and in that incident I completely lost sight of that. Having looked at the results of the reports that were sent in by other departments' near-miss incidents, I was stunned to learn that the main contributing factor in the majority of those incidents was the same as our incident, situational awareness.

Report #07-860

My department [Department name deleted] **responded to a mutual aid call for a large multi-unit apartment fire.** This incident was commanded by a neighboring fire department [Department name deleted]. The incident was located in a mixed use area of [City name deleted]. Upon arriving on scene (5-10 minutes after first arriving units) the four man crew from [Name of company deleted] was instructed by the Incident Commander to make entry and advance a hoseline into one of the upstairs burning units. They were instructed to begin attacking the fire in the common attic shared by multiple upstairs apartment units. They took a scuttle hole ladder, pike poles, axes, and a charged hoseline with them and entered the smoke filled unit. Two of us began breaching the ceiling sheetrock with a pike pole and positioned a scuttle hole ladder to access the attic space overhead. The other two personnel had the charged hoseline and worked their way to a large source of smoke coming from a shared wall between the units we were in and the adjacent unit. **The hose team used a second pike pole to open the wall between the units. They found a large volume of fire in the adjacent unit. As the two on the hose team backed up to inform us of the situation, the floor began sagging and cavernously opening up where the floor met the wall adjacent to the burning unit. This revealed a large volume of fire in the downstairs unit directly below us.** The officer of our hose team pulled the nozzleman back from the opening in the floor and our interior crew immediately backed out of the apartment. After everyone was safely outside, our team reported the rapidly deteriorating fire conditions to the Incident Commander.

We then descended the exterior metal stairs to ground level and pulled our equipment back. As we were performing this task, the Incident Commander gave the order for immediate withdrawal of all interior crews and sounded three blasts on all the air horns. **Approximately two minutes after the evacuation was ordered, the building we were working in collapsed.**

This incident had the potential for a significant loss of life if the interior crews continued working and were not made aware of the rapidly deteriorating conditions. It is my opinion that the Incident Commander could have more fully sized up the extent of the fire. An assessment should have been made regarding the degree in which the ground floor units were involved before ordering teams to make entry into the overhead upstairs units. Despite being "packed up", our somewhat limited visibility, our diminished situational awareness created by our SCBA masks, and our [Manufacturer deleted] hoods, **we should have checked the fire conditions downstairs before proceeding upstairs.**

Report # 09-1146

While returning from a previous incident, the engine spotted light smoke in a residential area. At approximately the same time that they began to report the smoke, the county dispatch rang out a structure assignment to that area. As a result the engine arrived several minutes prior to the next due unit. The structure was a triplex with each unit being approximately 2,500 sq. ft. or 7,500 sq. ft in total. It was built into the side of a grade and entry from the front door placed you on the second floor, leaving you with one floor below and one floor above.

The captain gave a report on conditions that included smoke and fire coming from the roof and all occupants out of the building. **The captain then made the decision to don SCBAs, pull an attack line, and make entry through the front door. A 360 degree survey had not been completed,** nor was any other unit on scene. Upon making entry, the captain reported encountering light smoke at the ceiling level with clear visibility into the structure. He then made the decision to advance the line down a hallway where the captain and fire fighter encountered heavy smoke down to the floor; a second alarm was requested.

At this point, the captain requested ventilation, but no other units were on scene and the department's only truck company has an extended response time into the involved area. The captain and fire fighter continued to advance until they encountered active fire. After a quick knock down, they employed the use of a thermal imager and spotted an additional heat source to their right, down another hallway. They advanced to that position and began fighting fire in the kitchen area.

The second due engine arrived a full 5 minutes and 11 seconds after the initial unit went on scene. The driver of the first arriving engine had already established his own water supply. The second unit was assigned to back up the first due engine. **After making an initial knock down of the fire in the kitchen, the captain realized he had fire below him and that there was an additional level to the building. However, he was not aware of how to access the lower level.** The captain and fire fighter then began to fight the fire from above it.

It was at this point that the captain and fire fighter suffered burns. It is believed that as the crew was fighting the fire windows on the lower level blew out, creating horizontal ventilation contributing to the rapid acceleration of the fire. The crew, being positioned above the fire, resulted in them being exposed to an excessive amount of heat. This resulted in the captain and fire fighter backing out of the building.

The crew was treated at the hospital. The captain returned to duty and completed his shift. The fire fighter did not return that day. Both the captain and fire fighter were wearing all personal protective equipment including hoods. The fire eventually grew to five alarms.

Report#09-1030

Upon walk around, the captain noted the window in the fire room was craze cracked. All windows and doors were intact. Second engine was delayed because they were doing training out of their district. The captain elected to make an offensive interior attack. He had his driver setup the positive pressure fan.

The incident commander arrived and noticed that the crew was entering the structure. The second engine arrived and placed a backup line into service. The incident commander noted that there was no exit vent hole. The driver of the second engine broke the window to the fire room and thick black smoke came out under great pressure (25-30 feet horizontal) the smoke quickly erupted to a ball of flame. Meanwhile the crew inside was trying to open a large window in the kitchen.

I believe that if the kitchen window had been opened prior to the fire room window, the fire ball would have caught the interior crew in a catastrophic flashover. The crew would have been between the vent exit hole and the fire while the positive pressure fan was pumping fresh air to fuel the fire. **Command should have stopped the operation, made a transitional defensive to offensive attack, and waited until the structure was properly ventilated and until the backup line was in place before beginning an interior attack.**

Determine the Occupant Survival Profile.

Objective: To cause the company officer and firefighter to consider fire conditions in relation to possible occupant survival of a successful *rescue event* as part of their initial and ongoing *individual risk assessment* and action plan development.

NO GO. If the occupant(s) cannot survive the search and *rescue event* do not commit. Obtain fire control before searching.

Our goal is to save lives. Firefighters are exposed to the greatest risk during primary search and rescue operations. Search efforts must be based on the potential to save lives. No action plan can be accurately developed until we first determine if the occupant can survive the fire conditions before rescuers reach them AND remove them. If survival is not possible, a more cautious approach to fire operations must be taken.

The firefighter, company officer and the incident commander must factor growing fire conditions, resources on scene (the number of firefighters to complete a rescue), and the time to complete a rescue into the decision to conduct and support search and rescue.

Search and rescue and the related removal of any victims from the fire building takes time and most often while conditions continue to deteriorate – sometimes rapidly, thus increasing risk. A search and rescue decision must be balance against time and conditions. In some cases, the search and rescue effort must be abandoned because of deteriorating conditions.

Today's fire environment is far more toxic and lethal than the past. Victims die quickly and sooner than what occurred a few decades ago. If there is no potential for survival, the action plan should be based on that determination and must reduce firefighter risk exposure.

The rescuer must determine if victims can survive individual compartments as part of decision making.

A fire in a home in the middle of the night, with fire showing out a rear window, and modest smoke throughout the rest of the building, may allow victim survival.

A fire in the same home in the middle of the night, with significant fire showing from several windows, and dense smoke under pressure pushing out of openings, may not permit any victims to survive the heat, toxic environment, and the time required to search and remove them .

A well involved structure will not allow for survival of any victims.

A fire in an apartment building may not allow survival in a well involved apartment (compartment), but the survival profile may be good in the adjacent apartment(s). The action plan should extend search and rescue to the exposure apartments if safe to do so.

An accurate determination of a survival profile most likely require a 360 degree size up

Firefighters must be continually aware that search and rescue takes time to complete – the patient may not survive the rescue event in a toxic environment and fire conditions which may not improve during the rescue effort. Be cautious

Abandoned and dilapidated buildings are a particular risk to firefighters and experience has shown there is little likely hood of containing any occupants.

SPECIAL NOTE: In an article titled “Survivability Profiling: Are victims Savable?”, published in the December 2009 issue of Fire Engineering magazine, author Captain Stephen Marsar, of the Fire Department of New York cited the following study.

The Boston Globe newspaper, in 2005, examined federal investigation reports of 52 fires that killed 80 firefighters between 1997 and 2004. In only 14 of those 52 incidents was there even a suspicion of trapped occupants. In only 6 of those 52 incidents were people in the building at the time of the fire departments arrival and, once again, not one of those 52 fires resulted in a civilian fatality.

B. Dedman, Fewer Resources, Greater Risk for Firefighters, Boston Globe, January 31, 2005

What this research suggests is firefighters are dying in large numbers at fires where there are NO OCCUPANT/VICTIMS in the building. In order to increase firefighter survival, firefighters must seriously evaluate whether any occupants are actually in the building and thoroughly assess their survival profile.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which fire fighters engaged in high risk operations at structures with minimal value and conditions indicated that occupant survival was unlikely, including:

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children—Keokuk, Iowa

[cdc.gov/niosh/fire/reports/face200004.html](https://www.cdc.gov/niosh/fire/reports/face200004.html)

At approximately 0823 hours, the three victims and two additional fire fighters had cleared the scene of a motor-vehicle incident. One of the fire fighters (Fire Fighter #1) riding on Engine 3 joined the ambulance crew to transport an injured patient to the hospital. At approximately 0824 hours, Central Dispatch received a call from a neighbor, about a structure fire with the possibility of children trapped inside. Central Dispatch notified the fire department and at approximately 0825 hours dispatched Aerial Truck 2 with the Shift Commander (Victim #1) and an Engine Operator (Victim #2). Aerial Truck 2 proceeded to the scene. At 0827 hours, Engine 3 was dispatched and responded to the scene with a Lieutenant and an Engine Operator (Victim #3). The Chief responded by Car 5661 to the hospital to pick up Fire Fighter #1 and continue to the scene. At approximately 0829 hours, the Shift Commander (Victim #1) radioed the hydrant position at the scene to Engine 3 who was approximately 1 minute behind Aerial Truck 2. As Aerial Truck 2 approached the location of the structure, the Shift Commander (Victim #1) radioed Central Dispatch and requested that 6 additional fire fighters be called in due to the severity of the situation. Aerial Truck 2 reported white to dark brown smoke showing from the residence.

Aerial Truck 2 arrived on the scene at approximately 0830 hours. A woman and a child were trapped on a porch roof at the front of the residence. The fire fighters were informed that three children were trapped inside the house. Victim #1 proceeded into the house through the front door to perform a search-and-rescue operation. A police officer, who arrived on the scene before Aerial Truck 2, positioned a ladder to the porch roof and removed the mother and child. The Lieutenant from Engine 3 connected a line (200 feet of a 5-inch supply line) to the hydrant as the Engine Operator (Victim #3) pulled the engine into position. After connecting the line, the Engine Operator (Victim #3) and the Lieutenant from Engine 3 connected the supply line to Aerial Truck 2.

At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene. The Chief assumed duties as the Incident Commander (IC). Through face-to-face contact the IC instructed Victim #3 to finish hooking the supply line to Aerial Truck 2, then "gear up" and proceed into the house to assist in the search-and-rescue operation. *Note: In this incident only fireground officers were equipped with portable radios, thus only certain members on the fireground receive their instructions over their portable radios. Other fireground personnel are forced to rely on face-to-face communications from the IC or their crew leader.* Fire Fighter #1 stretched 200 feet of a 1½-inch handline through the front door of the structure into the front downstairs room, noting smoky conditions with little heat. Fire Fighter #1 then went back to Engine 3 to finish donning her protective gear.

At this time, one of the victims handed a child to a police reserve officer near the front door of the structure. The police reserve officer transported the child to a nearby hospital. As the first child was removed, the IC charged the handline and went back up to the structure. At this time, a second child was brought to the door. The IC ran to the door and grabbed the child from one of the victims and began cardiopulmonary resuscitation (CPR). The IC then looked for someone to give the child to; however, there were no other fire fighters or emergency medical service personnel on the scene. A second police officer transported the IC and the child to the hospital.

Note: Both children removed from the structure were pronounced dead at the hospital.

At approximately 0835 hours, Fire Fighter #1 went up to the front of the structure to begin an active fire fight and noticed that the hoseline was free-flowing. **As Fire Fighter #1 continued toward the structure she discovered that the hoseline had burned through and flames were protruding from the entrance.**

Note: It is believed, through interviews conducted, evidence at the scene, and a fire model developed by NIST, that the dining room flashed, causing secondary flashovers in the living room, and ventilation conditions created a path of least resistance up the stairs, injuring and disorienting the three fire fighters enough to prevent their escape from the structure.

Noting that the hose was free-flowing, the Lieutenant from Engine 3 shut the line down. He then charged a second line that was stretched into the house for Fire Fighter #1 and proceeded to his engine to "gear up." At this time, Fire Fighter #1, standing inside the doorway of the structure, was yelling that they were out of water. The Lieutenant then proceeded to the pump panel of Aerial Truck 2 and opened the wheel valve, recharging the line for Fire Fighter #1. Fire Fighter #1 then initiated suppression activities in the living room. **Note: Due to the extreme heat Fire Fighter #1 would advance the hoseline into the room and then retreat. This sequence was repeated several times.**

At approximately 0839 hours, the Chief returned to the scene and continued his role as IC. Shortly after the Chief returned to the scene, Engine 6 arrived with an Assistant Chief (Assistant Chief #1) and a Lieutenant. As the Lieutenants from Engines 3 and 6 and Assistant Chief #1 finished donning their protective gear, they were told by onlookers that there was the possibility of a civilian in the upstairs apartment on the non-fire side of the building *Note: The neighbor's car was parked in front of the house, causing concern among onlookers that he was still inside the structure.* At this time the IC ordered the Lieutenant from Engine 3, the Lieutenant from Engine 6, and Assistant Chief #1 to form a three-man search-and-rescue team to search the apartment located on the top floor of the non-fire side.

The search-and-rescue team proceeded through the front door (non-fire side) to the upstairs apartment. As they reached the landing at the top of the stairs, the search-and-rescue team split up in their search efforts. Assistant Chief #1 went off to the left to search, the Lieutenant from Engine 3 went straight ahead toward the back of the structure, while the Lieutenant from Engine 6 stayed near the entrance of the structure. At this point, there was zero visibility in this side of the structure due to thick smoke.

Note: Through interviews conducted it was determined that the Fire Department had not completed any type of ventilation at this time. However, it is believed that horizontal ventilation took place in the rear of the structure by a police officer. Both rear first floor windows of the structure were cleared in both the fire and non-fire sides of the structure. Photographs reviewed by investigators show that the fire department was possibly on the scene conducting search-and-rescue operations when the horizontal ventilation was conducted; however, an exact time of the horizontal ventilation could not be determined, due to insufficient fireground communication between the fire department and the police officers on the scene. The window cleared on the fire side of the structure was the bathroom window near the kitchen. ATF agents, who conducted a post-fire investigation of the structure, and the engineers from NIST, who developed the fire model, concluded that the door leading from the bathroom to the kitchen area was closed and intact when the window was cleared. Consequently, it is believed that the clearing of this window had little impact on ventilation or fire growth.

After conducting their searches, the search-and-rescue team met on the upstairs landing to decide what their next move should be. At approximately 0848 hours, they heard the IC yelling for Victim #1, so the search-and-rescue team exited the structure and proceeded to the IC to get their next assignment. *Note: After returning from the hospital, the IC (Chief) regained command and started to account for all fire fighters on the scene. He realized that he was now missing three fire fighters (Victims #1, #2, and #3).* At approximately 0850 hours, Aerial Truck 1, consisting of a four-man crew (Lieutenant, Engine Operator, and Fire Fighters #2 and #3), arrived on the scene. At the same time, an Assistant Chief (Assistant Chief #2) and a fire fighter (Fire Fighter #4) arrived on the scene in a privately owned vehicle (POV). Assistant Chief #1 from Engine 6, the Lieutenant from Engine 6, and the Engine Operator from Engine 3 were ordered to continue as a Rapid Intervention Team (RIT) and search the fire side of the structure. Assistant Chief #2 and Fire Fighter #4 donned their SCBA, pulled an additional line off Aerial Truck 2, and went into the structure to assist in suppression activities. Assistant Chief #2, the nozzleman, and Fire Fighters #2 and #4 manned the hoseline inside the doorway, spraying water into the living room. Fire Fighter #1 was also near the entrance of the structure performing suppression activities. The Engine Operator from Aerial Truck 1 went into the hallway, and then heard Assistant Chief #2 ask for a positive pressure ventilation fan (PPV) to be placed in the front doorway. Fire Fighter #2 took the nozzle from Fire Fighter #4, and Assistant Chief #2 acted as additional backup as they continued spraying water into the living room. At this time, Fire Fighter #2 noticed a helmet lying on the floor in the front right room, and then saw one of the victims lying on the floor. *Note: It is undetermined why the victims' integrated and manual PASS devices were not heard sounding in this incident.* The interior suppression crew's (Fire Fighter #2, Fire Fighter #4, and Assistant Chief #2) low-air alarms sounded, and they were forced to exit the structure.

Fire Fighter #4 was ordered by the IC to go to the rear of the structure and aid in suppression activities. *Note: Two lines were taken to the rear of the structure; however, through interviews conducted, it is undetermined who pulled these lines to the rear of the structure.*

The interior suppression crew changed their air bottles and reentered. At this time the Engine Operator from Aerial Truck 1 placed a PPV fan in the front doorway. Upon entry, Assistant Chief #2, Fire Fighter #2, and the Engine Operator from Aerial Truck 1 removed who was thought to be Victim #1 from the structure. Upon exiting the structure, they realized it was Victim #2. Victim #2 was transported to the hospital where he was pronounced dead.

Due to the extreme heat inside the structure, the IC made the call to switch from a search-and-rescue operation to a defensive attack. The IC assigned Assistant Chief #1 the responsibility of keeping fire fighters out of the structure until it was deemed safe. At this time three additional fire fighters (Fire Fighters #5, #6, and #7) were transported to the scene by a police officer. Fire Fighter #7 was assigned to the rear of the structure with the Lieutenant from Engine 6 and Fire Fighter #2, to control the fire extension from the rear of the structure. Fire Fighter #5 was ordered to man a hoseline with the Lieutenant from Aerial Truck 1 on the side and rear of the structure to control fire extension and assist in suppression activities. Fire Fighter #6 was assigned with Assistant Chief #1 to man a hoseline from the main entrance of the structure to aid in the cool down.

After approximately 4 minutes of defensive fire fighting, search-and-rescue operations resumed. The Lieutenant from Engine 6 and Fire Fighter #3 formed a RIT and entered the fire side of the structure to search for the two missing fire fighters. However, they had to exit the structure due to problems with

Fire Fighter #3's personal protective equipment. At this time, Assistant Chief #1 and Fire Fighter #7 entered the structure to search for the two missing fire fighters and the third child. Approximately 1030 hours, as crews continued to suppress the fire inside the structure, Assistant Chief #1 and Fire Fighter #7 located Victim #1 and the third child at the top of the stairs on the second-floor landing. Assistant Chief #1 radioed the IC asking EMS personnel to proceed to the front of the structure to aid in the removal of the third child from the structure. After the third child was removed, Assistant Chief #1 and Fire Fighter #7 proceeded back up the stairs to the landing, and with help from Fire Fighter #6, they removed Victim #1 from the structure. Assistant Chief #1 and Fire Fighter #7 then located Victim #3 in the master bedroom and removed him from the structure. Fire Fighter #8 arrived on the scene by POV and assisted in fire suppression activities. Victims #1 and #3 and the third child were pronounced dead at the scene.

Fire Fighters #5 and #8 and the Engine Operator from Aerial Truck 1 received an order from the local Fire Marshal to ventilate the structure in preparation for a post-fire investigation. *Note: At approximately 1012 hours the local Fire Marshal arrived on the scene.* At this time Fire Fighters #5 and #8 and the Engine Operator from Aerial Truck 1 ventilated the roof to aid in suppression activities. The remaining crews were relieved from the scene at approximately 1530 hours. At this time, mutual-aid companies arrived on the scene and took over the suppression and overhaul activities.

NEAR MISS REPORTS

Report #09-672

A structure fire response was dispatched. Dispatch reported all occupants out of the structure. First units to arrive were a "quint" with driver only and an ambulance, which was returning from another call.

Units arrived with smoke showing from the front (side A). The ambulance crew began to gear up while the quint driver stretched a line to the front door. **Upon doing this, the quint driver was told that a child was unaccounted for. This was relayed to the ambulance crew who decided to make entry. Upon reaching the front door, they were met with fire. The front bay window then blew out.** The crew knocked down the flames and began to enter as not the push the fire through the house. At this time, the crew observed that the living room was on fire and there was smoke throughout the structure. **They began to push on to the hall to do a search for the child. As they made it to the middle of the living room, the ceiling collapsed on the crew. As it came down, it pushed one firefighter back and covered the other firefighter, knocking off his helmet and striking his back and neck.** At this time an engine arrived, driver only, and began a reverse lay to a hydrant. A rescue engine arrived, driver only as well, and an engine from a neighboring city staffed it with four firefighters. The inside crew dug themselves out and checked for injuries. The inside crew had not taken a portable radio with them. Upon exiting the structure, the assisting engine crew entered and searched the residence with an all clear. **The child was then accounted for outside.** The situation was investigated by the fire marshal and overhaul was completed.

The injured firefighter reported the incident to his supervisor who had him evaluated at the local ER. Luckily there were muscular injuries only, with 3 days off work and 1 week light duty.

Report#08-384

Engines [2], [1] and Truck [1] were dispatched to a reported residential structure fire with reported entrapment. **While enroute units were advised that the police department was on scene with confirmed entrapment.** The shift officer then requested that an additional engine be assigned to the box. Engine [3] was immediately dispatched. Knowing that Engine [1] and Truck [1] would arrive shortly after Engine [2] the shift officer ordered Engine [2] to proceed straight in and attempt a rescue. He then ordered Engine [1] to lay in and Truck [1] to advance a 1 3/4" line to protect the search crew. Engine [2]'s crew complied with the order and made entry via the 1st floor front door. **Despite encountering high heat and heavy smoke conditions, they made entry to search for the trapped victims. They advanced up the stairs to the second floor through fire in the stairwell. The crew, faced with deteriorating conditions on the second floor, continued the search. They quickly found two children obviously deceased and correctly decided to leave the victims and continue the search. Conditions began to become untenable as they returned to the hallway.** During these first few moments, the crew from Truck [1] advanced a dry line to the front door. The structure had a front porch with a roof. The crew from Truck [1] stopped on the porch and completed donning of their SCBA and PPE. They called for the line to be charged once they were completely equipped. For reasons not determined, the line was not immediately charged but neither firefighter was willing to leave the line to return to the engine to get it charged.

During this time, the fire flashed over as the crew from Engine [2] proceeded down the second floor hall to the windows that they had observed prior to entering the structure. As Engine [2] bailed out of the front window they were followed by fire, causing damage to their PPE that required one set to be retired from service. The crew from Truck [1] continued to wait for water on the porch while heavy fire vented out of the front door. They remained in place even though their PPE received significant thermal damage. Water was eventually supplied to the line and Truck [1] advanced into the structure making good progress. **The incident went to a 2nd alarm and resulted in the death of three civilians.**

DO NOT Risk Your Life for Lives or Property That Can Not Be Saved.

Objective: To prevent firefighters from engaging in high risk search and rescue and firefighting operations which may harm them when fire conditions prevent occupant survival and significant or total destruction of the building is inevitable.

NO GO. If fire conditions prevent occupant survivability.

NO GO. If the fire has, or will, destroy the building.

All firefighters must recognize that we cannot always save a life.

If conditions indicate there is no occupant can survive, or the building is lost to fire and well involved, firefighters should not extend risk. The action plan should be to protect firefighters.

Defensive exterior operations would be appropriate with large caliber streams from the outset to gain fire control.

Abandoned and dilapidated buildings are a particular risk to firefighters and experience has shown there is little likely hood of containing any occupants.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which fire fighters engaged in high risk operations at structures with minimal value and conditions indicated that occupant survival was unlikely and the building could no be saved, including:

Restaurant Fire Claims the Life of Two Career Fire Fighters – Texas, McDonalds Restaurant

<http://www.cdc.gov/niosh/fire/reports/face200013.html>

February 14, 2000, a 44-year-old male and a 30-year-old female, both career fire fighters, died in a restaurant fire. At 0430 hours, Central Dispatch received a call from a civilian who reported that fire was emitting through the roof of the restaurant. Medic 73 was first to arrive on the scene, followed by Engine 76 (Captain, Fire Apparatus Operator (FAO), and two fire fighters (Victim #1 and Victim #2). **Upon arrival, dispatch was notified by the two companies that there was visible fire emitting through the roof.** The Captain on Engine 76 radioed dispatch reporting that he and his crew were going to complete a "fast attack" (enter the structure with a 1¾-inch hoseline and knock down the fire with the water from their engine). Approximately 2 minutes later, Ladder 76 (Captain, FAO, and one fire fighter) arrived on the scene and the Captain assumed Incident Command (IC). After making forcible entry, the victims entered with a 1¾-inch hoseline as their Captain finished donning his gear. Shortly after, the Captain

entered the structure, met up with his crew, and then exited the structure to assist with the advancement of their hoseline. Engine 73 (Captain, FAO, and two fire fighters) arrived on the scene and one fire fighter entered the structure with a 1¾-inch hoseline. He stretched the hoseline past the front counter and around a wall in the dining area. The Captain from Engine 76 reentered the structure and followed a hoseline, which he believed the victims were on. **After meeting up with a fire fighter on the end of the line, the Captain exited and reentered the structure a second time. As he followed the line, debris began to fall and there was visible fire throughout the middle section of the kitchen soon after, District 10 (District Chief) arrived, completed a size-up, and assumed command. Due to the heavy fire he observed, he requested all companies convert to a defensive attack and evacuate the structure. At this point the middle roof section (over the kitchen) of the building had collapsed. An interior evacuation took place, and neither of the victims exited.** The IC sent several fire fighters inside to search for the victims. The fire fighters located and removed Victim #1 at 0530 hours. He was then transported to a local hospital where he was pronounced dead. The fire fighters located Victim #2 at 0713 hours, and she was pronounced dead at the scene. The scene was then turned over to the City Fire and Arson Bureau, which declared the incident to be a crime scene due to arson.

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children – Iowa

<http://www.cdc.gov/niosh/fire/pdfs/face200004.pdf>

On December 22, 1999, a 49-year-old Shift Commander (Victim #1) and two Engine Operators, 39 and 29 years of age respectively (Victim #2 and Victim #3), lost their lives while performing search-and-rescue operations at a residential structure fire. At approximately 0824 hours, Central Dispatch was notified of a structure fire with three children possibly trapped inside. At approximately 0825 hours, a Shift Commander and an Engine Operator (Victim #1 and Victim #2) were dispatched to the scene. At 0827 hours, Engine 3 (Lieutenant and Victim #3) responded to the scene. Aerial Truck 2 approaching the scene, **reporting via radio that white to dark brown smoke was showing from the residence, and requested six additional fire fighters.** When Aerial Truck 2 arrived on the scene at 0830 hours, 2 witnessed a woman and child trapped on the porch roof, and they were informed that three children were trapped inside the house. Victim #1 proceeded into the house to perform a search-and-rescue operation. Engine 3 arrived on the scene shortly after, and the Lieutenant connected a supply line to the hydrant as Victim #3 pulled the Engine into position. The Lieutenant and Victim #3 stretched a 5-inch supply line and connected it to Aerial Truck 2. At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene, and the Chief assumed Incident Command (IC). At this time, one of the victims removed the first of the three children from the structure, handed the child to a police reserve officer near the front entrance of the structure, and returned to the structure to continue search and-rescue operations. At this time one of the victims removed a second child. The IC grabbed the child and began cardiopulmonary resuscitation (CPR). Due to limited personnel on the fireground, the IC directed a police officer on the scene to transport him and the child to the hospital. After donning her gear, **Fire Fighter #1 approached the front door and noticed that the 1½-inch handline (previously stretched) had been burned through and water was free-flowing. It is believed that the three victims were hit with a thermal blast of heat before the handline burned through.** The three victims failed to exit as 12 additional fire fighters arrived on the scene began fire suppression and search-and-rescue operations. Victim #2 was located, removed, and transported to a nearby hospital, where he was pronounced dead. Victim #1 and Victim #3 were later found and pronounced dead on the scene.

NOTE: All three children died in this fire

Career Fire Fighter Injured during Rapid Fire Progression in an Abandoned Structure Dies Six Days Later – Georgia

<http://www.cdc.gov/niosh/fire/pdfs/face200702.pdf>

On November 23, 2006, a 33-year-old male career fire fighter (the victim) was seriously injured during a fire in a single story **abandoned duplex house**. **The victim was working the interior of the structure fire with other crew members for less than a minute when they were ordered to evacuate the structure because of extreme conditions. At about the same time a flashover or flameover occurred; the victim became disoriented and was unable to exit the burning structure.** The victim was rescued approximately 4 minutes later and transported via ambulance to a metropolitan trauma center where **he remained in critical condition for several days in the burn unit before succumbing to his injuries on November 29, 2006.**

Key contributing factors identified in this investigation include an **initial size up not being conducted, a failure to recognize the signs of an impending flashover/flameover as fire fighters entered the structure**, inadequate communication on the fire ground and the possibility that ventilation induced the rapid fire progression. NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments should:

NEAR MISS REPORTS

Report #06-444

I was assigned the position of Safety Officer on a one and a half story, single family, lightweight wood-frame structure. The first arriving units found a working fire in the attic that was in the process of venting through the roof on the C/D corner. Command assigned three crews the job of attacking the fire, but warned them about the possibility of a collapse hazard in that area. The crews made entry and found that there was no fire or smoke inside the structure and visibility was excellent. The attack crews made their way toward the seat of the fire and began to pull ceiling and hit the fire with an inch and three-quarter line.

As I made my way to the C side of the structure, **I was able to see through a large window into the house and saw that the attack crews were directly under a section of the roof that was severely damaged by fire and in danger of collapsing.** The roof was comprised of 2X4 trusses and wafer board. I **immediately notified command and advised that we pull all crews out.**

As the attack crews were making their way toward the door, they reported that a collapse had occurred. Most of the personnel were caught in a hallway that, though devoid of smoke, suddenly became engulfed in fire. Several members were knocked to the ground, but everyone made it outside. A PAR report was initiated by command to make sure all personnel were accounted for. **It was then discovered that two firefighters had received burns to the back of the neck and ears.** These two were

transported immediately to the ER. Both firefighters were wearing full protective equipment including Nomex hoods. One firefighter reported that he had been struck with enough force to dislodge his facemask and hood. At the ER, it was determined that both individuals had received second degree burns.

Report#08-150

As a rescue company, we responded to a structure fire reported to be a working fire. Our departmental policy dictates that a crew of four will divide into two teams. I was the B- Team supervisor and had the responsibility of covering the floor above the fire for search/rescue, ventilation, and fire extension.

Upon our arrival we found a **1 ½ story split level detached home with about 40% involvement** that included quadrant A of the upper level and quadrants A and B of the lower level. We were the third piece to arrive on the scene after a ladder and engine.

As we approached the Alpha side of the building I noticed a hose line going into the lower level that was charged. There was evidence (visible steam) from the outside that water was in fact being applied to the fire on the lower level. I saw members from the ladder company at the bottom of the stairs, thus steering my decision to go up.

My team member and I entered the building and proceeded to the upper floor in the area of the origin of the fire and began our search. We went straight at the top of the stairs through a kitchen and then left into the dining room. My team member and I had good face to face communication while proceeding through these areas.

Once I made it to the outside wall (B side) of the dining area I could hear the fire towards the front of the house. My partner and I began to turn around in an effort to move back through the path we came to search the Charlie and Delta quadrants, **when a loud rumble occurred and I was dropped to the floor. The ceiling had collapsed due to heavy fire in the cockloft area that we were unaware of. The collapse brought a heavy fire load down when it occurred and there was fire all around.** I yelled for my partner and he responded. The collapse had actually separated us, knocking him into a clear area. He was ok, advising he could make it out via the interior stairs. Once I got my bearing, I noticed a window and began to move the debris quickly as to make a rapid egress because the flames were intensifying.

As I began to make an unassisted egress from the upper floor window, the ladder truck driver ran up to the window with a ladder and placed just below the sill of the window. This ladder placement was a mere coincidence for I had not transmitted any information related to the collapse via the radio at this point. I made my way down the provided ladder notified the IC of the occurrence and recommended the evacuation of the building.

Extend *LIMITED* Risk to Protect SAVABLE Property.

Objective: To cause firefighters to limit risk exposure to a reasonable, cautious and conservative level when trying to save a building.

NO GO. If the building cannot be saved it's a no go. Considerer an exterior defensive strategy.

LIMITED. *Confined or restricted within certain limits.*

The firefighter must recognize that we cannot always save a building. Those that are lost are generally rebuilt after the fire.

No building is worth the life of a firefighter. If it can be saved, limited risk and careful calculated operations should be applied.

Firefighting operations must be fully supported with adequate resources and risk must be closely and continually assessed. Fire conditions must be constantly monitored.

If conditions deteriorate and become unsafe, crews must be rapidly withdrawn to a safe area and defensive operations implemented.

Beware of lightweight construction and early collapse potential.

Large caliber hose lines provide improved fire control and safety for firefighters. In some cases it would be appropriate to use large caliber monitor devices to quickly knock down fire before crews enter a building.

Lightweight construction poses a particularly high risk to firefighters.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which firefighters engaged in high risk operations at structures with minimal value and fire conditions indicated the building could not be saved as a contributing factor to fire fighter LODDs including:

Volunteer Deputy Fire Chief Dies after Falling Through Floor Hole in Residential Structure during Fire Attack—Indiana.

<http://www.cdc.gov/niosh/fire/reports/face200624.html>

On June 25, 2006, a 34-year-old male volunteer Deputy Fire Chief died after falling through a hole in the 1st floor of a residential structure during a basement fire attack. **The floor system in the 2-year-old 3,200 ft² house contained engineered wooden I-Joists covered with plywood sheeting.** The basement

was mostly unfinished and the I-Joists were exposed from the bottom. Little smoke and no fire was visible when fire fighters initially entered the house but conditions rapidly deteriorated. The victim was working by himself, operating a 1 ¾ inch hand line just inside the front entrance, **when he fell into the basement.** Attempts were made to reach the victim via a 14' roof ladder lowered into the hole, but debris in the basement, fire/smoke conditions, and the angle of the failed floor all disrupted attempts to reach the victim. Approximately 21 minutes elapsed from the time of the initial 911 call reporting the fire until the victim was located. The fire originated in the basement and the I-Joists were almost totally consumed in the area where the floor collapse occurred.

Career Engineer Dies and Fire Fighter Injured After Falling Through Floor While Conducting a Primary Search at a Residential Structure Fire – Wisconsin.

<http://www.cdc.gov/niosh/fire/reports/face200626.html>

On August 13, 2006 a 55-year-old male career Engineer (victim) died and his partner was injured after falling through the floor at a residential structure fire. The 5,600 ft² was constructed in 1999 and the first floor contained a heated flooring system consisting of a hot water piping system encased in lightweight concrete which was supported by **engineered wood I-Joists and trusses.** **An engine company was conducting a fast attack on a suspected basement fire,** while a ladder company conducted horizontal ventilation. The victim and his partner were assigned to conduct a primary search on the ground floor. Smoke made visibility difficult but little heat was detected as the victim and his partner proceeded to conduct a left hand search. **They sounded the ceramic tile floor and took one crawling step while on their knees. They heard a large crack just before the floor gave way sending them into the fire burning in the unfinished basement.** The victim fell into the room of origin while his partner fell on the other side of a basement door into a hallway. The partner was able to eventually crawl out of a basement window. The victim was recovered the next day. The floor collapsed approximately 8 minutes after the first crews arrived on scene.

Volunteer Fire Fighter Dies After Falling Through Floor Supported by Engineered Wooden-I Beams at Residential Structure Fire – Tennessee.

<http://www.cdc.gov/niosh/fire/reports/face200707.html>

On January 26, 2007, a 24-year-old male volunteer fire fighter **died at a residential structure fire after falling through the ground floor that was supported by engineered wood I-beams.** The victim's crew had advanced a hand line approximately 20 feet into the structure with near-zero visibility. They requested ventilation and a thermal imaging camera (TIC) in an attempt to locate and extinguish the fire. **The victim exited the structure to retrieve the TIC, and when he returned the floor was spongy as conditions worsened which forced the crew to exit. The victim requested the nozzle and proceeded back into the structure within an arm's distance of one of his crew members who provided back up while he stood in the doorway. Without warning, the floor collapsed sending the victim into the basement.** Crews attempted to rescue the victim from the fully involved basement, but a subsequent collapse of the main floor ceased any rescue attempts. The victim was recovered later that morning.

Volunteer Deputy Fire Chief Dies after Falling Through Floor Hole in Residential Structure during Fire Attack—Indiana.

<http://www.cdc.gov/niosh/fire/reports/face200624.html>

On June 25, 2006, a 34-year-old male volunteer Deputy Fire Chief died after falling through a hole in the 1st floor of a residential structure during a basement fire attack. **The floor system in the 2-year-old 3,200 ft² house contained engineered wooden I-Joists covered with plywood sheeting.** The basement was mostly unfinished and the I-Joists were exposed from the bottom. Little smoke and no fire was visible when fire fighters initially entered the house but conditions rapidly deteriorated. **The victim was working by himself, operating a 1 ¾ inch hand line just inside the front entrance, when he fell into the basement.** Attempts were made to reach the victim via a 14' roof ladder lowered into the hole, but debris in the basement, fire/smoke conditions, and the angle of the failed floor all disrupted attempts to reach the victim. Approximately 21 minutes elapsed from the time of the initial 911 call reporting the fire until the victim was located. The fire originated in the basement and the I-Joists were almost totally consumed in the area where the floor collapse occurred.

Partial Roof Collapse in Commercial Structure Fire Claims the Lives of Two Career Fire Fighters – Tennessee.

<http://www.cdc.gov/niosh/fire/reports/face200318.html>

On June 15, 2003, a 39-year-old male career Lieutenant (Victim #1) and a 39-year-old male career fire fighter (Victim #2) **died while trying to exit a commercial structure following a partial collapse of the roof which was supported by lightweight metal trusses (bar joists).** The victims were part of the initial entry crew searching for the fire and possible entrapment of the store manager. **Both victims were in the back of the store operating a handline on the fire that was rolling overhead above a suspended ceiling. A truck company was pulling ceiling tiles searching for fire extension when a possible backdraft explosion occurred in the void space above the ceiling tiles. Victim #1 called for everyone to back out due to the intense heat, just as the roof system at the rear of the structure began to fail, sending debris down on top of the fire fighters.** Victim #1 and Victim #2 became separated from the other fire fighters and were unable to escape. Crews were able to remove Victim #2 within minutes and transported him to a local hospital where he succumbed to his injuries the following day. Soon after Victim #2 was removed, the rear of the building collapsed preventing further rescue efforts until the fire was brought under control. Victim #1 was recovered approximately 1 ½ hours later.

SPECIAL NOTE: Underwriters Laboratories, with funding from the Department of Homeland Security, has developed an on-line course for fire professionals – “Structural Stability of Engineered Lumber in Fire Conditions” available at their website <http://www.uluniversity.us/>

NEAR MISS REPORTS

Report #09-522

My lieutenant and I made entry into a one-story home of a reported basement fire. We utilized a left hand search as a tactic to locate the basement. For an attack line, we pulled a charged, 200 foot, pre-connect. After making it to the bottom of the stairs, we heard the fire in the direction of the A/B corner which was the corner we had entered the building on the ground floor. There was an insufficient amount of hose to make a direct attack on the fire at this time. My lieutenant attempted to notify command to get us more hose, but was unable to transmit due to increased radio traffic. **The fire in the basement was indicating an impending flashover, and we realized it was time to get out.** We immediately began to retreat from the basement along with the back-up crew. **After ascending the stairs, we headed towards the A/B corner of the ground floor to exit the building. I was following my lieutenant and we noticed the floor felt incredibly spongy. As I pushed off with my right leg, I fell through the floor up to my groin.** I was able to remove my leg but was met with fire, pushing from the hole that my foot had just made. I sprayed water from our attack line for about 5 seconds to try to knock the fire down and give the back-up crew a few more seconds to get over the weakened floor and out of the house. Unfortunately, the water had no effect on the fire as it was well into the free-burning stage. **The back-up crew was cut-off and had to look for a secondary egress point. After I exited the building, I immediately notified command that the floor was compromised.** Command cleared all units from the interior and we began a defensive attack on the building. The back-up crew exited the building through a plate glass window on the A-side of the building, one of the members received a cut to the hand.

Report #09-578

Crews had been operating for 2 hours, at a structure fire, in a large manufacturing facility. We were operating in a defensive mode and had been since arrival. My crew was located about fifty feet away from the building on a hill above the building. We were operating a 2-1/2" attack line and having little effect on the fire. The roof and walls were intact in that area of the building. This task was assigned to us by the deputy chief of operations on behalf of command.

I was summoned to meet face-to-face with the battalion chief. The battalion chief was accompanied by an **acting battalion chief and he directed me to move my crew and line closer to the building. He also directed me to open 2 doors,** on the "B-side" of the building, so we could get water directly on the fire.

While attempting to force one of the doors, on the "B-side", the brick and cinder block wall collapsed narrowly missing one crew member who was in the doorway. Crew members that were standing farther back were hit by the bricks. I reported to command that all personnel were okay. **Command was completely unaware that any crew was operating in the collapse zone and had not given any order to open any doors.** The battalion chief that gave the order was not in command and was not assigned as a sector officer. He had been conducting his own 360 of the building when he gave the order.

The post incident critique determined that there had been a collapse zone established by command, but was not marked in accordance with department operating guidelines. Several crews were operating in the collapse zone including mine, but we were unaware a collapse zone had been established since it had not been communicated via radio.

Extend *Vigilant* and *Measured* Risk to Protect and Rescue SAVABLE Lives.

Objective: To cause firefighters to manage search and rescue and supporting firefighting operations in a calculated, controlled and safe manner, *while remaining alert to changing conditions*, during high risk primary search and rescue operations where lives can be saved.

NO GO. If you do not have the resources to conduct a safe search and rescue or firefighting operations.

VIGILANT. On the alert; watchful. (for changing fire conditions)

MEASURED. Careful; restrained. Calculated; deliberate.

Our goal is to save lives. Where the survival profile indicates lives may be saved, risk should be in applied in a very calculated manner.

Where victims may survive fire conditions, greater risk, in a calculate manner, may be justified.

Where it is believed lives can be saved, firefighters may tend to push the safety envelop. Risk may be justified, but must be closely monitored and controlled in a safe manner. If conditions become too high risk, firefighters should be withdrawn.

Rescue operations must be fully supported with adequate resources and risk must be closely and continually assessed. If resources are inadequate to maintain firefighter safety during search and firefighting operations, consider other safe approaches or implement defensive operations.

If conditions deteriorate and become unsafe, crews must be rapidly withdrawn. Defensive operations would be appropriate.

Search and rescue and the removal of the victim takes time. Fire conditions are almost always deteriorating, thus increasing risk. Firefighters must be constantly aware of changing conditions and balance the risks. Changing conditions may require the search to be abandoned in the middle of the search.

Beware of lightweight construction and early collapse potential for roofs, basements and floors.

Large caliber hose lines provide improved fire control and safety for firefighters. In some cases it would be appropriate to use large caliber monitor devices to quickly knock down fire before crews enter a building.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which primary search and rescue operations may not have been carried out in a vigilant , measured, calculated, controlled, and safe manner, including:

A Career Captain and an Engineer Die While Conducting a Primary Search at a Residential Structure Fire – California

<http://www.cdc.gov/niosh/fire/pdfs/face200728.pdf>

On July 21, 2007, a 34-year-old career captain and a 37-year-old engineer (riding in the fire fighter position) died while conducting a primary search for two trapped civilians at a residential structure fire. The two victims were members of the first arriving crew. **They made a fast attack and quickly knocked down the visible fire in the living room.** They requested vertical ventilation, grabbed a thermal imaging camera, and made re-entry without a handline to search for the two residents known to be inside. Another crew entered without a handline and began a search for the two residents in the kitchen area. A positive pressure ventilation fan was set at the front door to increase visibility for the search teams. **The second crew found and was removing one of the civilian victims from the kitchen area as rollover was observed extending from the hallway into the living room.** Fire fighters became concerned for the air supply of both victims who were still in the structure. Crews conducted a search for the victims and found them in a back bedroom where they had been overcome by the rapid fire event.

Career Fire Fighter Dies and Captain is Injured During a Civilian Rescue Attempt at a Residential Structure Fire – Georgia

<http://www.cdc.gov/niosh/fire/reports/face200716.html>

On May 28, 2007, a 41-year-old male career fire fighter (the victim) **died after becoming disoriented and falling down a set of stairs while searching for a missing male occupant at a residential structure fire.** A fire captain also received second degree burns resulting in lost-time from work. Both the victim and the captain were members of the first-responding fast attack engine company. After becoming disoriented, they were trapped and missing for several minutes before being found. The fire was reported at approximately 0449 hours. The first arriving fire fighters, including the victim, arrived on the scene at 0459 hours and were on-scene 13 minutes when the first mayday was called. **The male resident also perished in the fire.**

NEAR MISS REPORTS

Report#07-789

Responding to a residential structure fire, **my crew was given the assignment of performing a primary search.** Fire attack had already been assigned to another crew. My officer assumed command while my crew member and I started with our task. **The attack crew encountered heavy fire and heat shortly inside the front door off to the right.** We started a left hand search covering approximately two rooms. **At this point, the attack crew advised command that they had found a hole in the floor and command relayed this information to all units on the scene.** Stopping to check with my partner to make sure we were still together, I turned to resume our search. **As soon as I started forward, I found myself falling about ten feet into the basement.** The area in which I fell turned out to be the main area of fire involvement. My first actions were to collect myself and to get my face piece repositioned properly as it

had dislodged partially. **Surrounded by debris and fire, I had to get into a position to facilitate me communicating on the radio.** My crew member stuck an axe handle in the hole for me to feel, which gave me comfort in knowing someone was with me. I tried to follow our department's standard operating procedures as best I could while trying to maintain calmness. **I notified command of my unit identification, what had occurred, and my physical status. Upon command acknowledging my situation, I then operated my PASS device in short bursts to allow crews to locate me as well as me being able to communicate verbally. The attack crew was at this same hole but in a different location.** It should be noted, the "hole" was about 8' X 12' in size. The nozzle man had partially fallen into the hole but was pulled back by his crew. Being in their position, they were able to knock fire down around me once they realized I had fallen. Command had advised RIC to go in and assist the downed firefighter, another crew entered with a thermal imaging camera. The crew with the camera was able to find my exact location. With that, an attic ladder was called for and I was able to climb out of the basement. I was fortunate that I was able to come away from this incident with some strains, bumps, and bruises.

Report#09-1081

Brackets [] denote reviewer de-identification.

Engine [1] was alerted to a structure fire on [name deleted]. I was riding up as the officer that evening and upon arrival we found a wood frame residential building with a working fire on the Alpha/Bravo corner of the structure. I passed on command as a Chief Officer arrived and assumed a fire suppression role. **My crew stretched a 1 ¾" attack line to the front door with zero visibility inside the structure and as I was masking up on the front steps. I laid my gloves just on the inside of the doorway and when I finished masking up, I reached for my gloves and they were gone. I did not know that we had a fully involved basement fire and the fire had already burned out the main floor my crew was preparing to enter.** Engine [1] then took a defensive mode and extinguished the fire from the exterior.

Go in Together, Stay Together, Come Out Together

Objective: To ensure that firefighters always enter a burning building as a team of two or more members and *no firefighter is allowed to be alone* at any time while entering, operating in or exiting a building.

NO GO. If you don't have a partner, never enter a burning building

Line of Duty Death (LODD) reports are riddled with firefighter fatalities due to a firefighter separation from partners or crew members, by a single firefighter freelancing alone, and by a single firefighter leaving his partner or crew to exit alone when he is low on SCBA air supply.

*A critical element for firefighter survival is crew integrity. Crew integrity means firefighters go on together, they stay together at all times on the interior, and all come out together. **Period!***

*No firefighter shall be allowed to be by himself at any time while in the structure. **Period!***

It is an individual responsibility of every firefighter to stay connected with his partner or crew members at all times.

Freelancing by any member must be prohibited. Additionally, crews or buddy teams must never freelance. All firefighters must be operating under the direction of the incident commander, or division, group officer at all times.

The ultimate responsibility for crew integrity and insuring no members get separated or lost rests with the company officer or lead team member.

The company officer or team leader must maintain constant contact with assigned members by voice, touch or visual while in the hazard zone. If these elements are lost, so is crew integrity and firefighters are placed at great risk.

If a firefighter becomes separated and cannot get re-connected quickly with his partner he must get on the radio and attempt to communicate with his company officer or partner. If re-connection is not accomplished with three radio attempts or no more than one minute a May Day should be declared and the firefighter must activate the radio's emergency alert button followed by manually turn on the PASS alarm. Do not delay a May Day if necessary – one minute with deteriorating conditions can be life threatening. If the firefighters get reconnected before a RIT arrives, the May Day can be cancelled.

The hoseline, or rope safety line, is the firefighter's life line to the exit. Members must stay on the line at all times.

Fireground accountability also applies to crew integrity. All firefighting operations must be conducted under a recognized firefighter accountability system.

Key components of a recognized accountability system includes tag or passports (with crew names) that are turned in to an accountability officer at the point of entry, and the system must be able to identify the location of assigned crews within a small geographic area, and be able to identify when a firefighter is delayed or missing. All accountability must be managed at the point of entry in order to maintain continual awareness of who's in or out. Tags or passports collected at the command post cannot determine who's in or out and is not a system.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the lack of crew integrity (Go in together, Stay Together, and Go Out Together) was a contributing factor to fire fighter LODDs including:

Volunteer Deputy Fire Chief Dies after Falling Through Floor Hole in Residential Structure during Fire Attack—Indiana.

<http://www.cdc.gov/niosh/fire/reports/face200624.html>

On June 25, 2006, a 34-year-old male volunteer Deputy Fire Chief died after falling through a hole in the 1st floor of a residential structure during a basement fire attack. The floor system in the 2-year-old 3,200 ft² house contained engineered wooden I-Joists covered with plywood sheeting. The basement was mostly unfinished and the I-Joists were exposed from the bottom. Little smoke and no fire was visible when fire fighters initially entered the house but conditions rapidly deteriorated. **The victim was working by himself, operating a 1 ¾ inch hand line just inside the front entrance, when he fell into the basement.** Attempts were made to reach the victim via a 14' roof ladder lowered into the hole, but debris in the basement, fire/smoke conditions, and the angle of the failed floor all disrupted attempts to reach the victim. Approximately 21 minutes elapsed from the time of the initial 911 call reporting the fire until the victim was located. The fire originated in the basement and the I-Joists were almost totally consumed in the area where the floor collapse occurred.

Two Career Fire Fighters Die and Captain is Burned When Trapped during Fire Suppression Operations at a Millwork Facility – North Carolina

<http://www.cdc.gov/niosh/fire/pdfs/face200807.pdf>

On March 7, 2008, two male career fire fighters, aged 40 and 19 (Victims #1 and #2 respectively) were killed when they were trapped by rapidly deteriorating fire conditions inside a millwork facility in North Carolina. The captain of the hoseline crew was also injured, receiving serious burn injuries. The victims were members of a crew of four fire fighters operating a hoseline protecting a firewall in an attempt to contain the fire to the burning office area and keep it from spreading into the production and warehouse areas. . **The crew separated when a fire fighter ran low on air and followed the hoseline to the outside. The captain attempted to radio for assistance as the conditions deteriorated but fire**

fighters on the outside did not initially hear his Mayday. The captain sent a second fire fighter (Victim # 2) outside to relay information about their condition. Victim # 2 talked with the Incident Safety Officer, and then returned to re-join his crew. Once it was realized that the crew was in trouble, multiple rescue attempts were made into the burning warehouse in an effort to reach the trapped crew as conditions deteriorated further. Three members of a rapid intervention team (RIT) were hurt rescuing the injured captain. Victim #1 was located and removed during the fifth rescue attempt. Victim #2 could not be reached until the fire was brought under control. The fourth crew member had safely exited the burning warehouse prior to the deteriorating conditions that trapped his fellow crew members. Key contributing factors identified in this investigation include radio communication problems (unintelligible transmissions in and out of the fire structure that may have led to misunderstanding of operational fireground communications), inadequate size up and incomplete pre-plan information, a deep-seated fire burning within the floor of the office area that was able to spread into the production and warehouse facility, the procedures used in which operational modes were repeatedly changed from offensive to defensive, **lack of crew integrity at a critical moment in the event**, and weather which restricted fireground visibility.

Volunteer Fire Fighter Dies While Lost in Residential Structure Fire-Alabama

<http://www.cdc.gov/niosh/fire/pdfs/face200834.pdf>

On October 29, 2008, a 24-year old male volunteer fire fighter (the victim) was fatally injured while fighting a residential structure fire. **The victim, one of three fire fighters on scene, entered the residential structure by himself through a carport door with a partially charged 1½-in hose line; he became lost in thick black smoke.** The victim radioed individuals on the fireground to get him out. Fire fighters were unable to locate the victim after he entered the structure which became engulfed in flames. The victim was caught in a flashover and was unable to escape the fire. Approximately an hour after the victim entered the structure alone, a police officer looking through the kitchen window noticed the victim's hand resting on a kitchen counter; the victim was nine feet from the carport door he had entered. The victim was removed from the structure and pronounced dead at the scene by emergency medical services. Key contributing factors identified in this investigation include: fire fighters entering a structure fire without adequate training, insufficient manpower, and lack of an established incident command system.

Career Fire Fighter Dies of Carbon Monoxide Poisoning after Becoming Lost While Searching for the Seat of a Fire in Warehouse - New York

<http://www.cdc.gov/niosh/fire/pdfs/face200404.pdf>

On December 16, 2003, a 30-year-old male **fire fighter died after he became separated from his crew members** while searching for the seat of a fire at a furniture warehouse. His crew exited due to

worsening conditions and a missing member announcement was made. At one point while inside the warehouse, members of an engine crew thought they heard a scream but could not identify the source. After an evacuation order was given and as engine crew members were exiting, **the victim's officer mistakenly identified one of them as the missing member and cancelled the emergency message.** Once fire fighters had exited, a personnel accountability report (PAR) was taken several minutes later on the street which revealed that the victim was still missing. The victim's officer initiated a second emergency message for a missing member and a search was begun. The victim, who had a working radio, was found lying face down with his face piece removed and 900 psi left in his self-contained breathing apparatus (SCBA). His Personal Alert Safety System (PASS) alarm was reported by fire fighters to be inaudible. His carboxyhemoglobin (COHb) level was 74.8% in the emergency room. The victim did not declare a May Day and did not activate his radios emergency activation button.

NEAR MISS REPORTS

Report #06-055

Arriving on a truck company as the driver/operator, with only staffing of two firefighters, I was assigned to perform horizontal ventilation on the uninvolved portion of the structure. The acting officer was assigned to assist the attack crew. The structure was a vacant and unfurnished dwelling. The floor plan was split from the entry way and an interior fire attack crew was operating on the west side of the split floor plan. **I was ordered by the incident commander to enter the east side of the floor plan and perform ventilation of the interior windows. I had no radio and was alone on this assignment.** After entering the east side of the structure with full PPE and positive pressure SCBA, **I walked about 20 feet and fell through the floor from a floor collapse. I was unable to call for assistance and was trapped in the collapse of the floorboards for approximately 10 minutes.** Another team member came in to find me and assisted me out of the broken floor boards. We exited the structure together. There were heavy smoke conditions but no fire involvement on the east side of the structure.

Report#06-245

Working fire in a 3 story wood frame, balloon construction. Building is 28 feet wide by 38 feet deep. **First due engine reported the fire in the first floor rear bathroom had spread to the second and third floors through the walls. Heavy smoke venting from the gable end vents of the house on the "A" and "C" sides.**

Engine crew, officer and 2 fire fighters, operating on the third floor, opening the walls and attempting to cut off extension. **IC requested that I enter the third floor to assist the hose crew and give him a situation report.** Rather than go to the rear of the building and follow the hose line, I climbed the front exterior stair case and forced entry into the third floor apartment. I could hear the hose team from the doorway. I experienced some delay in entering the room because a chair had been placed against the door. I entered the room at the same time the truck company pushed the ceiling down from the vent

hole. I proceeded towards the sounds of the engine crew while calling out for them. **Unknown to me at the time, the crew had retreated the way they entered as the attic flashed over. The visibility was zero and it was pretty hot. I followed the wall on the right in an attempt to reach the hose crew. About half way in I realized they were no longer on the floor.** I hesitated for a few seconds, should I continue towards the rear of the building or reverse and head back to way I came? I had a radio, but never called a mayday or urgent. I decided to continue and found the rear door about one minute later. I exited the building down the rear stairs.

Report #08-393

Our fire company responded mutual aid for a reported structure fire involving a single family dwelling in a neighboring district. **The occupants had exited the building and were accounted for upon arrival of the first officer.** On arrival, the engine in which I was riding had to pass in front of the building and **I commented to the crew on board that we would not be conducting interior operations due to the amount of fire throughout the building.** I reported into the IC and my crew of 5 was given an assignment to stretch a 2-1/2 inch hand line to the rear of the building (C) and apply water in the area of the rear deck/kitchen. The host fire department was in the process of stretching handlines in the front of the building and applying water through openings in the garage (D) and the area of the front door (A). At this point a water supply with tankers was being established, but all attack lines were still being operated on booster tank water. A RIT team was also enroute from two neighboring departments.

While working with my crew in the rear of the fire building, I looked up into the kitchen area through the double sliding doors that opened onto the rear deck. **There in the middle of the fully involved kitchen area was a single firefighter (from the host department) in full PPE, standing fully upright with flames above him at the ceiling level and behind him in the kitchen cabinets.** He then called out to my crew, wanting to use the 2-1/2 inch handline we were operating. He indicated that "he could hit it from his position". When the disbelief wore off after a few seconds, I immediately ordered the firefighter to leave the building. He balked at first, claiming again that he could make a difference by applying water from his position in the fully involved kitchen. At this point, I even more forcefully ordered him from the building. He then exited the building via the front door, opposite our position.

I then transferred command of my crew to a lieutenant on the crew and went in search of the IC to report the episode to him.

Maintain Continuous Awareness of Your Air Supply, Situation, Location and Fire Conditions.

Objective: To cause all firefighters and company officers to maintain constant situational awareness their SCBA air supply and where they are in the building as well as all that is happening in their area of operations and elsewhere on the fireground that may affect their risk and safety.

NO GO. If you don't have a full SCBA bottle.

NO GO. If you don't know your air supply all the time, don't go.

NO GO. If you don't know where you are at all times, don't go

The firefighter is nearly always to point person working in the area of greatest risk.

Your SCBA air supply is your life support system and you must constantly be aware of how much air you are consuming and when you have reached the turnaround point. Firefighters should always plan on exiting before the low air alarm activates.(NFPA 1404)

Always check your air supply and confirm a full bottle before entering a burning structure confirm a full bottle. You should also have some knowledge of your individual air consumption rate that will help calculate time in the hazard zone.

Frequently check your air supply while in the structure. Check air supply before and after going up or down stairs. Check before entering and searching a room and after going down a hall way or isle. Check your air supply before and after doing a labor demanding task.

Their air consumption during laborious firefighting tasks can be more than double the "old" minute rating system. (The old" 30 minute" bottle rating can be consumed in 15 minutes or less)

Provided frequent air supply status reports to your company officer (or team leader) so that he/she has some awareness of the teams remaining air supply. The company officer should include the lowest air supply status as part of progress reports to the incident commander or the division or group officer.

Know your turn around point and exit before the low air warning activates.

The National Near Miss Reporting System lists "Situational Awareness" as the most commonly reported cause for a life threatening near miss event. The next three most reported causes of near miss events are; decision making, human error, and individual action.

Situational awareness is defined as; the level of understanding and attentiveness one has (the firefighter) regarding the reality of a set of conditions (fire conditions and fireground operations). When situational awareness is high, there are rarely surprises. When situational awareness is

low or absent, “unexpected” events occur (that can injure or kill firefighters). Simply put, situational awareness is the relationship between what one perceives is happening and what is really happening. **Simply put; pay attention to what’s really happening!**

The set of conditions that affects situational awareness can be broken down into three divisions: a lack of information, a lack of knowledge and a lack of cognition. These three divisions are made up of their own unique factors, including misinterpreting conditions and surroundings, not recognizing factors and cues, gathering of incomplete information, being narrow focused and being impaired.

Another “simply put” - Firefighters must be aware of their work environment and in control of their actions – **ALL THE TIME!**

All firefighters, for basic survival, must maintain constant awareness of their surroundings. Conditions early on in the fire attack will be out of control, placing the firefighter at continued risk. Even after the fire is controlled, the buildings structural integrity has been compromised-sometimes considerably.

Monitoring fireground communications is another area of maintaining situational awareness.

Both the International Association of Fire fighters and the International Association of Fire Chiefs support the position that ALL firefighters operating within the hazard zone must be equipped with a portable radio or other approved voice communication device.

The firefighter must maintain constant situational awareness of changing conditions in his/her area of work, AND elsewhere on the fireground. Firefighters must closely monitor all radio communications on their assigned radio channel. Worsening conditions elsewhere on the fireground can quickly affect firefighter safety in all other work areas.

All team members must listen to all radio communications. Sometimes the company officer in charge of the crew may miss critical communications for the crew because of noise, etc.

Radio communications from other points on the fireground provide additional situational awareness about changing conditions on the fireground. Conditions will either be improving or deteriorating. Worsening conditions elsewhere on the fireground can quickly result in unsafe conditions in your area of operation.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents where failure to constantly monitor SCBA air supply or maintain situational awareness about all that was happening which was a contributing factor to fire fighter LODDs including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Career Fire Fighter Dies in Wind Driven Residential Structure Fire – Virginia

<http://www.cdc.gov/niosh/fire/pdfs/face200712.pdf>

On April 16, 2007, a 24-year-old male career fire fighter (the victim) was fatally injured while trapped in the master bedroom during a wind-driven residential structure fire. At 0603 hours, dispatch reported a single family house fire. At 0609 hours, the victim's ladder truck was second to arrive on scene. Fire was visible at the back exterior corner of the residence. Noticing cars in the driveway, no one outside, and no lights visible in the house, the lieutenant from the first arriving engine called in a second alarm. A charged 2 ½" hoseline was stretched to the front door by the first arriving engine crew. The engine crew stayed at the door with the attack line while the cause of poor water pressure in the hoseline was determined. The victim and his lieutenant, wearing their SCBA, entered the residence through the unlocked front door. **With light smoke showing, they walked up the stairs to check the bedrooms.** The victim and lieutenant cleared the top of the stairs and went straight into the master bedroom. **With smoke beginning to show at ceiling level,** the victim did a right-hand search while the lieutenant with thermal imaging camera (TIC) in-hand checked the bed. **Suddenly the room turned black then orange with flames.** The lieutenant yelled to the victim to get out. While verbal communication among the crew was maintained, the lieutenant found the doorway and moved toward the stairs. He ended up falling down the stairs to a curve located midway in the staircase. The lieutenant tried to direct the victim to the stairs verbally and with a flashlight. As the wind gusted up to 48 miles per hour, the wind-driven fire and smoke engulfed the residence. The incident commander (IC) ordered an evacuation and the

lieutenant was brought outside by the engine and rescue company crews. The ladder truck lieutenant received burns on his ears and right index finger. At 0614 hours, the rescue company officer issued a Mayday followed by the victim's Mayday. With protection from hose lines, several attempts were made by the engine and rescue company crews to reach the second floor. On the third attempt the stair landing was reached but the ceiling started collapsing and flames intensified. At 0621 hours, due to the intensity of the fire throughout the structure, all fire fighters were evacuated, operations turned defensive, but the incident continued in rescue mode. At 0657 hours, the victim was found in the master bedroom partially on a couch underneath the front windows.

2007

Two Volunteer Fire Fighters Die When Struck by Exterior Wall Collapse at a Commercial Building Fire Overhaul - Alabama

<http://www.cdc.gov/niosh/fire/pdfs/face200607.pdf>.

On February 21, 2006, a 62-year-old male volunteer fire captain (Victim # 1) and a 23-year old male volunteer fire fighter (Victim # 2) died when they were struck by a collapsing exterior wall of a one-story commercial building during overhaul operations following a structure fire. The building was approximately 50 years old and had been renovated several times with at least two additions. The exterior walls were constructed of concrete blocks. However, multiple layers of different siding materials covering the front wall of the building hid the underlying concrete block wall from view. The fire was reported at approximately 1728 hours and **fire fighters from a number of fire departments were on-scene for several hours containing the fire to the building**. The heavy timber roof collapsed after burning for over 2 hours. The last mutual aid crew was released before 2100 hours. The remaining fire fighters noticed that concrete **block walls** on both sides of the structure were **starting to lean outward** so sections of the walls that were **bulging outward** were pulled down. **At approximately 2130 hours, the two victims, along with a third fire fighter, were stretching a 1 ¾ inch hand line to the front entrance to put water on hotspots when the front wall collapsed, striking the two victims**. The third fire fighter was handling the houseline a few feet behind the two victims and was struck on the foot by falling debris, narrowly missing serious injury.

Career Battalion Chief and Career Master Fire Fighter Die and Twenty-Nine Career Fire Fighters are Injured during a Five Alarm Church Fire – Pennsylvania

<http://www.cdc.gov/niosh/fire/pdfs/face200417.pdf>

On March 13, 2004, a 55-year-old male career Battalion Chief (Victim #1) and a 51-year-old male career master fire fighter (Victim #2) were fatally injured during a structural collapse at a church fire. Victim #1 was acting as the Incident Safety Officer and Victim #2 **was performing overhaul, extinguishing remaining hot spots inside the church vestibule when the bell tower collapsed on them and numerous other fire fighters**. Twenty-three fire fighters were injured during the collapse were transported to area hospitals. A back draft occurred earlier in the incident that injured an additional six fire fighters. The collapse victims were extricated from the church vestibule several hours after the collapse. The victims were pronounced dead at the scene.

NEAR MISS REPORTS

Report#06-282

Units noticed smoke in the area while responding to an EMS call. They were then notified of a structure fire and responded. Upon arrival they encountered a ranch-style home with heavy smoke showing from the front door. **Police officers on scene, fire dispatch, and a resident on-scene all told the Captain that a 9 year-old boy was trapped in the basement.**

The crew advanced a 1.75" line to the basement and found heavy smoke conditions with relatively low heat. They searched the basement exhaustively, found a burning mattress but had not located the missing child. In the meantime, other crews were completing a search of the main level. **The Captain's low-air alarm sounded but he decided to continue searching. At about the same time that a relief crew arrived downstairs, the Captain ran out of air. He unsealed his mask and took a total of two breaths at the floor level before he was able to exit the basement. It was later determined that the missing child was at a neighbor's house.**

Report#09-1081

Brackets [] denote reviewer de-identification.

Engine [1] was alerted to a structure fire on [name deleted]. I was riding up as the officer that evening and **upon arrival we found a wood frame residential building with a working fire** on the Alpha/Bravo corner of the structure. I passed on command as a Chief Officer arrived and assumed a fire suppression role. My crew stretched a 1 ¾" attack line to the front door with zero visibility inside the structure and **as I was masking up on the front steps. I laid my gloves just on the inside of the doorway and when I finished masking up, I reached for my gloves and they were gone. I did not know that we had a fully involved basement fire and the fire had already burned out the main floor my crew was preparing to enter.** Engine [1] then took a defensive mode and extinguished the fire from the exterior.

Report#07-697

While commanding a single family residence house fire that started from a lightning strike, **a firefighter depleted his air and got lost in the residence.** The residence was a single story ranch home with brick and had 2 additions in the rear where the fire started. The firefighter was assigned to interior fire attack group with the Assistant Fire Chief and three additional firefighters. The firefighter was removing sheet rock from the ceiling and extinguishing the fire in the attic. **He stated that his low alarm was going off but he did not notify anybody. He continued to work until his air ran out. While trying to leave the residence he got disoriented for a short period before finding the Assistant Chief, who showed him the way out.** The firefighter was equipped with his own radio and **the SCBA was working properly including the heads-up display.** Upon exiting the residence, the I/C was notified that the firefighter was going to the ambulance for rest and oxygen with a paramedic. After being evaluated and treated, he was transported to the local hospital for smoke inhalation.

Constantly Monitor Fireground Communications for Critical Radio Reports.

Objective: To cause all firefighters and company officers to maintain constant awareness of *all* fireground radio communications on their assigned channel for progress reports, critical messages and other information that may affect their risk and safety.

NO GO. If your team is not equipped with a radio(s) don't enter a burning building.

NO GO. If your team is equipped with only one radio and it fails while in the building and you have no other means to communicate - exit.

Both the International Association of Fire fighters and the International Association of Fire Chiefs support the position that ALL firefighters operating within the hazard zone must be equipped with a portable radio or other approved voice communication device.

The fire crew's radio(s) is the fire crew's life line connection with the incident command and rescuers.

The firefighter must maintain constant situational awareness of changing conditions elsewhere on the fireground by closely monitor all radio traffic on the assigned radio channel. Worsening conditions elsewhere on the fireground can quickly affect firefighter safety in all other work areas.

All firefighters must listen to all radio communications. Sometimes the company officer in charge of the crew may miss critical communications for the crew because of noise, etc.

Radio communications from other points on the fireground provide additional situational awareness about changing conditions on the fireground. Conditions will either be improving or deteriorating. Worsening conditions elsewhere on the fireground can quickly result in unsafe conditions in your area of operation.

It's also important the company officer or team leader provide supervisors or the incident commander frequent progress reports so that the command organization maintains real time situational awareness.

In a situations where the crew may have only one radio and that radion fails,while in a burning building, the crew must evacuate to a safe location.They same would apply iif the crew were eppuiped with more than one radio and for some reason they all become inoperable.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which failure to monitor fireground radio communications for progress reports may have been a contributing factor to fire fighter LODDs including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor.** The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio. Officers working outside the structure initially did not hear the radio Mayday until an off-duty officer responding to the scene in his personal vehicle heard the Mayday and advised the Chief that a Mayday was being called over the radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

NEAR MISS REPORTS

Report#06-234

Multiple companies operating at a residential fire that started in the walk-out basement. The 1st due Engine arrived and stretched a 2 1/2" through a garage that led directly into the basement area. Other companies stretched 2- 1 3/4" lines into the first floor. I arrived and was assigned by the IC to assist in the basement. After operating for the life of my 30 minute SCBA, I exited to change bottles and observed that conditions had not improved, but deteriorated. As I re-approached the scene, the IC (B/C) pulled everyone out, and an aerial was used to darken down the fire. **While this was being set-up the Company Officers met, and the comment was made by one that the first floor had a hole in it that you could put a car in. This information was never relayed to the IC or other companies operating on-scene.** After using the Aerial, some company officers wanted to re-enter even though additional portions of the interior structure had collapsed.

Report#07-738

My department was dispatched to a possible dwelling fire. Our first engine arrived on scene and advised they had a working fire. The chief of the department arrived on scene and assumed command, reporting about 60% involvement. A crew went interior for fire attack and another crew was sent to the roof. I arrived on scene and was assigned a crew to do a primary search. While doing the primary, I realized that Fire Attack had extinguished most of the fire. I determined that instead of one working fire with 60 % involvement, we actually had 3 separate fires in three separate rooms. I heard the saw cranking up on the roof and realized that ventilation was not needed. **I called out to command to stand by on the roof vent just as I saw a member of the fire attack crew stand up onto a chair and poke his head up into the attic access. He quickly came back down as the saw blade went by his head.**

You Are Required to Report Unsafe Practices or Conditions That Can Harm You. Stop, Evaluate and Decide.

Objective: To prevent company officers and firefighters from engaging in unsafe practices or exposure to unsafe conditions that can harm them and *allowing any member to raise an alert about a safety concern without penalty* and mandating the supervisor address the question to insure safe operations.

NO GO. If anything will harm you, it's a no-go. Report it immediately to command or your supervisor.

The firefighter is nearly always to point person working in the area of greatest risk.

All firefighters are responsible for their own safety and the safety of other firefighters. Each firefighter is responsible for identifying risks and hazards and reporting them.

Supervisors are responsible for accepting reports regarding safety concerns and properly acting to ensure the safety of firefighters. This means crews should stop for a moment to assess the situation, quickly talk and report, and then decide the correct and safe response to the situation.

This item by no means suggests that a firefighter engage in insubordination. The fireground is fast paced action and clearly must be managed by a well disciplined and structured command organization. This policy statement does, however, allow a "red flag" to be raised by any member without penalty.

When the situation is questioned, the supervisor is mandated to accept that safety concern, take a few seconds to stop (assess), talk, and make a safe decision (go, no-go, or modify the objective/task). In some cases, the situation may affect the action plan or other areas of the fireground and must be reported to the incident commander or other supervising officers. The policy has proven to be successful in reducing risk to firefighters.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which exposure to unsafe practices or conditions were not reported that may have ben a contributing factor in LODD's, including:

Career Fire Fighter Dies and Two Career Fire Fighters Injured in a Flashover During a House Fire - Ohio

<http://www.cdc.gov/niosh/fire/pdfs/face200312.pdf>

On March 21, 2003, a 25-year old male career fire fighter (the victim) was fatally injured in a flashover during a house fire. **The victim and two other fire fighters were on an interior attack crew and had just**

gone through the front door of a single family residence. The hose line was uncharged and the crew was calling for water when a flashover occurred. From the time the victim arrived on scene until the flashover was approximately four minutes. After the flashover, fire fighters on the front porch witnessed the victim walk toward the front door then turn and retreat into the structure. The two other fire fighters on the interior crew exited through the front door. They were injured and transported to the hospital where they were treated and released. The victim was located and removed from the structure within 10 minutes. He was transported via ambulance to the hospital where he was pronounced dead.

NEAR MISS REPORTS

Report #09-364

On the morning of [date and time deleted], we received an alarm of a structure fire about ½ mile from Station [1]. Engine [1], Engine [2] and Rescue [1] responded.

Upon the arrival of Engine [1] and Rescue [1] we found heavy smoke showing from the structure. Engine [1] laid two 1 ¾" lines and caught the hydrant right across the street. Engine [1] group went in through the front door, but due to extreme amount of heat, were not able to get to the seat of the fire. Group 1 lieutenant called for vertical ventilation but due to staffing issues, ventilation was not able to be performed.

Our chief arrived on scene and assumed command. He advised us to exit the building and we were going defensive. After exiting the house, group 1 pulled their line to the C-side of the structure and Group 2 (off of Engine [2]) pulled the second 1 ¾" to the B-side of the structure. The Incident Commander then advised the first arriving off duty personnel to set up the PPV fan at the front door. Once two off-duty personnel arrived, they became Group 3 and set up and turned on the fan. The structure was an old [deleted] house built in the early 1900s with a very big and open attic. After the smoke cleared, the Incident Commander advised Group 1 and 2 to stop flowing water because Group 3 was going in the front door and we were going back offensive.

Due to heavy fire, Group 3 was doing no good and backed out. Two more off-duty personnel arrived and the Incident Commander made them Group 4 and assigned them to vertically ventilate. **This order was given 45 minutes into the fire and approximately 30 minutes after a defensive attack was ordered and the PPV fan was set up. The roof was already visibly sagging and from the road you could see heavy fire in the attic. Three lieutenants and a captain on scene advised the Incident Commander that the task was unsafe. Group 4 ignored our plea and put a ladder on the building.** Once on the roof and starting to ventilate, the roof gave way and collapsed. The two firefighters in Group 4 were standing on the roof ladder and were able to roll off the house. The roof ladder sustained major fire damage and the firefighter making the cuts was very lucky that his back up firefighter was holding onto him and saw the roof start to give way. This allowed for the back up firefighter to pull the [power saw operator] up and fall off the rood onto the ground instead of into the fire.

After it was over, the firefighters from Group 4 stated that the Incident Commander ordered us to ventilate and we were not going to break an order."

Report#08-470

During a training fire, **we were training probationary firefighters on stages of fire and fire attack. The lieutenant conducting interior operations let the fire continue to grow without knocking it down. He had probies standing up in the heat, which was unsafe.** The fire then grew to a point that we needed to evacuate the structure. Firefighters were slow to exit the building. Because of poor communications after exiting the building, probies attempted to re-enter an unsafe environment to extinguish the fire. They were in the training house just inside the door when they did back out. Poor communications, leadership, and decision making contributed to this near-miss. The fire could have flashed over.

Report#09-1006

At approximately 0900, firefighters were dispatched to a report of a commercial structure fire with smoke showing. **Additional reports stated there was a possibility of someone trapped inside. Upon arrival of fire personnel, the battalion chief gave an initial size up of a wood frame, brick office building with heavy smoke showing.** While fire crews were preparing to make an attack on the fire and perform a search and rescue operation, the battalion chief was attempting to perform a walk-around of the structure. He was passing the “B” side of the structure and approaching the “C” side when he realized there was a basement area. The basement area had a window that had been broken with heavy smoke coming from the window. **When he approached the window (for whatever reason), he decided to look into the basement. He did this by sticking his head into the window area. This is when a huge cloud of smoke engulfed him.** The battalion chief was not wearing any PPE and was only dressed in the station uniform. He immediately retreated to safety and was not injured, but did inhale a good bit of smoke.

Case Report - Seattle Fire Department

On the night of January 5, 1995, four Seattle firefighters died when the first floor of a commercial warehouse collapsed.

In 2001 a Seattle ladder company officer and a probationary firefighter became lost on the third floor of an apartment building during a multiple alarm fire. As they were trying to find their way out, the officer ran out of air and became separated from the firefighter. The firefighter was able to find and exit. The officer, now sucking smoke, found a window a dropped three stories and received severe injuries but survived.

In July, 2001, a new fire chief was appointed. Within two months, two additional near fatal incidents occurred. One firefighter became separated from his partner in the hold of a multiple ship fire and ran out of air. By chance, another crew found the firefighter and the crew exited with the firefighter.

A month later, a captain at a working residential fire experienced a mechanical failure on his SCBA and collapsed from smoke inhalation. Another crew found the unconscious fire officer and rescued him. He was intubated and transported to the hospital where he fully recovered.

The fire chief called a “Safety Stand Down” and had staff rapidly develop a Firefighter Survival Training Program. The fourth quarter scheduled training was dropped and replaced with the survival training. Included was multi-bullet a new “Best Safety Practices” policy. One of the bullets stated;

- Any Member is Authorized to Say NO to Unsafe Practices or Conditions. Stop, Talk, and Decide.

During training, a survivor of the 1995 fire described arriving as a second due engine company with heavy smoke issuing from the building. His crew stretched a hoseline to the front door to back up the first crew that had entered earlier. As he was putting on his face piece he noted smoke pushing out of cracks in the sidewalk and thought that was awfully odd. The culture at the time (like many fire departments) made it awkward for any firefighter to challenge a company officer on a decision. The crew entered the building and moments later the floor fell away from them.

He told the training officer that had the new policy with the above bullet been in place that night in 1995 he would have been far more comfortable to raise an alert and perhaps all the firefighters would have been saved.

You Are Required to Abandon Your Position and Retreat Before Deteriorating Conditions Can Harm You.

Objective: To cause firefighters and company officers to be aware of fire conditions and cause an early exit to a safe area when they are exposed to deteriorating conditions, unacceptable risk and a life threatening situation.

NO GO. If you the fire is overtaking you, retreat or exit the building before you are harmed.

NO GO. If you radio lose communications, exit the building.

Firefighters are nearly always at a point of greatest risk when operating on the fireground.

No firefighter needs approval from a supervisor or the Incident Commander to abandon a high risk operation that deteriorates and becomes unsafe and life threatening if doing so (reporting) impedes or delays a rapid exit to a safe location. Firefighters should withdrawal and retreat to a safe location and notify the Incident Commander of the action as soon as it's safe to do so.

Withdrawal from a position must occur early enough to allow a safe exit from the building or to relocate to a safe location. DO NOT push the safety envelop and extend risk for what is already lost.

Emergency exit from a building nearly often takes longer than it took to get into the interior operating position.

Conditions can deteriorate rapidly creating life threatening conditions for the firefighter. Under these conditions the proper firefighter decision is to immediately abandon the position and exit the building or seek a safe location. No hesitation should occur as seconds can mean surviving or dying. Seconds can make the difference.

A radio report to the Incident commander (or the division/Group Supervisor) on the decision to abandon the position should be made as soon as possible, but only when safe to do so and when it does not cause a delay in exiting.

Firefighters should not allow equipment to delay the exit. If saving the hoseline will delay exit – leave it. The same applies for any other equipment.

Twelve firefighters died during firefighting operations at a wild land fire on Storm King Mountain in Colorado. One of the contributing factors cited in their deaths was firefighters were trying to outrun the fire while carrying hand tools, chain saws, and backpacks. If any equipment will delay your exit to a safe area – leave it behind.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in failure to be constantly aware of changing fire conditions and failure to exit to a safe location in a timely fashion were contributing factors to fire fighter LODDs, including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse. The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Partial Roof Collapse in Commercial Structure Fire Claims the Lives of Two Career Fire Fighters – Tennessee.

<http://www.cdc.gov/niosh/fire/reports/face200318.html>

On June 15, 2003, a 39-year-old male career Lieutenant (Victim #1) and a 39-year-old male career fire fighter (Victim #2) died while trying to exit a commercial structure following a partial collapse of the roof which was supported by lightweight metal trusses (bar joists). The victims were part of the initial entry crew searching for the fire and possible entrapment of the store manager. **Both victims were in the back of the store operating a handline on the fire that was rolling overhead above a suspended ceiling. A truck company was pulling ceiling tiles searching for fire extension when a possible backdraft explosion occurred in the void space above the ceiling tiles.** Victim #1 called for everyone to back out due to the intense heat, just as the roof system at the rear of the structure began to fail, sending debris down on top of the fire fighters. Victim #1 and Victim #2 became separated from the other fire fighters and were unable to escape. Crews were able to remove Victim #2 within minutes and transported him to a local hospital where he succumbed to his injuries the following day. Soon after

Victim #2 was removed, the rear of the building collapsed preventing further rescue efforts until the fire was brought under control. Victim #1 was recovered approximately 1 ½ hours later.

Noonday, TX,-A Volunteer Mutual Aid Captain and Fire Fighter Die in a Remodeled Residential Structure Fire – Texas;

<http://www.cdc.gov/niosh/fire/pdfs/face200729.pdf>

On August 3, 2007, a 19 year-old male fire fighter (victim #1) and a 42 year-old male Captain (victim #2) responding from the same volunteer mutual aid department were fatally injured during a residential structure fire. While enroute, the fire district's Assistant Chief requested mutual aid from two neighboring departments due to dispatch updating the report to a fully involved structure fire. At 0150 hours, the Assistant Chief (Incident Commander) arrived on scene with four other fire fighters in an engine. At 0151 hours, the first interior attack crew entered the structure with flames visible in the foyer. At 0213 hours, the initial attack crew briefed a new interior attack crew (the victims) from the second mutual aid department on the location of a few hot spots to be knocked down. At 0216 hours, the IC requested ventilation. **Horizontal and vertical ventilation was conducted and a powered positive pressure ventilation fan was utilized at the front door but little smoke was pushed out. Minutes later, heavy dark smoke pushed out of the front door. The IC made several attempts to radio the interior attack crew with no response.** Approximately 21 minutes after entry, an evacuation horn was sounded. A three member RIT team made entry and located one of the victims, but was unable to fully extricate him. Ultimately, several RIT teams were necessary to recover the victims. Both victims died of smoke inhalation and thermal injuries.

NEAR MISS REPORTS

Report #05-589

Dispatched to a reported chimney fire at (address deleted) while enroute to the fire in (company deleted) advised by units on scene that it would be a working house fire. As the officer on the truck I collected my crew accountability tags and placed them on the ring.

Next, I donned my pack, grabbed the TIC, and attached it to my pack. I told FF (name deleted) to help catch the hydrant. When we arrived, the hydrant was in the yard across the street from the fire.

There was heavy fire coming from the B, C side; we pulled a 2 ½ to the C side and knocked down the majority of the visible fire. We decided an interior attack would be performed. The Lt, and Chief, and myself pulled a cross lay to the front door. I then put on my mask and pulled up my nomex. The front door was locked so I broke the window next to it and reached through an unlocked the door. When we opened the door, heavy black smoke came out. The smoke was down to the floor and there was no visibility on the first floor. As we searched for the stairs to the second floor we went down a step and then across the kitchen floor and back up the step and found the step leading to the upstairs. As we went up the stairs, I yelled back to the Chief to stop and feed us more hose because the stair way had a turn in it.

When we got to the top of the stairs, you could feel that it was getting hotter and we went to the right. There was still no visibility at this time. As we went down the hall trying to find a door we heard the Chief yelling that if we couldn't find it then we need to start backing out. At this time, I felt a door handle and yelled that I had found one. I stood up on my knees to open the door and at that time, **I could see fire come from behind me. The fire completely covered my body. I fell to the floor and started rolling around trying to get the fire out when I felt like I had it out I felt my body to make sure I wasn't still on fire.**

I looked around and could not see anyone. I called a mayday. I started searching for another room or a window because the hallway I was in was on fire, the stairs were on fire, and I needed a way out. However, I didn't find anything at this time. The fire in the hall died down and I felt for the hoseline. When I found it, I started to follow it to the stairs. I found the Lt and told him to get out and he dove down the stairs that were still on fire.

I then heard someone yelling and I went back down the hallway to try to find him. However, I didn't find anything. I turned around and went back to the stairs, which were still on fire. At this time I started to wonder if we we're going to make it out of this predicament.

I stooped and waited at the top of the stairs trying to see if the fire would die down when it didn't I made the decision that I wasn't going to just sit here and wait to die. I dove head first through the fire down the stairs. And I hit the wall where the stairs made a turn and started rolling down them when I got to the bottom I could see the Lt who yelled at me and we found the front door and ran to it when we got there it had shut and we were beating and pulling on it trying to get it open after doing this for a while I calmed down and realized that the door had locked after we went in. I unlocked it, opened it and we went out and went down in the front yard.

They stripped us of our gear. My helmet was damaged, my coat was damaged. Both parts of the gear were damaged due to the high heat conditions.

Report #07-860

My department [Department name deleted] responded to a mutual aid call for a large multi-unit apartment fire. This incident was commanded by a neighboring fire department [Department name deleted]. The incident was located in a mixed use area of [City name deleted]. Upon arriving on scene (5-10 minutes after first arriving units) the four man crew from [Name of company deleted] was instructed by the Incident Commander to make entry and advance a hoseline into one of the upstairs burning units. They were instructed to begin attacking the fire in the common attic shared by multiple upstairs apartment units. They took a scuttle hole ladder, pike poles, axes, and a charged hoseline with them and entered the smoke filled unit. Two of us began breaching the ceiling sheetrock with a pike pole and positioned a scuttle hole ladder to access the attic space overhead. The other two personnel had the charged hoseline and worked their way to a large source of smoke coming from a shared wall between the units we were in and the adjacent unit. The hose team used a second pike pole to open the wall between the units. **They found a large volume of fire in the adjacent unit. As the two on the hose team backed up to inform us of the situation, the floor began sagging and cavernously opening up where the floor met the wall adjacent to the burning unit. This revealed a large volume of fire in the downstairs unit directly below us.** The officer of our hose team pulled the nozzleman back from the

opening in the floor and our interior crew immediately backed out of the apartment. After everyone was safely outside, our team reported the rapidly deteriorating fire conditions to the Incident Commander. We then descended the exterior metal stairs to ground level and pulled our equipment back. As we were performing this task, the Incident Commander gave the order for immediate withdrawal of all interior crews and sounded three blasts on all the air horns. Approximately two minutes after the evacuation was ordered, the building we were working in collapsed.

This incident had the potential for a significant loss of life if the interior crews continued working and were not made aware of the rapidly deteriorating conditions. It is my opinion that the Incident Commander could have more fully sized up the extent of the fire. An assessment should have been made regarding the degree in which the ground floor units were involved before ordering teams to make entry into the overhead upstairs units. Despite being "packed up", our somewhat limited visibility, our diminished situational awareness created by our SCBA masks, and our [Manufacturer deleted] hoods, **we should have checked the fire conditions downstairs before proceeding upstairs.**

Report#08-384

Engines [2], [1] and Truck [1] were dispatched to a reported residential structure fire with reported entrapment. While enroute units were advised that the police department was on scene with confirmed entrapment. The shift officer then requested that an additional engine be assigned to the box. Engine [3] was immediately dispatched. Knowing that Engine [1] and Truck [1] would arrive shortly after Engine [2] **the shift officer ordered Engine [2] to proceed straight in and attempt a rescue.** He then ordered Engine [1] to lay in and Truck [1] to advance a 1 3/4" line to protect the search crew. Engine [2]'s crew complied with the order and made entry via the 1st floor front door. Despite encountering high heat and heavy smoke conditions, they made entry to search for the trapped victims. They advanced up the stairs to the second floor through fire in the stairwell. **The crew, faced with deteriorating conditions on the second floor, continued the search. They quickly found two children obviously deceased and correctly decided to leave the victims and continue the search. Conditions began to become untenable as they returned to the hallway.** During these first few moments, the crew from Truck [1] advanced a dry line to the front door. The structure had a front porch with a roof. The crew from Truck [1] stopped on the porch and completed donning of their SCBA and PPE. They called for the line to be charged once they were completely equipped. **For reasons not determined, the line was not immediately charged but neither firefighter was willing to leave the line to return to the engine to get it charged.** During this time, the fire flashed over as the crew from Engine [2] proceeded down the second floor hall to the windows that they had observed prior to entering the structure. **As Engine [2] bailed out of the front window they were followed by fire, causing damage to their PPE that required one set to be retired from service.** The crew from Truck [1] continued to wait for water on the porch while heavy fire vented out of the front door. They remained in place even though their PPE received significant thermal damage. Water was eventually supplied to the line and Truck [1] advanced into the structure making good progress. The incident went to a 2nd alarm and resulted in the death of three civilians.

Report#10-010

It was after lunch and our station was alerted for a reported house fire. The dispatch report was fire in a second floor bathroom. The area is not serviced by a municipal water supply so tankers were added at the time of dispatch. I was the officer on the truck company and arrived behind a chief officer, who was on scene about one minute prior to our arrival. **His report advised a larger single-family home with the occupant outside and nothing evident.** The truck was able to position in the driveway on the Alpha /Delta corner. We met briefly with the homeowner who advised us she thought the fire was on the 2nd floor in a bathroom. My tiller man and I entered the structure from the side Delta entrance. There was a light haze of smoke. When we entered the living room area, I made a transmission over the radio that the house was full of "junk" and for all units to use caution. **The homeowner was a hoarder and there was no visible floor. Magazines and papers and boxes were all over the place.**

As we proceeded to find the fire, there was still no IDLH; however, the smoke was a little thicker in the living room but only about one foot from the ceiling. I heard command start placing units in service from our assignment to run another fire in a bordering company's area. I made a transmission that we definitely had a fire in this house and we haven't found it yet so don't release anybody.

My tiller man and I did a complete primary of the house and found increasing smoke conditions but no fire. It was obvious to us the fire was on the first floor. We closed windows and watched where the smoke was coming from. In the living room, the smoke increased so we focused our attention there. I have to add there were two hose lines in place at this time, one at the main entrance and another one at the side Delta entrance.

Neither hose line was advanced into the house because we didn't know where the fire was and, due to the hoarding, the thought was once you went in and got in place you were stuck. There was no room to move around or re-position a hose line.

I was standing in the middle of the living room and using the thermal imager started to scan the area. I saw an area of high heat on the Charlie/ Bravo corner of the living room. I directed my tiller man to the area and he opened up. The area was a door and when he struck it with his pike pole, the room was free-burning. We attempted to shut the door but the fire escaped so fast we were unable to shut it. The room went from some visibility to zero visibility and high heat. We as a team recognized immediately we were in a bad situation and scrambled to exit. We were able to make it back to our initial entry point. I made a transmission to the crews at the front door where the fire was.

We were met by another crew in the kitchen. The fire was coming through the door right behind us. We were able to shut that door enough to keep the fire from entering the kitchen area. We then exited the kitchen onto the porch on the Delta side and made it to the exterior.

Declare a May Day As Soon As You THINK You Are In Danger.

Objective: To insure the firefighter is comfortable with, and there is no delay in, declaring a May Day when a firefighter is faced with a life threatening situation and the May Day is declared as soon as they THINK they are in trouble.

NO GO. If you're lost, separated or in trouble never hesitate to declare a May Day.

There is a very narrow window of survivability when a firefighter finds him/her in trouble. Any delay in declaring a May-Day eats into the survival time window.

If the firefighter is about to run out of air, or already out of air, he/she faces a very toxic atmosphere that will quickly incapacitate them, followed shortly by death. Declare a May-Day before you run out of air.

DO NOT hesitate! As soon as you THINK you're in trouble – declare the May-Day!

Provide the incident commander your name, company, location, air supply and situation.

When declaring a May Day, also activate the radio's emergency alert button and then manually activate the PASS device. (Some fire service professionals recommend activating the emergency button first. Additional, new technology allows the radio to be programmed to go to a designated emergency channel clear of radio traffic to declare the May Day and talk to the incident commander free of interference).

Also, understand that rapid intervention may not be rapid.

Research conducted by the Phoenix and the Seattle fire departments determined that it would take between 19 and 21 minutes to search, locate, and remove a firefighter from a building. This time exceeds the average life (time) of most SCBA bottles.

The research was conducted in buildings involving 5,000 square foot buildings. While Rescue time will vary depending on square footage, and complexity of the building, the point is if you get in trouble, RIT is not going to be rapid! Research also determined an average of 12 firefighters was needed to rescue a downed firefighter.

Also, understand that this research was conducted in "sterile" exercises under non-fire conditions. One can expect actual rescue times to be even longer with actual fire conditions, which involve high heat, water, with debris littering the floor and slippery conditions.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the lack of an early May Day declaration (or no May Day) and fireground survival training was a contributing factor to fire fighter LODDs including:

Career Fire Fighter Dies and Captain is Injured During a Civilian Rescue Attempt at a Residential Structure Fire – Georgia

<http://www.cdc.gov/niosh/fire/reports/face200716.html>

On May 28, 2007, a 41-year-old male career fire fighter (the victim) died after becoming disoriented and falling down a set of stairs while searching for a missing male occupant at a residential structure fire. A fire captain also received second degree burns resulting in lost-time from work. Both the victim and the captain were members of the first-responding fast attack engine company. **After becoming disoriented, they were trapped and missing for several minutes before being found.** The fire was reported at approximately 0449 hours. The first arriving fire fighters, including the victim, arrived on the scene at 0459 hours and were on-scene 13 minutes when the first mayday was called. The male resident also perished in the fire.

Career Fire Fighter Dies of Carbon Monoxide Poisoning after Becoming Lost While Searching for the Seat of a Fire in Warehouse - New York

<http://www.cdc.gov/niosh/fire/pdfs/face200404.pdf>

On December 16, 2003, a 30-year-old male fire fighter (the victim) died after he became separated from his crew members while searching for the seat of a fire at a furniture warehouse. His crew exited due to worsening conditions and a missing member announcement was made. At one point while inside the warehouse, members of an engine crew thought they heard a scream but could not identify the source. After an evacuation order was given and as engine crew members were exiting, **the victim's officer mistakenly identified one of them as the missing member and cancelled the emergency message.** Once fire fighters had exited, a personnel accountability report (PAR) was taken on the street which revealed that the victim was still missing. The victim's officer initiated a second emergency message for a missing member and a search was begun. The victim, who had a working radio, was found lying face down with his face piece removed and 900 psi left in his self-contained breathing apparatus (SCBA). His Personal Alert Safety System (PASS) alarm was reported by fire fighters to be inaudible. His carboxyhemoglobin (COHb) level was 74.8% in the emergency room. **The victim did not declare a May Day and did not activate his radios emergency alert button.**

NEAR MISS REPORTS

Report#08-577

Crews were fighting a fire in a 4 unit rowhouse/townhouse, wood-frame dwelling. Fire was visible from the C side (exterior). Crews reported fire in walls and ceilings on first floor and fire was moving up to the second floor. Initial crews were containing the fire, while an additional crew moved to the second floor for reconnaissance and search. When the reconnaissance crew reached the second floor, 2 members (a

lieutenant and a firefighter) entered a bathroom that was located directly above the fire. Almost immediately upon entering the bathroom, a 6' to 7' section of the bathroom floor collapsed with the lieutenant falling through the floor. The lieutenant was able to catch himself on a floor joists and nearby debris. As the floor collapsed, the firefighter jumped into a tub and did not fall through the floor.

Immediately upon falling through the floor, the lieutenant called a "mayday" and provided a clear and concise report detailing his unit, his location, the situation, and his immediate needs. Operations acknowledged the mayday, quickly confirmed the situation, and deployed the RIT team to the location of the trapped lieutenant. Simultaneously, command called for an additional alarm to stage nearby. Upon hearing the mayday and receiving associated information, a firefighter operating in the exterior of the structure notified two additional firefighters that the lieutenant had been seen operating in the area of a second floor window. A ground ladder was raised to the window and several firefighters helped the lieutenant extricate himself from the collapsed floor.

Within a minute or two from the time of the mayday call the lieutenant had been extricated and self-evacuated from the structure. Immediately upon hearing that the trapped lieutenant had been located, extricated, and removed from the building, command removed all personnel from the structure and ordered a PAR. The PAR revealed that all members were accounted for and firefighting operations commenced. Soon after the incident, the fire was knocked down and placed "under control." Meanwhile, the lieutenant and firefighter involved in the collapse were examined by an ambulance crew at the scene and no injuries were observed.

Report#09-990

Our department was dispatched to a structure fire reported by police who were initially dispatched to a burglar alarm. First companies arrived to find a two story, wood frame multi-use structure with moderate smoke issuing from the structure. After forcing entry, the engine company (three person hose team) entered with an inch and three-quarter attack line and a TIC. The crew reported high heat conditions and indicated that the TIC screen was red! They proceeded to the right and pushed to the rear of the structure with heavy black smoke but no visible fire. A rescue company (2 person team) entered shortly after the engine company. They too reported extreme heat at the floor and a Red screen on the TIC. The rescue crew also proceeded to the right and pushed to the rear.

Outside, the IC and ladder company crew observed smoke conditions rapidly changing from laminar light brown smoke to a turbulent black smoke pushing from the entry doorway. At this time, IC attempted to contact the initial engine company without success.

Back inside, the rescue crew reached the engine company at the rear wall. They all reported the same high heat conditions with no visible fire. **Some confusion occurred when personnel mingled together and at some point, the rescue crew lost contact with each other. The engine captain also lost track of one of his two rookie firefighters. One of the rescue members retreated outside and reported he had lost his partner. At the same time, the engine captain attempted to radio IC that he too had lost a member of his crew and to report the condition encountered inside.**

Back outside, the IC ordered the ladder company to "vent" a large window on the A Side of the structure. As this window was vented, the ladder crew observed fire at the floor level and it rolled across the room toward the rear of the structure.

The captain of the engine observed the fire roll over head and ordered his crew to evacuate. He reported extreme heat and made a hasty exit out of a window. Upon exiting, he reported that he had lost his crew and a MAYDAY was called. Almost immediately, all interior crews were accounted for at the entry doorway. The engine captain sustained 2nd degree burns to his face. No other injuries were reported. Crews quickly regrouped.

Later arriving companies were assigned to the fire attack, and the fire was quickly contained.

Report#09-1033

At 1730 hrs, our department was dispatched to a reported structure fire (smoke in a structure). Initial response was three engines, one tower, and chief officer. On arrival the first due engine advised of a single story residential (wood frame construction) with no hazards showing (smoke or fire). Command was established, a 1.75" line deployed, and an investigative mode initiated. While searching the interior of the structure, two firefighters encountered, as they described, a light haze of smoke with low heat inside the structure. Upon entering the kitchen area, the members reported brown tan laminar smoke in the kitchen with low heat conditions. Upon seeing the smoke, both firefighters stopped and donned their SCBA. Finding no fire, the two (lieutenant and firefighter) continued to search for the origin of the smoke. Prior to entering a bedroom off a narrow hallway (29" wide by 10' long), the firefighters decided to leave the hoseline in the hallway outside of the bedroom door.

Seconds after entering the bedroom, a fire erupted in size and intensity that I have never seen before. Given this, the lieutenant declared a working fire and they would be attacking the fire with the charged hoseline. Additionally, the lieutenant called for exterior ventilation of the bedrooms windows. **Within seconds of this transmission, a mayday was declared. The room and exterior went from nothing showing, and I mean nothing showing, to fully involved within seconds. The mayday was called because the firefighters were trapped inside the bedroom.** After venting, the flames engulfed the entire window and seconds later both firefighters dove out of the room through the flames to the exterior. Initially, it was believed that one more firefighter was still inside the structure. However, this turned out to be unfounded.

The preliminary investigation revealed that that one of the firefighters, while in the room and after the flash over, inadvertently closed the bedroom door thinking that they were opening it. Engulfed in fire, they were unable to locate the door and egress to safety, thus they had to run and dive through the flames. As a result, three firefighters were transported to the hospital (two from the interior and one involved in the rescue effort). Through heavenly blessing, none of the three was seriously hurt and all have since been released.

SECTION SEVEN

Explanations And Lesson Plans

**The Incident Commanders Rules of Engagement
for Firefighter Safety**

Introduction

The Incident Commanders Rules of Engagement for Firefighter Safety assumes that the Incident Command Systems is implemented fully and properly at emergency incidents. Not to do so creates chaos and places all firefighters at high risk for injury or death.

Essential to effective command operations is a stationary command post. Conducting command out of a chief officers vehicle, or specialized command vehicle, greatly enhances the command function. These vehicles allow for more reliable and more powerful radio communications. Listening (vital to firefighter safety) is also improved because of a quieter interior of vehicles. These vehicles also allow better night-time lighting for the incident commander and command staff and greater access to tactical plans and other vital information (i.e. hard copy/3 ringer binders or computer files)

Because National Fire Protection Standards require a safety officer to be assigned at working fires, the Rules assume this requirement is practiced. The Incident Safety Officer must be involved in the continuous risk assessment and action plan development as well as ongoing revision of the plan. He must have the authority to cease, or alter to make safe, fire ground operations.

The Incident Commanders Rules of Engagement for Firefighter Safety

Rapidly Conduct, or Obtain, a 360 Degree Size of the Incident.

Objective: To cause the incident commander to obtain an early 360 degree survey and risk assessment of the fireground in order to determine the safest approach to tactical operations as part the risk assessment and action plan development *and before firefighters are placed at substantial risk.*

NO GO. If an assigned objective cannot be achieved because existing conditions prevent success, stop and evaluate the situation and revise the objective.

To keep firefighters safe, the complete fireground must be rapidly assessed before a complete and 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. During that time period the incident commander should be cautious in assignments for any crews to high risk objectives.

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.

Abandoned and dilapidated buildings are a special consideration for a no-go decision. Where an active and progressing fire is present, a defensive strategy should be seriously considered.

The size up also includes evaluation of interior conditions and forecasting where the fire may progress and how quickly.

If the size up looks unsafe, “feels” unsafe, DON’T DO IT! Sometimes the gut is a good indicator for a no-go decision.

Until the complete 360 degree assessment is completed, the incident commander must be cautious in the commitment of fire crews, must constantly monitor changing conditions, and be prepared to immediately adjust their commitment or withdrawal crews all together.

Investigation of firefighter fatalities has frequently identified lack of a complete 360 degree fireground assessment as a contributing factor in their deaths.

Without a 360 degree rapid assessment, the incident commander is routinely limited to a view of only one side of the fireground. Conditions are often much worse out of sight of the incident commander, thus placing the fire attack crew(s) at risk.

The initial arriving incident commander, will always be at a disadvantage regarding knowledge about the building, access to the interior, and the buildings contents.

Without on-going progress reports from all points of the fireground, the incident commander will have a very limit “picture” of what’s happening and the action plan will be weak and likely unsafe.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which a complete 360 degree size-up was not conducted that may have contributed to fire fighter fatalities including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture**

quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. **Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died.** At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children – Iowa

<http://www.cdc.gov/niosh/fire/pdfs/face200004.pdf>

On December 22, 1999, a 49-year-old Shift Commander (Victim #1) and two Engine Operators, 39 and 29 years of age respectively (Victim #2 and Victim #3), lost their lives while performing search-and-rescue operations at a residential structure fire. At approximately 0824 hours, Central Dispatch was notified of a structure fire with three children possibly trapped inside. At approximately 0825 hours, a Shift Commander and an Engine Operator (Victim #1 and Victim #2) were dispatched to the scene. At 0827 hours, Engine 3 (Lieutenant and Victim #3) responded to the scene. **Aerial Truck 2 approaching the scene, reporting via radio that white to dark brown smoke was showing from the residence, and requested six additional fire fighters. When Aerial Truck 2 arrived on the scene at 0830 hours, 2 witnessed a woman and child trapped on the porch roof, and they were informed that three children were trapped inside the house.** Victim #1 proceeded into the house to perform a search-and-rescue operation. Engine 3 arrived on the scene shortly after, and the Lieutenant connected a supply line to the hydrant as Victim #3 pulled the Engine into position. The Lieutenant and Victim #3 stretched a 5-inch supply line and connected it to Aerial Truck 2. At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene, and the Chief assumed Incident Command (IC). At this time, one of the victims removed the first of the three children from the structure, handed the child to a police reserve officer near the front entrance of the structure, and returned to the structure to continue search and-rescue operations. At this time one of the victims removed a second child. The IC grabbed the child and began cardiopulmonary resuscitation (CPR). **Due to limited personnel on the fireground, the IC directed a police officer on the scene to transport him and the child to the hospital.** After donning her gear, Fire Fighter #1 approached the front door and noticed that the 1½-inch handline (previously stretched) had been burned through and water was free-flowing. It is believed that the three victims were hit with a thermal blast of heat before the handline burned through. The three victims failed to exit as 12 additional fire fighters arrived on the scene began fire suppression and search-and-rescue operations. Victim #2 was located, removed, and transported to a nearby hospital, where he was pronounced dead. Victim #1 and Victim #3 were later found and pronounced dead on the scene.

NOTE: All three children were pronounce dead at the hospital

Volunteer Fire Chief Killed when Buried by Brick Parapet Wall Collapse – Texas

<http://www.cdc.gov/niosh/fire/reports/face200821.html>

On July 05, 2008, a 42-year old male volunteer fire chief was killed when he was struck by a collapsing brick parapet wall during a commercial structure fire. The fire chief, along with four fire fighters, were finishing mopping up suppression activities at a grass fire when the fire department was dispatched to a structure fire. The fire chief and 2 fire fighters left the scene of the grass fire in a tanker and traveled to the scene of the structure fire where **the fire chief began to size-up the burning commercial structure while the other 2 fire fighters traveled 5 blocks back to the station to obtain an engine and structural fire fighting gear.** The 2 fire fighters returned to the structure fire scene with an engine parked in the street directly in front of the burning automotive repair and upholstery business. **The fire chief grabbed a self-contained breathing apparatus (SCBA) from the engine and pulled a preconnected 1 ¾-inch handline to the front door,** assisted by a fire fighter who had just arrived in her personal automobile. The fire chief worked the nozzle through the doorway (using tank water) while the other fire fighters established water supply. **Less than 5 minutes after the engine arrived on scene and shortly after water supply was established, the brick parapet wall at the front of the structure collapsed, striking the fire chief and burying him under the brick debris.** Rescuers quickly uncovered the fire chief and medical treatment was started immediately. The fire chief, still conscious, was transported to a trauma hospital where he died several hours later.

Nine Fire Fighters from a Combination Department Injured in an Explosion at a Restaurant Fire – Colorado

<http://www.cdc.gov/niosh/fire/reports/face200803.html>

On February 22, 2008, a deputy chief and eight fire fighters were injured during an explosion at a restaurant fire in Colorado. At 1340 hours, **dispatch reported visible smoke and flames through the roof of a commercial structure.** At 1344 hours, police arrived and began evacuating the restaurant and the adjoining retail store. The restaurant was part of a block-long row of adjoining structures. **Over the next 25 minutes, 3 engines, 2 ladder trucks, and 24 fire department members arrived on scene including the injured fire fighters.** A crew entered the restaurant with moderate smoke showing toward the rear and no flames visible. The crew backed out and entered the retail store (an adjacent building attached to the restaurant) to check for fire in the ceiling but found only light smoke visible. Another crew attempted to ventilate the retail store with a chainsaw, and when the roof was noticed to be spongy, they moved to the roof of the next building, two buildings down from the restaurant. **Interior crews operating in all three buildings had backed out. A crew closed the front doors of the restaurant fearing the oxygen would feed the increasingly greenish-black smoke pushing out of the roof of the restaurant.** Fireground personnel noticed the front windows of the restaurant and adjoining retail store were vibrating as flames from the roof of the restaurant intensified. **At 1427 hours, the restaurant and two adjoining buildings exploded sending glass, bricks, and wood debris into the street.** The crew on the roof located two buildings down from the restaurant, felt the front portion of the flat roof heave up about five feet, sending a fire officer to the ground below and temporarily trapping four other fire fighters; all incurred injuries. In addition, four fire fighters, positioned on the ground within 6 feet of the store fronts, were injured by flying debris.

NEAR MISS REPORTS

Report#09-532

The fire was in a two story, older commercial structure. The first floor housed a thrift store and an art gallery, with storage on the second floor. The fire started in the rear of the thrift store. **We found heavy fire coming out of the A, D, and C side doors and windows.** Crews went interior with a 2 1/2" line, entering on the D side, and operated about five minutes. Smoke caused the power lines to arc. The hose line was abandoned and the personnel were reassigned.

We were assigned to pull a 2 1/2" line to the second floor from the outside stairs. The stairs were loose at the landing. **We attempted to force the door when the door frame fell into the building. The second floor flashed and the roof collapsed. The incident commander changed to a defensive operation and abandoned the building.** Approximately fifteen minutes later the fire breached into the art gallery. One firefighter sustained a minor injury

Report#07-908

All hands were working at a 4 alarm fire, involving three, balloon framed, three story, 30'x75' tenement houses. **Heavy structural damage was sustained by the center (origin) structure.** Exposure "B" experienced exterior fire damage as well as a fully involved attic space. The "D" exposure received exterior fire damage. A crew of three firefighters was operating an exterior handline between the original structure and the "B" exposure. At this time **the major body of fire had been controlled, leaving several stubborn pockets of fire to deal with.** The Incident Safety Officer (ISO) noted the crew's position and evaluated the safety of the operation against the risk involved. The center building had been severely weakened by the fire and it was determined that the benefit did not merit the risk. **The ISO ordered the crew to move the line to the adjacent yard at the rear of the building.** This would place them safely out of the collapse zone. **Approximately five to ten minutes later the structure suffered a sudden, catastrophic collapse, sending most of the debris to the area where the crew had been operating before the move. This could easily have resulted in death for our members. Instead it was a non-event.**

Report#09-1146

While returning from a previous incident, the engine spotted light smoke in a residential area. At approximately the same time that they began to report the smoke, the county dispatch rang out a structure assignment to that area. As a result the engine arrived several minutes prior to the next due unit. The structure was a triplex with each unit being approximately 2,500 sq. ft. or 7,500 sq. ft in total. It was built into the side of a grade and entry from the front door placed you on the second floor, leaving you with one floor below and one floor above.

The captain gave a report on conditions that included smoke and fire coming from the roof and all occupants out of the building. The captain then made the decision to don SCBAs, pull an attack line, and make entry through the front door. **A 360 degree survey had not been completed, nor was any other unit on scene.** Upon making entry, the captain reported encountering light smoke at the ceiling level with clear visibility into the structure. He then made the decision to advance the line down a hallway where the captain and fire fighter encountered heavy smoke down to the floor; a second alarm was requested.

At this point, the captain requested ventilation, but no other units were on scene and the department's only truck company has an extended response time into the involved area. The captain and fire fighter continued to advance until they encountered active fire. After a quick knock down, they employed the use of a thermal imager and spotted an additional heat source to their right, down another hallway. They advanced to that position and began fighting fire in the kitchen area.

The second due engine arrived a full 5 minutes and 11 seconds after the initial unit went on scene. The driver of the first arriving engine had already established his own water supply. The second unit was assigned to back up the first due engine. **After making an initial knock down of the fire in the kitchen, the captain realized he had fire below him and that there was an additional level to the building.** However, he was not aware of how to access the lower level. The captain and fire fighter then began to fight the fire from above it.

It was at this point that the captain and fire fighter suffered burns. It is believed that as the crew was fighting the fire windows on the lower level blew out, creating horizontal ventilation contributing to the rapid acceleration of the fire. The crew, being positioned above the fire, resulted in them being exposed to an excessive amount of heat. This resulted in the captain and fire fighter backing out of the building.

The crew was treated at the hospital. The captain returned to duty and completed his shift. The fire fighter did not return that day. Both the captain and fire fighter were wearing all personal protective equipment including hoods. The fire eventually grew to five alarms.

Determine the Occupant Survival Profile.

Objective: To cause the incident commander to consider fire conditions in relation to possible occupant survival of a successful *rescue event* before committing firefighters to high risk search and rescue operations as part of the initial and ongoing *risk assessment* and action plan development.

NO GO: If the occupants cannot survive the search AND rescue event do not commit the rescue. Obtain fire control before searching.

Our goal is to save lives. The greatest risk taken by firefighters is based on the potential to save lives. No action plan can be accurately developed until we first determine if the victim can survive the fire conditions before rescuers reach them AND then survival their removal. If victim survival is not possible, a more cautious approach to fire operations must be taken.

The incident commander must factor growing fire conditions, resources on scene (the number of firefighters to complete a rescue), and the time to complete a rescue into the decision to conduct and support search and rescue.

Search and rescue and the related removal of the victim from the fire building takes time and most often occurs while fire conditions continue to deteriorate – sometimes rapidly, thus, increasing risk. A search and rescue decision must be balanced against time and conditions. In some cases a rescue effort must be abandoned because of deteriorating conditions.

Today's fire environment is far more lethal than the past. Victims die quickly and sooner than what occurred a few decades ago. If there is no potential for survival, the action plan should be based on that determination and reduce the risk exposure of firefighters.

The incident commander must determine if victims can survive conditions in individual compartments as part of decision making.

A fire in a home in the middle of the night, with fire showing out the rear window, and modest smoke throughout the rest of the building may allow victims survival.

A fire in the same home in the middle of the night, with significant fire showing, and dense smoke under pressure pushing out of openings, may not allow any victims to survive the heat, toxic environment, and the time required to search and remove them. A more cautious approach should be taken in firefighting operations.

A well involved structure will not allow for survival of any victims.

A well involved fire in an apartment may not allow survival in the compartment, but the survival profile may be good in the adjacent apartment(s). The action plan should extend search and rescue to the exposure apartments if safe to do so.

An accurate determination of a survival profile may require a 360 degree size up.

It must be understood that search and rescue takes time to complete-the patient may not survive the toxic environment and fire conditions may not improve during the rescue efforts. Be cautious.

Abandoned and dilapidated buildings are a particular risk to firefighters.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the incident commander may not have considered that the present fire conditions made it unlikely that any occupants could survive the rescue event, including:

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children – Iowa

<http://www.cdc.gov/niosh/fire/pdfs/face200004.pdf>

On December 22, 1999, a 49-year-old Shift Commander (Victim #1) and two Engine Operators, 39 and 29 years of age respectively (Victim #2 and Victim #3), lost their lives while performing search-and-rescue operations at a residential structure fire. At approximately 0824 hours, Central Dispatch was notified of a structure fire with three children possibly trapped inside. At approximately 0825 hours, a Shift Commander and an Engine Operator (Victim #1 and Victim #2) were dispatched to the scene. At 0827 hours, Engine 3 (Lieutenant and Victim #3) responded to the scene. **Aerial Truck 2 approaching the scene, reporting via radio that white to dark brown smoke was showing from the residence,** and requested six additional fire fighters. When Aerial Truck 2 arrived on the scene at 0830 hours, **Aerial Truck 2 witnessed a woman and child trapped on the porch roof, and they were informed that three children were trapped inside the house.** Victim #1 proceeded into the house to perform a search-and-rescue operation. Engine 3 arrived on the scene shortly after, and the Lieutenant connected a supply line to the hydrant as Victim #3 pulled the Engine into position. The Lieutenant and Victim #3 stretched a 5-inch supply line and connected it to Aerial Truck 2. At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene, and the Chief assumed Incident Command (IC). **At this time, one of the victims removed the first of the three children from the structure, handed the child to a police reserve officer near the front entrance of the structure, (the child was pronounced dead at the hospital) and returned to the structure to continue search and-rescue operations. At this time one of the victims removed a second child.** The IC grabbed the child and began cardiopulmonary resuscitation (CPR). Due to limited personnel on the fireground, the IC directed a police officer on the scene to transport him and the child to the hospital. After donning her gear, Fire Fighter #1 approached the front door and noticed that the 1½-inch handline (previously stretched) had been burned through and water was free-flowing. It is believed that the three victims were hit with a thermal blast of heat before the handline burned through. The three victims failed to exit as 12 additional fire fighters arrived on the scene began fire suppression and search-and-rescue operations. Victim #2 was located, removed, and transported to a nearby hospital, where he was pronounced dead. Victim #1 and Victim #3 were later found and pronounced dead on the scene.

NOTE: All three children were pronounced dead at the hospital

Volunteer Fire Fighter and Trapped Resident Die and a Volunteer Lieutenant is Injured following a Duplex Fire - Pennsylvania

<http://www.cdc.gov/niosh/fire/pdfs/face200806.pdf>

On February 29, 2008, a 21-year old male volunteer fire fighter (the victim) and a 33-year old volunteer Lieutenant were injured during a structural fire. **The fire fighters were attempting to locate and rescue a 44-year old female resident from a burning duplex. The fire fighters became trapped on the second floor when fire conditions deteriorated.** The victim was rescued by the rapid intervention team (RIT) and both the victim and injured Lieutenant were transported to the hospital. The victim remained in critical condition for several days in the burn unit before succumbing to his injuries on March 5, 2008. **The female resident of the structure did not survive the fire.**

NEAR MISS REPORTS

MORE REPORTS PENDING

Conduct an Initial Risk Assessment and Implement a SAFE ACTION PLAN

Objective: To cause the incident commander to develop a safe action plan by conducting a thorough size-up, assess the occupant survival profile and completing a thorough risk assessment *before* firefighters are placed in high risk positions on the fireground.

The victim survival profile and 360 degree size-up will provide information on fire conditions and a risk assessment for a more accurate, and safe, initial action plan.

The first companies or officers to an assigned geographic location or function MUST provide an initial size up report to the incident commander.

The incident commander must have a logical vision as to where the fire is progressing, or likely to travel, and a consideration of time lines, along with a reasonable calculation of what fire crews can accomplish safely (or not accomplish) while developing the action plan.

Ongoing progress reports will continue to provide information critical to the plan and decision making as well as revisions to the action plan.

The action plan, and all commitment of fire crews, must consider the safety of firefighters as the highest priority.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the incident commander did not conduct a thorough size-up, thoroughly assess the occupant survival profile and complete a full risk assessment before placing fire fighters in high risk positions, including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor.**

The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. **Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died.** At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children – Iowa

<http://www.cdc.gov/niosh/fire/pdfs/face200004.pdf>

On December 22, 1999, a 49-year-old Shift Commander (Victim #1) and two Engine Operators, 39 and 29 years of age respectively (Victim #2 and Victim #3), lost their lives while performing search-and-rescue operations at a residential structure fire. At approximately 0824 hours, Central Dispatch was notified of a structure fire with three children possibly trapped inside. At approximately 0825 hours, a Shift Commander and an Engine Operator (Victim #1 and Victim #2) were dispatched to the scene. At 0827 hours, Engine 3 (Lieutenant and Victim #3) responded to the scene. **Aerial Truck 2 approaching the scene, reporting via radio that white to dark brown smoke was showing from the residence, and requested six additional fire fighters. When Aerial Truck 2 arrived on the scene at 0830 hours, 2 witnessed a woman and child trapped on the porch roof, and they were informed that three children were trapped inside the house.** Victim #1 proceeded into the house to perform a search-and-rescue operation. Engine 3 arrived on the scene shortly after, and the Lieutenant connected a supply line to the hydrant as Victim #3 pulled the Engine into position. The Lieutenant and Victim #3 stretched a 5-inch supply line and connected it to Aerial Truck 2. At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene, and the Chief assumed Incident Command (IC). **At this time, one of the victims removed the first of the three children from the structure, handed the child to a police reserve officer near the front entrance of the structure, (the child was pronounced dead at the hospital)** and returned to the structure to continue search and-rescue operations. At this time one of the victims removed a second child. The IC grabbed the child and began cardiopulmonary resuscitation (CPR). Due to limited personnel on the fireground, the IC directed a police officer on the scene to transport him and the child to the hospital. **After donning her gear, Fire Fighter #1 approached the front door and noticed that the 1½-inch handline (previously stretched) had been burned through and water was free-flowing. It is believed that the three victims were hit with a thermal blast of heat before the handline burned through. The three victims failed to exit as 12 additional fire fighters arrived on the scene began fire suppression and search-and-rescue operations.** Victim #2 was located, removed, and transported to a nearby hospital, where he was pronounced dead. Victim #1 and Victim #3 were later found and pronounced dead on the scene.

Career Fire Captain Dies When Trapped by Partial Roof Collapse in a Vacant House Fire – Texas

<http://www.cdc.gov/niosh/fire/pdfs/face200509.pdf>

On February 19, 2005, a 39-year-old career fire Captain (the victim) died after **being trapped by the partial collapse of the roof of a vacant one-story wood frame dwelling. The house was abandoned and**

known by residents in the area to be a “crack house” at the time of the incident. The victim was the captain on the first-arriving engine crew which was assigned to perform a “fast attack” – to take a hoseline into the house, locate the seat of the fire, and begin extinguishment. The one-story wooden ranch-style house was built in the 1950s and additional rooms had been added at the rear in at least two phases following the initial construction. **Crews arriving on scene could see fire venting through the roof at the rear of the house.** The victim and a fire fighter advanced the initial attack line through the front entrance and made their way toward the rear of the house. Visibility was good in the front of the house but conditions quickly changed as they advanced toward the rear. **The fast attack crew had just begun to direct water onto the burning ceiling in the kitchen and den areas when the roof at the rear of the structure (over the building additions) collapsed, trapping the captain under burning debris.** The collapse pushed fire toward the front of the house which quickly ignited carbon and dust particles suspended in the air along with combustible gases, sending a fireball rolling toward the front of the structure. Prior to the time of the collapse, two other crews had entered through the front entrance. **The rapidly deteriorating conditions following the collapse quickly engulfed the other crews with fire. Crew members became disoriented and crews became separated as they attempted to find their way out. Five fire fighters received burns requiring medical attention.**

NEAR MISS REPORTS

Report#07-749

A hose team entered a two story single family structure with a **well involved roof/attic fire**. Prior to the hose team entering the building, **a deck gun had been used to control the fire**. A portion of the second floor ceiling collapsed and briefly trapped a member. The member was easily removed and exited the building with a strained neck. **The hose team entered the building before an Incident Action Plan had been established and argued with the Incident Commander about defensive tactics.** The Safety Officer advised the duty captain to exit the building but the captain was convinced that an offensive attack was warranted. The building was not occupied by civilians.

If You Do Not Have the Resources to Safely Support and Protect Firefighters – Seriously Consider a Defensive Strategy.

Objective: To prevent the commitment of firefighters to high risk tactical objectives that cannot be accomplished safely due to inadequate resources on the scene.

One or two fire crews, with two or three members each, cannot be expected to complete the same work as the NFPA 1710 standard recommendation of 17 members on the scene as part of the initial response to a structure fire.

Many times, the fire is advanced, complex or exceeds the available resources for some period of time.

Conducting search and rescue, along with interior firefighting operations, where there is significant fire in the building, and with inadequate resources on scene, places firefighters in the interior at extreme risk.

Delays in arrival of additional requested resources also creates a high risk to firefighters engaged in interior operations.

If on scene resources are not adequate to effectively conduct search and rescue and control the fire, or support a RIT, limit the risk exposure of firefighters. Seriously consider an early defensive operation.

The incident commander, and firefighters, must recognize we cannot always save people or buildings when we do not have the resources on scene to do so.

Compliance with the OSHA “two in, two out” rule should never be violated at a working fire and establishing a fully staffed Rapid Intervention Team must be in place for firefighter safety.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the lack of adequate staffing on scene was a contributing factor to fire fighter LODDs including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. The first arriving engine company found a rapidly growing fire at the enclosed

loading dock connecting the showroom to the warehouse. The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor.** The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children—Iowa

[cdc.gov/niosh/fire/reports/face200004.html](https://www.cdc.gov/niosh/fire/reports/face200004.html)

At approximately 0823 hours, the three victims and two additional fire fighters had cleared the scene of a motor-vehicle incident. One of the fire fighters (Fire Fighter #1) riding on Engine 3 joined the ambulance crew to transport an injured patient to the hospital. At approximately 0824 hours, Central Dispatch received a call from a neighbor, about a structure fire with the possibility of children trapped inside. Central Dispatch notified the fire department and at approximately 0825 hours dispatched Aerial Truck 2 with the Shift Commander (Victim #1) and an Engine Operator (Victim #2). Aerial Truck 2 proceeded to the scene. At 0827 hours, Engine 3 was dispatched and responded to the scene with a Lieutenant and an Engine Operator (Victim #3). The Chief responded by Car 5661 to the hospital to pick up Fire Fighter #1 and continue to the scene. At approximately 0829 hours, the Shift Commander (Victim #1) radioed the hydrant position at the scene to Engine 3 who was approximately 1 minute behind Aerial Truck 2. As Aerial Truck 2 approached the location of the structure, **the Shift Commander (Victim #1) radioed Central Dispatch and requested that 6 additional fire fighters be called in due to the severity of the situation.** Aerial Truck 2 reported white to dark brown smoke showing from the residence.

Aerial Truck 2 arrived on the scene at approximately 0830 hours. **A woman and a child were trapped on a porch roof at the front of the residence. The fire fighters were informed that three children were trapped inside the house.** Victim #1 proceeded into the house through the front door to perform a search-and-rescue operation. A police officer, who arrived on the scene before Aerial Truck 2, positioned a ladder to the porch roof and removed the mother and child. The Lieutenant from Engine 3 connected a line (200 feet of a 5-inch supply line) to the hydrant as the Engine Operator (Victim #3) pulled the engine into position. After connecting the line, the Engine Operator (Victim #3) and the Lieutenant from Engine 3 connected the supply line to Aerial Truck 2.

At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene. The Chief assumed duties as the Incident Commander (IC). Through face-to-face contact the IC instructed Victim #3 to finish hooking the supply line to Aerial Truck 2, then "gear up" and proceed into the house to assist in the search-and-rescue operation. *Note: In this incident only fireground officers were equipped with portable radios, thus only certain members on the fireground receive their instructions over their portable radios. Other fireground personnel are forced to rely on face-to-face communications from the IC or their crew leader.* Fire Fighter #1 stretched 200 feet of a 1½-inch handline through the front door of the structure into the front downstairs room, noting smoky conditions with little heat. Fire Fighter #1 then went back to Engine 3 to finish donning her protective gear.

At this time, one of the victims handed a child to a police reserve officer near the front door of the structure. The police reserve officer transported the child to a nearby hospital. (The child was pronounced dead) As the first child was removed, the IC charged the handline and went back up to the structure. At this time, a second child was brought to the door. The IC ran to the door and grabbed the child from one of the victims and began cardiopulmonary resuscitation (CPR). The IC then looked for someone to give the child to; however, there were no other fire fighters or emergency medical service personnel on the scene. A second police officer transported the IC and the child to the hospital.

Note: All three children removed from the structure were pronounced dead at the hospital.

At approximately 0835 hours, Fire Fighter #1 went up to the front of the structure to begin an active fire fight and noticed that the hoseline was free-flowing. As Fire Fighter #1 continued toward the structure she discovered that the hoseline had burned through and flames were protruding from the entrance. *Note: It is believed, through interviews conducted, evidence at the scene, and a fire model developed by NIST, that the dining room flashed, causing secondary flashovers in the living room, and ventilation conditions created a path of least resistance up the stairs, injuring and disorienting the three fire fighters enough to prevent their escape from the structure.*

Noting that the hose was free-flowing, the Lieutenant from Engine 3 shut the line down. He then charged a second line that was stretched into the house for Fire Fighter #1 and proceeded to his engine to "gear up." At this time, Fire Fighter #1, standing inside the doorway of the structure, was yelling that they were out of water. The Lieutenant then proceeded to the pump panel of Aerial Truck 2 and opened the wheel valve, recharging the line for Fire Fighter #1. Fire Fighter #1 then initiated suppression activities in the living room. **Note: Due to the extreme heat Fire Fighter #1 would advance the hoseline into the room and then retreat. This sequence was repeated several times.**

At approximately 0839 hours, the Chief returned to the scene and continued his role as IC. Shortly after the Chief returned to the scene, Engine 6 arrived with an Assistant Chief (Assistant Chief #1) and a Lieutenant. As the Lieutenants from Engines 3 and 6 and Assistant Chief #1 finished donning their protective gear, they were told by onlookers that there was the possibility of a civilian in the upstairs apartment on the non-fire side of the building. *Note: The neighbor's car was parked in front of the house, causing concern among onlookers that he was still inside the structure.* At this time the IC ordered the Lieutenant from Engine 3, the Lieutenant from Engine 6, and Assistant Chief #1 to form a three-man search-and-rescue team to search the apartment located on the top floor of the non-fire side.

The search-and-rescue team proceeded through the front door (non-fire side) to the upstairs apartment. As they reached the landing at the top of the stairs, the search-and-rescue team split up in their search efforts. Assistant Chief #1 went off to the left to search, the Lieutenant from Engine 3 went straight ahead toward the back of the structure, while the Lieutenant from Engine 6 stayed near the entrance of the structure. At this point, there was zero visibility in this side of the structure due to thick smoke.

Note: Through interviews conducted it was determined that the Fire Department had not completed any type of ventilation at this time. However, it is believed that horizontal ventilation took place in the rear of the structure by a police officer. Both rear first floor windows of the structure were cleared in both the fire and non-fire sides of the structure. Photographs reviewed by investigators show that the fire department was possibly on the scene conducting search-and-rescue operations when the horizontal ventilation was conducted; however, an exact time of the horizontal ventilation could not be determined, due to insufficient fireground communication between the fire department and the police officers on the scene. The window cleared on the fire side of the structure was the bathroom window near the kitchen. ATF agents, who conducted a post-fire investigation of the structure, and the engineers from NIST, who developed the fire model, concluded that the door leading from the bathroom to the kitchen area was closed and intact when the window was cleared. Consequently, it is believed that the clearing of this window had little impact on ventilation or fire growth.

After conducting their searches, the search-and-rescue team met on the upstairs landing to decide what their next move should be. At approximately 0848 hours, they heard the IC yelling for Victim #1, so the search-and-rescue team exited the structure and proceeded to the IC to get their next assignment. *Note: After returning from the hospital, the IC (Chief) regained command and started to account for all fire fighters on the scene. He realized that he was now missing three fire fighters (Victims #1, #2, and #3).* At approximately 0850 hours, Aerial Truck 1, consisting of a four-man crew (Lieutenant, Engine Operator, and Fire Fighters #2 and #3), arrived on the scene. At the same time, an Assistant Chief (Assistant Chief #2) and a fire fighter (Fire Fighter #4) arrived on the scene in a privately owned vehicle (POV). Assistant Chief #1 from Engine 6, the Lieutenant from Engine 6, and the Engine Operator from Engine 3 were ordered to continue as a Rapid Intervention Team (RIT) and search the fire side of the structure. Assistant Chief #2 and Fire Fighter #4 donned their SCBA, pulled an additional line off Aerial Truck 2, and went into the structure to assist in suppression activities. Assistant Chief #2, the nozzleman, and Fire Fighters #2 and #4 manned the hoseline inside the doorway, spraying water into the living room. Fire Fighter #1 was also near the entrance of the structure performing suppression activities. The Engine Operator from Aerial Truck 1 went into the hallway, then heard Assistant Chief #2 ask for a positive pressure ventilation fan (PPV) to be placed in the front doorway. Fire Fighter #2 took the nozzle from Fire Fighter #4, and Assistant Chief #2 acted as additional backup as they continued spraying water into the living room. At this time, Fire Fighter #2 noticed a helmet lying on the floor in the front right room, then saw one of the victims lying on the floor. *Note: It is undetermined why the victims' integrated and manual PASS devices were not heard sounding in this incident.* The interior suppression crew's (Fire Fighter #2, Fire Fighter #4, and Assistant Chief #2) low-air alarms sounded, and they were forced to exit the structure.

Fire Fighter #4 was ordered by the IC to go to the rear of the structure and aid in suppression activities. *Note: Two lines were taken to the rear of the structure; however, through interviews conducted, it is undetermined who pulled these lines to the rear of the structure.*

The interior suppression crew changed their air bottles and reentered. At this time the Engine Operator from Aerial Truck 1 placed a PPV fan in the front doorway. Upon entry, Assistant Chief #2, Fire Fighter #2, and the Engine Operator from Aerial Truck 1 removed who was thought to be Victim #1 from the structure. Upon exiting the structure, they realized it was Victim #2. Victim #2 was transported to the hospital where he was pronounced dead.

Due to the extreme heat inside the structure, the IC made the call to switch from a search-and-rescue operation to a defensive attack. The IC assigned Assistant Chief #1 the responsibility of keeping fire fighters out of the structure until it was deemed safe. At this time three additional fire fighters (Fire Fighters #5, #6, and #7) were transported to the scene by a police officer. Fire Fighter #7 was assigned to the rear of the structure with the Lieutenant from Engine 6 and Fire Fighter #2, to control the fire extension from the rear of the structure. Fire Fighter #5 was ordered to man a hoseline with the Lieutenant from Aerial Truck 1 on the side and rear of the structure to control fire extension and assist in suppression activities. Fire Fighter #6 was assigned with Assistant Chief #1 to man a hoseline from the main entrance of the structure to aid in the cool down.

After approximately 4 minutes of defensive fire fighting, search-and-rescue operations resumed. The Lieutenant from Engine 6 and Fire Fighter #3 formed a RIT and entered the fire side of the structure to search for the two missing fire fighters. However, they had to exit the structure due to problems with Fire Fighter #3's personal protective equipment. At this time, Assistant Chief #1 and Fire Fighter #7 entered the structure to search for the two missing fire fighters and the third child. Approximately 1030 hours, as crews continued to suppress the fire inside the structure, Assistant Chief #1 and Fire Fighter #7 located Victim #1 and the third child at the top of the stairs on the second-floor landing. Assistant Chief #1 radioed the IC asking EMS personnel to proceed to the front of the structure to aid in the removal of the third child from the structure. After the third child was removed, Assistant Chief #1 and Fire Fighter #7 proceeded back up the stairs to the landing, and with help from Fire Fighter #6, they removed Victim #1 from the structure. Assistant Chief #1 and Fire Fighter #7 then located Victim #3 in the master bedroom and removed him from the structure. Fire Fighter #8 arrived on the scene by POV and assisted in fire suppression activities. Victims #1 and #3 and the third child were pronounced dead at the scene.

Fire Fighters #5 and #8 and the Engine Operator from Aerial Truck 1 received an order from the local Fire Marshal to ventilate the structure in preparation for a post-fire investigation. *Note: At approximately 1012 hours the local Fire Marshal arrived on the scene.* At this time Fire Fighters #5 and #8 and the Engine Operator from Aerial Truck 1 ventilated the roof to aid in suppression activities. The remaining crews were relieved from the scene at approximately 1530 hours. At this time, mutual-aid companies arrived on the scene and took over the suppression and overhaul activities.

Volunteer Fire Fighter Dies While Lost in Residential Structure Fire-Alabama

<http://www.cdc.gov/niosh/fire/pdfs/face200834.pdf>

On October 29, 2008, a 24-year old male volunteer fire fighter (the victim) was fatally injured while fighting a residential structure fire. **The victim, one of three fire fighters on scene, entered the residential structure by himself through a carport door with a partially charged 1½-in hose line; he became lost in thick black smoke.** The victim radioed individuals on the fireground to get him out. Fire fighters were unable to locate the victim after he entered the structure which became engulfed in

flames. The victim was caught in a flashover and was unable to escape the fire. Approximately an hour after the victim entered the structure alone, a police officer looking through the kitchen window noticed the victim's hand resting on a kitchen counter; the victim was nine feet from the carport door he had entered.

NEAR MISS REPORTS

Report #09-364

On the morning of [date and time deleted], we received an alarm of a structure fire about ½ mile from Station [1]. Engine [1], Engine [2] and Rescue [1] responded.

Upon the arrival of Engine [1] and Rescue [1] we found heavy smoke showing from the structure. Engine [1] laid two 1 ¾" lines and caught the hydrant right across the street. **Engine [1] group went in through the front door, but due to extreme amount of heat, were not able to get to the seat of the fire. Group 1 lieutenant called for vertical ventilation but due to staffing issues, ventilation was not able to be performed.**

Our chief arrived on scene and assumed command. He advised us to exit the building and we were going defensive. After exiting the house, group 1 pulled their line to the C-side of the structure and Group 2 (off of Engine [2]) pulled the second 1 ¾" to the B-side of the structure. The Incident Commander then advised the first arriving off duty personnel to set up the PPV fan at the front door. Once two off-duty personnel arrived, they became Group 3 and set up and turned on the fan. The structure was an old [deleted] house built in the early 1900s with a very big and open attic. After the smoke cleared, the Incident Commander advised Group 1 and 2 to stop flowing water because Group 3 was going in the front door and we were going back offensive.

Due to heavy fire, Group 3 was doing no good and backed out. Two more off-duty personnel arrived and the Incident Commander made them Group 4 and assigned them to vertically ventilate. This order was given 45 minutes into the fire and approximately 30 minutes after a defensive attack was ordered and the PPV fan was set up. The roof was already visibly sagging and from the road you could see heavy fire in the attic. Three lieutenants and a captain on scene advised the Incident Commander that the task was unsafe. Group 4 ignored our plea and put a ladder on the building. Once on the roof and starting to ventilate, the roof gave way and collapsed. The two firefighters in Group 4 were standing on the roof ladder and were able to roll off the house. The roof ladder sustained major fire damage and the firefighter making the cuts was very lucky that his back up firefighter was holding onto him and saw the roof start to give way. This allowed for the back up firefighter to pull the [power saw operator] up and fall off the rood onto the ground instead of into the fire.

After it was over, the firefighters from Group 4 stated that the Incident Commander ordered us to ventilate and we were not going to break an order."

DO NOT Risk Firefighter Lives for Property That Can Not Be Saved – Seriously Consider a Defensive Strategy.

Objective: To prevent the commitment of firefighters to high risk search and rescue and firefighting operations that may harm them when fire conditions prevent occupant survival and significant or total destruction of the building is inevitable

NO GO: If fire conditions prevent occupant survival, adjust the action plan.

NO GO: If the fire has, or will destroy, adjust the action plan.

If conditions indicate there is no victim survival, or the building is already lost to fire, DO NOT place firefighters at risk. The action plan should protect firefighters. Consider early defensive operations.

Abandoned and dilapidated buildings are a special consideration for a no-go decision. Where an active and progressing fire is present, a defensive strategy should be seriously considered.

It is the incident commander's responsibility to control firefighters on the fireground and insure they are not engaging in independent or freelance activities that put them at risk once the incident is determined to be a defensive operation.

The incident commander, because of an exterior view, often is in the best position to determine if the fire is defensive from the outset, or if conditions continue to deteriorate, declare it as such.

The incident commander must continuously monitor changing conditions and not hesitate to declare the fire a defensive operation and immediately evacuate crews from the building if conditions worsen.

After ordering an evacuation of the building, or, the incident commander must conduct a "round robin" radio call to all Division/Group Supervisors and/or fire crews to confirm they understand that the fire is defensive and that all crews are indeed evacuating the building and have done so. Once evacuation is complete a Personnel Accountability Report (PAR) roll call must be conducted to confirm all firefighters are out of the building.

Anytime operations go from an offensive to a defensive strategy a Personnel Accountability Report must be taken to confirm all firefighters are out of the building.

Abandoned and dilapidated buildings pose a particular risk to firefighters.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the incident commander committed firefighters to high risk operations at structures with minimal value and conditions indicated occupant survival was unlikely, and the building could not be saved, including:

Career Fire Captain Dies When Trapped by Partial Roof Collapse in a Vacant House Fire – Texas

<http://www.cdc.gov/niosh/fire/pdfs/face200509.pdf>

On February 19, 2005, a 39-year-old career fire Captain (the victim) **died after being trapped by the partial collapse of the roof of a vacant one-story wood frame dwelling. The house was abandoned and known by residents in the area to be a “crack house” at the time of the incident.** The victim was the captain on the first-arriving engine crew which was assigned to perform a “fast attack” – to take a hoseline into the house, locate the seat of the fire, and begin extinguishment. The one-story wooden ranch-style house was built in the 1950s and additional rooms had been added at the rear in at least two phases following the initial construction. Crews arriving on scene could see fire venting through the roof at the rear of the house. The victim and a fire fighter advanced the initial attack line through the front entrance and made their way toward the rear of the house. Visibility was good in the front of the house but **conditions quickly changed as they advanced toward the rear. The fast attack crew had just begun to direct water onto the burning ceiling in the kitchen and den areas when the roof at the rear of the structure (over the building additions) collapsed, trapping the captain under burning debris. The collapse pushed fire toward the front of the house which quickly ignited carbon and dust particles suspended in the air along with combustible gases, sending a fireball rolling toward the front of the structure.** Prior to the time of the collapse, two other crews had entered through the front entrance. The rapidly deteriorating conditions following the collapse quickly engulfed the other crews with fire. Crew members became disoriented and crews became separated as they attempted to find their way out. Five fire fighters received burns requiring medical attention.

Volunteer Fire Lieutenant Killed While Fighting a Basement Fire - Pennsylvania

<http://www.cdc.gov/niosh/fire/pdfs/face200808.pdf>

On March 5, 2008, a 35-year-old male volunteer Fire Lieutenant (the victim) died while fighting a basement fire. **About 30 minutes after the fire call had been dispatched and the crews had been evacuated from the structure and accounted for, a decision was made to re-enter the structure to try and extinguish the fire.** The victim, an Assistant Chief (AC), and a Captain had made their way down an interior stairway to the basement area where the victim opened a 1 ¾-inch hoseline. Shortly thereafter, the Captain told the AC that he had to exit the basement stairs. A few seconds later, the AC told the victim to shut down the line and evacuate the basement because the fire was intensifying. The AC was second up the stairs and told a fire fighter at the top of the stairway landing that the victim was coming up behind him. The AC exited the structure while the fire fighter stayed at the top of the stairway and yelled several times to the victim, but received no response. The fire fighter exited the structure and informed the AC that the victim had not come up from the basement. The AC then notified the Incident

Commander who activated a rapid intervention (RIT) team. The RIT made entry into the structure but was repelled by the intensity of the fire. After several more rescue attempts, the victim was removed from the building and later pronounced dead at the hospital. Four other fire fighters were treated for minor injuries and were released from the hospital. The following factors were identified as contributing to the incident: an absence of relevant standard operating guidelines; lack of fire fighter team continuity; suboptimal incident command and risk management; and lack of a backup hose line.

NEAR MISS REPORTS

Report #10-213

After operating for about five hours at a large type III building, an officer on the scene determined it was necessary to enter the structure to search for a missing occupant. It was very cold and water had been flowing approximately 3000 GPM via two aerial master streams for about four hours.

Much of the water was frozen within the structure and the missing occupant was suspected of being in the room of origin. **It was evident to most on the scene that the victim, if inside, was dead.** Despite these facts, the IC allowed a company to enter the structure and go upstairs. **The axe they were using to sound the floor broke through the steps and fell into the basement. This easily could have been a firefighter falling through the floor.**

Report #09-364

On the morning of [date and time deleted], we received an alarm of a structure fire about ½ mile from Station [1]. Engine [1], Engine [2] and Rescue [1] responded.

Upon the arrival of Engine [1] and Rescue [1] we found heavy smoke showing from the structure. Engine [1] laid two 1 ¾" lines and caught the hydrant right across the street. Engine [1] group went in through the front door, but due to extreme amount of heat, were not able to get to the seat of the fire. Group 1 lieutenant called for vertical ventilation but due to staffing issues, ventilation was not able to be performed.

Our chief arrived on scene and assumed command. **He advised us to exit the building and we were going defensive.** After exiting the house, group 1 pulled their line to the C-side of the structure and Group 2 (off of Engine [2]) pulled the second 1 ¾" to the B-side of the structure. The Incident Commander then advised the first arriving off duty personnel to set up the PPV fan at the front door. Once two off-duty personnel arrived, they became Group 3 and set up and turned on the fan. The structure was an old [deleted] house built in the early 1900s with a very big and open attic. **After the smoke cleared, the Incident Commander advised Group 1 and 2 to stop flowing water because Group 3 was going in the front door and we were going back offensive.**

Due to heavy fire, Group 3 was doing no good and backed out. Two more off-duty personnel arrived and the Incident Commander made them Group 4 and assigned them to vertically ventilate. **This**

order was given 45 minutes into the fire and approximately 30 minutes after a defensive attack was ordered and the PPV fan was set up. The roof was already visibly sagging and from the road you could see heavy fire in the attic. Three lieutenants and a captain on scene advised the Incident Commander that the task was unsafe. Group 4 ignored our plea and put a ladder on the building. Once on the roof and starting to ventilate, the roof gave way and collapsed. The two firefighters in Group 4 were standing on the roof ladder and were able to roll off the house. The roof ladder sustained major fire damage and the firefighter making the cuts was very lucky that his back up firefighter was holding onto him and saw the roof start to give way. This allowed for the back up firefighter to pull the [power saw operator] up and fall off the rood onto the ground instead of into the fire.

After it was over, the firefighters from Group 4 stated that the Incident Commander ordered us to ventilate and we were not going to break an order.”

Report#09-926

A first due, four-person engine company arrived at an abandoned, single story wood-frame residential structure fire. **Approximately 60 percent of the building was involved, with the roof sagging on the “A / B” corner.** A firefighter, backed up by a captain, pulled a 2 ½” pre-connect with a combination nozzle and began attacking the fire from the “A” side. A permanent water supply had been established.

The crew was worried about an adjacent exposure structure approximately 30 feet away on the “B” side. Therefore, they attacked the fire head-on. The exposure structure was also an abandoned building.

The firefighter on the nozzle received second degree burns to shoulders, chest, thighs, and forearms (approximately 18% BSA). The burns were secondary to radiant heat. The firefighter was wearing full PPE, including an SCBA. His turnouts sustained some discoloration and melting on the reflective striping on arms, chest, and thigh area. The firefighter was transported to the hospital for burn care and released the next morning. He is off duty until further notice.

Report#09-532

The fire was in a two story, older commercial structure. The first floor housed a thrift store and an art gallery, with storage on the second floor. The fire started in the rear of the thrift store. **We found heavy fire coming out of the A, D, and C side doors and windows.** Crews went interior with a 2 1/2” line, entering on the D side, and operated about five minutes. Smoke caused the power lines to arc. The hose line was abandoned and the personnel were reassigned.

We were assigned to pull a 2 ½” line to the second floor from the outside stairs. The stairs were loose at the landing. **We attempted to force the door when the door frame fell into the building. The second floor flashed and the roof collapsed.** The incident commander changed to a defensive operation and abandoned the building. Approximately fifteen minutes later the fire breached into the art gallery. One firefighter sustained a minor injury.

Extend *LIMITED* Risk to Protect SAVABLE Property.

Objective: To cause the incident commander to limit risk exposure to a reasonable, cautious and conservative level when trying to save a building that is believed, following a thorough size-up, to be savable.

LIMITED. Confined or restricted within certain limits.

NO GO: If the building can not be saved, consider an exterior defensive attack.

No building is worth the life of a firefighter. If it can be saved, cautious and conservative operations should be applied.

The incident commander and fire crews must recognize we cannot always save a building. When buildings are lost, most will be demolished and rebuilt. Limited risk is appropriate.

Firefighting operations must be fully supported with adequate resources and risk must be closely and continually assessed. If conditions deteriorate and become unsafe, crews must be rapidly withdrawn and defensive operations implemented.

The risk to firefighters continues after fire control. All buildings will be structurally compromised by fire and may be at risk to crews conducting overhaul. The atmosphere will remain toxic for some time.

Beware of lightweight construction and an early collapse potential in roofs, basements and floors.

Abandoned and dilapidated buildings pose a particular high risk to firefighters.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which efforts to save a building without conducting a risk exposure assessment led to fire fighter LODDs including:

Charleston, SC,- Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom

and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse.** The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. **The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Career Fire Fighter Dies in Wind Driven Residential Structure Fire – Virginia

<http://www.cdc.gov/niosh/fire/pdfs/face200712.pdf>

On April 16, 2007, a 24-year-old male career fire fighter was fatally injured while trapped in the master bedroom during a wind-driven residential structure fire. The victim was a fire fighter on the second apparatus to arrive on scene. **Fire was visible at the back exterior corner of the residence.** Noticing cars in the driveway, no one outside, and no lights visible in the house, the lieutenant from the first arriving engine called in a second alarm, suspecting the possibility of residents still inside. A charged 2 ½" hoseline was stretched to the front door by the first arriving engine crew but did not enter due to poor water pressure in the hoseline. The victim and his lieutenant, wearing their SCBA, entered the residence through the unlocked front door. **With light smoke showing, they walked up the stairs to check the bedrooms. The victim and lieutenant cleared the top of the stairs and went straight into the master bedroom. With smoke beginning to show at ceiling level,** the victim did a right-hand search while the lieutenant with thermal imaging camera (TIC) in-hand checked the bed. **Suddenly the room turned black then orange with flames.** The lieutenant yelled to the victim to get out. The lieutenant found the doorway and moved toward the stairs, falling down the stairs to midway landing. The lieutenant tried to direct the victim to the stairs verbally and with a flashlight. **As the wind gusted up to 48 miles per hour, the wind-driven fire and smoke engulfed the residence. The incident commander (IC) ordered an evacuation and the lieutenant was brought outside by the engine and rescue company crews.** Several attempts were made by the engine and rescue company crews to reach the second floor. On the third attempt the stair landing was reached but the ceiling started collapsing and flames intensified. Due to the intensity of the fire throughout the structure, all fire fighters were evacuated and operations turned defensive. The victim was found in the master bedroom partially on a couch underneath the front windows.

Volunteer Deputy Fire Chief Dies after Falling Through Floor Hole in Residential Structure during Fire Attack—Indiana.

<http://www.cdc.gov/niosh/fire/reports/face200624.html>

On June 25, 2006, a 34-year-old male volunteer Deputy Fire Chief **died after falling through a hole in the 1st floor of a residential structure during a basement fire attack. The floor system in the 2-year-old 3,200 ft² house contained engineered wooden I-Joists covered with plywood sheathing.** The basement was mostly unfinished and the I-Joists were exposed from the bottom. **Little smoke and no fire was visible when fire fighters initially entered the house but conditions rapidly deteriorated.** The victim was working by himself, operating a 1 ¾ inch hand line just inside the front entrance, when he fell into the basement. Attempts were made to reach the victim via a 14' roof ladder lowered into the hole, but debris in the basement, fire/smoke conditions, and the angle of the failed floor all disrupted attempts to reach the victim. Approximately 21 minutes elapsed from the time of the initial 911 call reporting the fire until the victim was located. The fire originated in the basement and the I-Joists were almost totally consumed in the area where the floor collapse occurred.

Career Engineer Dies and Fire Fighter Injured After Falling Through Floor While Conducting a Primary Search at a Residential Structure Fire – Wisconsin.

<http://www.cdc.gov/niosh/fire/reports/face200626.html>

On August 13, 2006 a 55-year-old male career Engineer (victim) died and his partner was injured after falling through the floor at a residential structure fire. **The 5,600 ft² was constructed in 1999 and the first floor contained a heated flooring system consisting of a hot water piping system encased in lightweight concrete which was supported by engineered wood I-Joists and trusses.** An engine company was conducting a fast attack on a suspected basement fire, while a ladder company conducted horizontal ventilation. The victim and his partner were assigned to conduct a primary search on the ground floor. **Smoke made visibility difficult but little heat was detected as the victim and his partner proceeded to conduct a left hand search. They sounded the ceramic tile floor and took one crawling step while on their knees. They heard a large crack just before the floor gave way sending them into the fire burning in the unfinished basement.** The victim fell into the room of origin while his partner fell on the other side of a basement door into a hallway. The partner was able to eventually crawl out of a basement window. The victim was recovered the next day. The floor collapsed approximately 8 minutes after the first crews arrived on scene.

Volunteer Fire Fighter Dies After Falling Through Floor Supported by Engineered Wooden-I Beams at Residential Structure Fire – Tennessee.

<http://www.cdc.gov/niosh/fire/reports/face200707.html>

On January 26, 2007, a 24-year-old male volunteer fire fighter died at a residential structure fire after falling through **the ground floor that was supported by engineered wood I-beams. The victim's crew had advanced a hand line approximately 20 feet into the structure with near-zero visibility.** They requested ventilation and a thermal imaging camera (TIC) in an attempt to locate and extinguish the fire. The victim exited the structure to retrieve the TIC, and when he returned **the floor was spongy as conditions worsened which forced the crew to exit.** The victim requested the nozzle and proceeded back into the structure within an arm's distance of one of his crew members who provided back up

while he stood in the doorway. Without warning, the floor collapsed sending the victim into the basement. Crews attempted to rescue the victim from the fully involved basement, but a subsequent collapse of the main floor ceased any rescue attempts. The victim was recovered later that morning.

Partial Roof Collapse in Commercial Structure Fire Claims the Lives of Two Career Fire Fighters – Tennessee.

<http://www.cdc.gov/niosh/fire/reports/face200318.html>

On June 15, 2003, a 39-year-old male career Lieutenant (Victim #1) and a 39-year-old male career fire fighter (Victim #2) died while trying to exit a commercial structure following a partial collapse of the roof which was supported by lightweight metal trusses (bar joists). The victims were part of the initial entry crew searching for the fire and possible entrapment of the store manager. **Both victims were in the back of the store operating a handline on the fire that was rolling overhead above a suspended ceiling.** A truck company was pulling ceiling tiles searching for fire extension when a possible backdraft explosion occurred in the void space above the ceiling tiles. **Victim #1 called for everyone to back out due to the intense heat, just as the roof system at the rear of the structure began to fail, sending debris down on top of the fire fighters.** Victim #1 and Victim #2 became separated from the other fire fighters and were unable to escape. Crews were able to remove Victim #2 within minutes and transported him to a local hospital where he succumbed to his injuries the following day. Soon after Victim #2 was removed, the rear of the building collapsed preventing further rescue efforts until the fire was brought under control. Victim #1 was recovered approximately 1 ½ hours later.

SPECIAL NOTE ABOUT LIGHTWEIGHT/ENGINEERED TRUSS SYSTEMS: Underwriters Laboratories, with funding from the Department of Homeland Security, has developed an on-line course for fire professionals – “Structural Stability of Engineered Lumber in Fire Conditions” available at their website <http://www.uluniversity.us/>

Houston, TX,- Career Fire Captain Dies When Trapped by Partial Roof Collapse in a Vacant House Fire – Texas;

<http://www.cdc.gov/niosh/fire/pdfs/face200509.pdf>

On February 19, 2005, a 39-year-old career fire Captain (the victim) **died after being trapped by the partial collapse of the roof of a vacant one-story wood frame dwelling. The house was abandoned and known by residents in the area to be a “crack house” at the time of the incident.** The victim was the captain on the first-arriving engine crew which was assigned to perform a “fast attack” – to take a hoseline into the house, locate the seat of the fire, and begin extinguishment. The one-story wooden ranch-style house was built in the 1950s and additional rooms had been added at the rear in at least two phases following the initial construction. Crews arriving on scene could see fire venting through the roof at the rear of the house. The victim and a fire fighter advanced the initial attack line through the front entrance and made their way toward the rear of the house. **Visibility was good in the front of the house but conditions quickly changed as they advanced toward the rear. The fast attack crew had just begun to direct water onto the burning ceiling in the kitchen and den areas when the roof at the rear of the structure (over the building additions) collapsed, trapping the captain under burning debris.** The

collapse pushed fire toward the front of the house which quickly ignited carbon and dust particles suspended in the air along with combustible gases, sending a fireball rolling toward the front of the structure. Prior to the time of the collapse, two other crews had entered through the front entrance. The rapidly deteriorating conditions following the collapse quickly engulfed the other crews with fire. Crew members became disoriented and crews became separated as they attempted to find their way out. Five fire fighters received burns requiring medical attention.

NEAR MISS REPORTS

Report#08-522

Crews responded to a local cement manufacturing plant for a reported coal pile fire. When the crews arrived they discovered an exterior coal conveyor belt on fire. The conveyor is approximately 80-100 feet in height, covered, and was not operating at the time of the fire. The fire was attacked using elevated master streams from two ladder trucks. The main body of the fire was quickly knocked down. The incident commander and plant personnel put together a plan to overhaul the conveyor to extinguish the remaining pockets of fire that were burning in the accumulated coal dust. There were no visible flames at this time. The plan was to put hand lines in service along a cat walk located beside the conveyor. The process would be labor intensive as it was starting to get dark and the height of the conveyor slowed operations.

The plan was to start at one end of the conveyor and work towards the other end. Crews would be rotated out as they ran out of air. Lock-out/tag-out was confirmed. All crew were required to be in full PPE including SCBA. Hose streams and hand tools were used to break up the pockets of coal dust. The plan was in place and overhaul was started.

The winds had been gusty all day with gust to 25 mph. Approximately 2 -1/2 to 3 hours into the operation, the crew from Quint [1], working with a three person crew, was operating on the catwalk. No visible flames were present. **A strong gust of wind came up and created a coal dust cloud. The cloud ignited and completely enveloped one of the crew members in fire. The other two crew members were able to douse him with the hose stream in seconds.** The incident commander went on to say, " The fact that the crew was on air no doubt saved (the crewmember) from serious injury, or even death. Suffice to say all three were impressed with the explosive nature of the coal dust, and how quickly they were in trouble." The crew member remarked, "I felt as hot as sitting in the flashover simulator, only instantaneously." He was uninjured and continued working.

Extended Vigilant and Measured *Risk* to Protect and Rescue SAVABLE Lives.

Objective: To cause the incident commander to manage search and rescue, and supporting firefighting operations, in a highly calculated, controlled, and cautious manner, while remaining alert to changing conditions, during high risk search and rescue operations.

VIGILANT. On the alert; watchful.

MEASURED. Careful; restrained. Calculated; deliberate.

NO GO: If you don't have the resources to conduct safe search and rescue operations

Our goal is to save lives. Where the survival profile indicates lives may be saved, risk exposure should be applied in a very calculated and cautious manner.

The survival profile assessment plays an important role in the tactical decision to commit to rescue operations. It must be recognized it takes time to conduct a search and complete (extract) a rescue. What appears to be a reasonable risk when the decision is made can rapidly deteriorate with time and place firefighters at extreme risk.

Rescue operations must be fully supported with adequate resources and risk must be closely and continually assessed. The incident commander and command organization offices must remain alert for changing conditions and balance the risks in a measured manner. Changing conditions may require the search to be abandoned in the middle of the search.

All interior search and rescue operations must be supported by appropriate sized hoselines.

Once crews are committed, and conditions deteriorate, it will take time to withdrawal crews. The incident commander must stay ahead of the fire and evacuate firefighters in time.

Beware of lightweight construction and early collapse potential for roofs, basements and floors.

Large caliber hose lines provide improved fire control and safety for firefighters. In some cases it would be appropriate to use large caliber monitor devices to quickly knock down fire before crews enter a building

Don't Push the Safety Envelop.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in the incident commander did not manage the operation in a vigilant and

measured manner with a calculated, controlled and cautious approach which became a contributing factor to fire fighter LODDs including:

Career Fire Fighter Dies and Captain is Injured During a Civilian Rescue Attempt at a Residential Structure Fire – Georgia

<http://www.cdc.gov/niosh/fire/reports/face200716.html>

On May 28, 2007, a 41-year-old male career fire fighter (the victim) **died after becoming disoriented and falling down a set of stairs while searching for a missing male occupant at a residential structure fire.** A fire captain also received second degree burns resulting in lost-time from work. Both the victim and the captain were members of the first-responding fast attack engine company. After becoming disoriented, they were trapped and missing for several minutes before being found. The fire was reported at approximately 0449 hours. The first arriving fire fighters, including the victim, arrived on the scene at 0459 hours and were on-scene 13 minutes when the first mayday was called. **The male resident also perished in the fire.**

A Career Captain and an Engineer Die While Conducting a Primary Search at a Residential Structure Fire - California

<http://www.cdc.gov/niosh/fire/reports/face200728.html>

On July 21, 2007, a 34-year-old career captain and a 37-year-old engineer (riding in the fire fighter position) died while conducting a primary search for two trapped civilians at a residential structure fire. The two victims were members of the first arriving crew. They made a fast attack and quickly knocked down the visible fire in the living room. **They requested vertical ventilation, grabbed a thermal imaging camera, and made re-entry without a handline to search for the two residents known to be inside.** Another crew entered without a handline and began a search for the two residents in the kitchen area. A positive pressure ventilation fan was set at the front door to increase visibility for the search teams. **The second crew found and was removing one of the civilian victims from the kitchen area as rollover was observed extending from the hallway into the living room.** Fire fighters became concerned for the air supply of both victims who were still in the structure. Crews conducted a search for the victims and found them in a back bedroom where they had been overcome by the rapid fire event.

Volunteer Fire Fighter and Trapped Resident Die and a Volunteer Lieutenant is Injured following a Duplex Fire - Pennsylvania

<http://www.cdc.gov/niosh/fire/pdfs/face200806.pdf>

On February 29, 2008, a 21-year old male volunteer fire fighter (the victim) and a 33-year old volunteer Lieutenant were injured during a structural fire. **The fire fighters were attempting to locate and rescue a 44-year old female resident from a burning duplex. The fire fighters became trapped on the second floor when fire conditions deteriorated.** The victim was rescued by the rapid intervention team (RIT) and both the victim and injured Lieutenant were transported to the hospital. The victim remained in critical condition for several days in the burn unit before succumbing to his injuries on March 5, 2008. The female resident of the structure did not survive the fire.

Residential House Fire Claims the Life of One Career Fire Fighter—Florida

cdc.gov/niosh/fire/reports/face20004.html

On November 25, 2000, a 30-year-old career male fire fighter (the victim) died in a residential house fire. At 0135 hours, fire fighters received a call of a reported structure fire. Engines 5, 2, 1, Ladder 11, and Rescue 32 responded to the early morning call. At 0141 hours, Engine 5 arrived on the scene and the Captain assumed incident command (IC). **The IC reported to dispatch that they had a well-involved, single-story house fire. He then decided to send a search team inside the structure because it was unclear if the homeowners had exited.** The victim from Engine 5, and the Captain and the Lieutenant from Rescue 32, teamed up to enter the house and complete the search. The victim, Captain, and Lieutenant advanced a 1¾-inch handline through the front door as the Captain and Lieutenant from Ladder 11 were ordered to set up positive pressure ventilation (PPV) fan at the front door and then back up the search crew. The Lieutenant and a fire fighter from Engine 1 advanced a second line to the rear of the structure to attack the fire. The victim, and the Captain and Lieutenant from Rescue 32, advanced their line down a hallway and into a bedroom when **the Captain noticed heavy fire in a room off to their right**. The Captain requested that the victim pass him the nozzle because there was heavy fire in an adjacent room in the rear of the structure and he was afraid it was going to flash. The Lieutenant responded, saying that they could not locate the nozzle. **In fear of a possible flashover, the Captain ordered the victim and Lieutenant to exit immediately. As the three attempted to exit, the hallway became heavily involved with fire. The Lieutenant and Captain fell over debris and the victim became disoriented. The Captain and Lieutenant exited the structure but the victim did not exit.** The IC immediately ordered exterior crews to enter the structure and search for the missing victim. Approximately 56 minutes later, fire fighters found the victim. He was pronounced dead at the scene.

NEAR MISS REPORTS**MORE REPORTS PENDING**

Act Upon Reported Unsafe Practices and Conditions That Can Harm Firefighters. Stop, Evaluate and Decide.

Objective: To prevent firefighters and supervisors from engaging in unsafe practices or exposure to unsafe conditions that can harm them and *allowing any member to raise an alert about a safety concern without penalty* and mandating the incident commander and command organization officers promptly address the question to insure safe operations.

NO GO: If anything will harm a firefighter.

The prime responsibility of all incident commanders is to insure safe operations.

The incident commander and all command team officers MUST accept any report regarding unsafe conditions or practices and take appropriate and safe action.

All firefighters within the hazard zone are at the point of greatest risk. Their position allows them to observe unsafe conditions that the incident commander, or the division or group supervisor, may not see. They must be authorized to take safe corrective action

All firefighters are responsible for their own safety and the safety of other firefighters working with them. Each firefighter is responsible for identifying risks and hazards and reporting them. The incident commander must insure supervisors accept reports without hesitation and promptly act on them to ensure the safety of firefighters.

This rule by no means suggests that a firefighter engage in insubordination. The fireground is fast paced action and clearly must be managed by a well disciplined and structured command organization.

This policy does, however, allow a “red flag” to be raised by any member without penalty. When the situation is questioned, the supervisor is mandated to accept that concern, take a few seconds to stop (assess), talk, and make a safe decision (go, no-go).

In some cases, the unsafe situation may affect other areas of the fireground and must be communicated to the incident commander or other supervising officers.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which fire fighters or supervisors had the opportunity to report unsafe practices or exposures to unsafe conditions and didn't, including:

Charleston, SC,- Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. **The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

NEAR MISS REPORTS

Report #07-795

While on the scene of a multiple occupancy, single story, commercial structure fire, our incident command requested mutual aid companies from several other departments. We had fire blowing through the front windows and door. After the majority of the fire was knocked down, a mutual aid company was assigned the task of opening up the metal roof. It was at this point and time when things got a little scary. One of the mutual aid companies laddered the roof and ascended with three firefighters and a lieutenant. **One of the firefighters was carrying an axe in his left hand, a saw in his right hand, and trying to climb the ladder at the same time. There were several other firefighters under and around the area as this was taking place. There were numerous rope bags on hand to hoist tools instead of carrying this tool combination. This same company was also observed by me and many other firefighters and officers dropping tools off the roof, being too close to each other on the roof while swinging an axe, and really just posing a huge safety risk to everyone on the fireground.** This all happened with our Safety Officer sitting on the bumper of our engine. There were numerous chiefs and other officers watching these unsafe acts. None of them said anything to this company.

Report#06-181

On the morning of 24DEC04 at 0100, our department responded to a rekindled structure fire in a 3 story balloon construction. The first fire was heavily involved on the previous day, same shift. **The department attempted an interior attack. After some time, the structure was deemed unsafe and the department went to a defensive posture.** Approximately 20 minutes later, **the OIC created a "task force" of 3 firefighters from our department and 3 from a mutual aid department to attempt an interior attack on the 3rd floor.** There were no accountability tags from the other department.

When we started walking into the house, I stated that I had "a bad feeling" about the situation and was wary of going back into a home that was deemed unsafe a half an hour ago. As we made our way into the third floor, our department split from the mutual aid department. We all remained on the 3rd floor but in separate rooms. Another firefighter and I crawled into an attic space to hit the fire while our 3rd member stayed in the room to feed hose around a knee wall to our position. Inside the attic/crawl space, **after approximately 2 minutes, we heard a large crash. We reversed our direction and once in the room, we noticed the roof had collapsed.** All we could see was stars and the full moon. **Our 3rd firefighter was nowhere to be found. He was buried in the collapsed roof made of very heavy slate tiles.** RIT was activated and our member was removed safely by RIT with little entanglement or extrication. Now the two of us were trapped as the rubble had blocked the stairs, our egress. We were assisted through a hole in the rubble to the stairs below the pile after 5 minutes of moving debris. The mutual aid department was removed. No injuries no deaths. However, the firefighter that had the roof fall on him stated he felt the roof hit his head and push him down. He stated had his head been turned in either direction even by a slight amount, he would have a broken neck or been killed.

Report#09-522

My lieutenant and I made entry into a one-story home of a reported basement fire. We utilized a left hand search as a tactic to locate the basement. For an attack line, we pulled a charged, 200 foot, pre-connect. After making it to the bottom of the stairs, we heard the fire in the direction of the A/B corner which was the corner we had entered the building on the ground floor. There was an insufficient amount of hose to make a direct attack on the fire at this time. My lieutenant attempted to notify command to get us more hose, but was unable to transmit due to increased radio traffic. **The fire in the basement was indicating an impending flashover, and we realized it was time to get out.** We immediately began to retreat from the basement along with the back-up crew. **After ascending the stairs, we headed towards the A/B corner of the ground floor to exit the building. I was following my lieutenant and we noticed the floor felt incredibly spongy. As I pushed off with my right leg, I fell through the floor up to my groin. I was able to remove my leg but was met with fire, pushing from the hole that my foot had just made.** I sprayed water from our attack line for about 5 seconds to try to knock the fire down and give the back-up crew a few more seconds to get over the weakened floor and out of the house. Unfortunately, the water had no effect on the fire as it was well into the free-burning stage. The back-up crew was cut-off and had to look for a secondary egress point. **After I exited the building, I immediately notified command that the floor was compromised. Command cleared all units from the interior and we began a defensive attack on the building.** The back-up crew exited the building through a plate glass window on the A-side of the building, one of the members received a cut to the hand.

Report #09-298

After a recent third alarm was brought under control, a ladder company firefighter (who was performing overhaul) stepped out of a third floor window onto a wooden balcony which immediately collapsed. The balcony and where it was attached to the building had been weakened by fire. The third floor collapsed onto the second floor causing that balcony to collapse and sending the member violently to the ground.

The condition of the rear wall and balcony were well known throughout the operation. There were numerous radio messages warning of this condition. The breakdown in communications occurred when a relieving unit was not notified of these dangers. The situation could have been a tragedy. Incredibly, the member only suffered minor injuries.

Case Report - Seattle Fire Department

On the night of January 5, 1995, four Seattle firefighters died when the first floor of a commercial warehouse collapsed.

In 2001 a Seattle ladder company officer and a probationary firefighter became lost on the third floor of an apartment building during a multiple alarm fire. As they were trying to find their way out, the officer ran out of air and became separated from the firefighter. The firefighter was able to find and exit. The officer, now sucking smoke, found a window a dropped three stories and received severe injuries but survived.

In July, 2001, a new fire chief was appointed. Within two months, two additional near fatal incidents occurred. One firefighter became separated from his partner in the hold of a multiple ship fire and ran out of air. By chance, another crew found the firefighter and the crew exited with the firefighter.

A month later, a captain at a working residential fire experienced a mechanical failure on his SCBA and collapsed from smoke inhalation. Another crew found the unconscious fire officer and rescued him. He was intubated and transported to the hospital where he fully recovered.

The fire chief called a "Safety Stand Down" and had staff rapidly develop a Firefighter Survival Training Program. The fourth quarter scheduled training was dropped and replaced with the survival training. Included was multi-bullet a new "Best Safety Practices" policy. One of the bullets stated;

- Any Member is Authorized to Say NO to Unsafe Practices or Conditions. Stop, Talk, and Decide.

During training, a survivor of the 1995 fire described arriving as a second due engine company with heavy smoke issuing from the building. His crew stretched a hoseline to the front door to back up the first crew that had entered earlier. As he was putting on his face piece he noted smoke pushing out of cracks in the sidewalk and thought that was awfully odd. The culture at the time (like many fire departments) made it awkward for any firefighter to challenge a company officer on a decision. The crew entered the building and moments later the floor fell away from them.

He told the training officer that had the new policy with the above bullet been in place that night in 1995 he would have been far more comfortable to raise an alert and perhaps all the firefighters would have been saved.

Maintain Frequent Two-Way Communications and Keep Interior Crews Informed of Changing Conditions

Objective: To insure that the incident commander is obtaining frequent progress reports from command organization officers and all interior crews are kept informed of changing fire conditions observed from the exterior by the incident commander, or other command officers, that may affect crew safety.

The general practice when using the incident command system is to obtain progress reports from supervisor or crews operating on the interior of the building. It is not common practice for the incident commander to provide a progress report to interior crews about exterior observations of fire conditions that may affect their safety. But he must.

Frequent two-way communications means the incident commanders provides interior crews progress reports regarding exterior observations or critical information that may affect their safety. It also means company officers, and other command organization officers also provide the incident commander with frequent progress reports.

In order to maintain crew situational awareness, the Incident Commander MUST keep interior crews informed of changing conditions and exterior observations. What is observed on the exterior, or what is occurring elsewhere on the fireground, may quickly increase the risk and reduce the safety of firefighters.

Interior crews have often reported moderate conditions at their location on the interior while the incident commanders (or division or group supervisors) are observing deteriorating fire conditions from the exterior.

It's absolutely essential that the incident commander, command organization officers constantly monitor (listen) all radio communications (from crews within the hazard zone)

Crews on the interior need to know what's being observed on the exterior. Communicate!

The NIOSH Fire Fighter Fatality Investigation and Prevention program has identified a number of incidents in which the incident commander and company officers/fire fighters and supervisors did not maintain frequent two-way radio communications to report changing conditions, including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. **Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died.** At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Career Fire Fighter Dies in Wind Driven Residential Structure Fire – Virginia

<http://www.cdc.gov/niosh/fire/pdfs/face200712.pdf>

On April 16, 2007, a 24-year-old male career fire fighter was fatally injured while trapped in the master bedroom during a wind-driven residential structure fire. The victim was a fire fighter on the second apparatus to arrive on scene. Fire was visible at the back exterior corner of the residence. Noticing cars in the driveway, no one outside, and no lights visible in the house, the lieutenant from the first arriving engine called in a second alarm, suspecting the possibility of residents still inside. A charged 2 ½" hoseline was stretched to the front door by the first arriving engine crew but did not enter due to poor water pressure in the hoseline. The victim and his lieutenant, wearing their SCBA, entered the residence through the unlocked front door. **With light smoke showing, they walked up the stairs to check the bedrooms.** The victim and lieutenant cleared the top of the stairs and went straight into the master bedroom. With smoke beginning to show at ceiling level, the victim did a right-hand search while the lieutenant with thermal imaging camera (TIC) in-hand checked the bed. **Suddenly the room turned black then orange with flames.** The lieutenant yelled to the victim to get out. The lieutenant found the doorway and moved toward the stairs, falling down the stairs to midway landing. The lieutenant tried to direct the victim to the stairs verbally and with a flashlight. **As the wind gusted up to 48 miles per hour, the wind-driven fire and smoke engulfed the residence.** The incident commander (IC) ordered an evacuation and the lieutenant was brought outside by the engine and rescue company crews. Several attempts were made by the engine and rescue company crews to reach the second floor. On the third attempt the stair landing was reached but the ceiling started collapsing and flames intensified. Due to the intensity of the fire throughout the structure, all fire fighters were evacuated and operations turned defensive. The victim was found in the master bedroom partially on a couch underneath the front windows.

Report#09-990

Our department was dispatched to a structure fire reported by police who were initially dispatched to a burglar alarm. First companies arrived to find **a two story, wood frame multi-use structure with moderate smoke issuing from the structure.** After forcing entry, the engine company (three person hose team) entered with an inch and three-quarter attack line and a TIC. **The crew reported high heat conditions and indicated that the TIC screen was red!** They proceeded to the right and pushed to the rear of the structure with heavy black smoke but no visible fire. A rescue company (2 person team) entered shortly after the engine company. They too reported extreme heat at the floor and a Red screen on the TIC. The rescue crew also proceeded to the right and pushed to the rear.

Outside, the IC and ladder company crew observed smoke conditions rapidly changing from laminar light brown smoke to a turbulent black smoke pushing from the entry doorway. At this time, IC attempted to contact the initial engine company without success.

Back inside, the rescue crew reached the engine company at the rear wall. They all reported the same high heat conditions with no visible fire. Some confusion occurred when personnel mingled together and at some point, the rescue crew lost contact with each other. The engine captain also lost track of one of his two rookie firefighters. One of the rescue members retreated outside and reported he had lost his partner. At the same time, the engine captain attempted to radio IC that he too had lost a member of his crew and to report the condition encountered inside.

Back outside, the IC ordered the ladder company to "vent" a large window on the A Side of the structure. As this window was vented, the ladder crew observed fire at the floor level and it rolled across the room toward the rear of the structure.

The captain of the engine observed the fire roll over head and ordered his crew to evacuate. He reported extreme heat and made a hasty exit out of a window. Upon exiting, he reported that he had lost his crew and a MAYDAY was called. Almost immediately, all interior crews were accounted for at the entry doorway. The engine captain sustained 2nd degree burns to his face. No other injuries were reported. Crews quickly regrouped.

Later arriving companies were assigned to the fire attack, and the fire was quickly contained.

Report#10-041

Upon arrival, the crew of the first-in engine found **heavy smoke coming from a 2 1/2 story single family dwelling.** Crews quickly realized the fire was located in the basement. Two crew members stretched a line into the first floor to hold the fire to the basement as per the departments SOP. The remainder of the crew went around to the rear and attempted to enter the basement from an exterior entrance without a hoseline for search. The crew was quickly driven out of the basement by the heavy fire conditions. Meanwhile, the crew on the first floor made their way to the rear of the first floor where the interior stairwell entrance was located. They were able to keep the fire in the basement but the smoke was to the floor on the first floor. **Approximately 16 minutes into the incident, an officer**

notified command that the first floor inside the main entrance was starting to burn through. Command then asked for the evacuation tone after a short delay because the message was not originally heard. As the crew on the first floor turned to exit, they realized the floor was burned out in the front entrance. They then attempted to find a window when one of the firefighter's low air alarm began to sound on their SCBA. After a short time of searching around, the crew found a window but not before one of the firefighters ran out of air. The firefighter called for a ladder, but a deputy chief outside did not recognize the severity of the situation and told the firefighter the front door was 25 feet to his right. The firefighter was now completely out of air and his partner was also beginning to run low. As conditions continued to worsen, he dove out the window with his partner right behind him. Fortunately, there were bushes underneath the window that broke the firefighter's fall. Neither firefighter was injured.

Report#09-1020

It was about 11:10 pm, when companies were dispatched to a reported structure fire in a detached single-family dwelling. **Upon arrival, it was reported that light smoke was showing and all occupants were evacuated. Crews began searching for the fire. Conditions at the time were minimal and crews decided to search without stretching a hoseline.**

At approximately 11:40, conditions deteriorated and heavy smoke began to fill the second floor. Two crews were operating inside without a RIT established or any back-up crew waiting outside. The officer reported they were having difficulty locating the attic access. A three man crew went back to the second floor to search again. **Within a minute of reaching the floor, heavy smoke filled the hallway extending to the floor.** The officer indicated that he could not see his hand in front of his mask, even at floor level. The officer ordered his crew to evacuate the second floor. He had reached the top of the stairs as the last person came off the floor. At that point, **an explosion occurred and fire blew into the stair well burning a firefighter who was on the steps. The firefighter was rendered unconscious and fell to the bottom of the steps.** The officer fell backwards onto the landing and was momentarily disoriented. Upon gaining orientation, he proceeded down the steps and was joined by another firefighter who assisted in dragging the unconscious firefighter out of the structure.

The cause of the explosion was later determined to be a result of the other crew operating inside the structure, who had decided to breach an interior wall in search of the fire. Fortunately, the firefighters were in full PPE, but they did experience some minor burns.

Obtain Frequent Progress Reports and Revise the Action Plan.

Objective: To cause the incident commander, as well as all command organization officers, to obtain frequent progress reports, to continually assess fire conditions and any risk to firefighters, and to regularly adjust and revise the action plan to maintain safe operations.

The National Near Miss Reporting System lists the top two causes of near fatal events as lack of “Situational Awareness” followed by “Decision Making”. The next most frequently reported causes of near miss reports are; human error, and individual action.

Situational awareness is defined as; the level of understanding and attentiveness one has (the firefighter) regarding the reality of a set of conditions (fire conditions and fireground operations). When situational awareness is high, there is rarely a surprise. When situational awareness is low or absent, “unexpected” events occur (that can injure or kill firefighters). Simply put, situational awareness is the relationship between what one perceives is happening and what is really happening.

The set of conditions that affects situational awareness can be broken down into three divisions: a lack of information, a lack of knowledge and a lack of cognition. These three divisions are made up of their own unique factors, including misinterpreting conditions and surroundings, not recognizing factors and cues, gathering incomplete information, being narrow focused and being impaired.

Another “simply put” – The incident commander must be aware of all conditions and operations and control of firefighter actions and risk – ALL THE TIME!

Frequent progress reports allow the incident commander to maintain a high level of situational awareness.

Good decisions can’t happen without obtaining a 360 size up of the fireground.

The incident commander cannot make good decisions without good information – thus, the need for frequent progress reports. He must also LISTEN and understand what his hearing.

Conditions on the fireground will be constantly changing, often deteriorating. The Incident Commander MUST conduct a continuous assessment of tactical operations, changing fire conditions, and risk to firefighters.

In order to continually assess and revise the action plan, the Incident Commander must obtain frequent progress reports from all points on the fireground and quickly revise the action plan. The Incident commander must stay ahead of the fire.

The action plan must be revised and updated based on this assessment.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the incident commander did not obtain frequent or adequate progress reports to continually assess the fire conditions and revise the action plan, including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. **The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse.** The Assistant Chief entered the main showroom entrance at the front of the structure but did not find any signs of fire or smoke in the main showroom. He observed fire inside the structure when a door connecting the rear of the right showroom addition to the loading dock was opened. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified.** One fire fighter activated the emergency button on his radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. **Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the first-responding fire department died.** At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Structure Fire Claims the Lives of Three Career Fire Fighters and Three Children – Iowa

<http://www.cdc.gov/niosh/fire/pdfs/face200004.pdf>

On December 22, 1999, a 49-year-old Shift Commander (Victim #1) and two Engine Operators, 39 and 29 years of age respectively (Victim #2 and Victim #3), lost their lives while performing search-and-rescue operations at a residential structure fire. At approximately 0824 hours, Central Dispatch was notified of a structure fire with three children possibly trapped inside. At approximately 0825 hours, a Shift Commander and an Engine Operator (Victim #1 and Victim #2) were dispatched to the scene. At 0827 hours, Engine 3 (Lieutenant and Victim #3) responded to the scene. **Aerial Truck 2 approaching the scene, reporting via radio that white to dark brown smoke was showing from the residence, and requested six additional fire fighters.** When Aerial Truck 2 arrived on the scene at 0830 hours, 2 witnessed a woman and child trapped on the porch roof, and they were informed that three children were trapped inside the house. Victim #1 proceeded into the house to perform a search-and-rescue operation. Engine 3 arrived on the scene shortly after, and the Lieutenant connected a supply line to the hydrant as Victim #3 pulled the Engine into position. The Lieutenant and Victim #3 stretched a 5-inch supply line and connected it to Aerial Truck 2. At approximately 0831 hours, the Chief and Fire Fighter #1 arrived on the scene, and the Chief assumed Incident Command (IC). At

this time, **one of the victims removed the first of the three children from the structure, handed the child to a police reserve officer near the front entrance of the structure (the child was pronounced dead at the hospital)**, and returned to the structure to continue search and-rescue operations. At this time **one of the victims removed a second child. The IC grabbed the child and began cardiopulmonary resuscitation (CPR). Due to limited personnel on the fireground, the IC directed a police officer on the scene to transport him and the child to the hospital.** After donning her gear, Fire Fighter #1 approached the front door and noticed that the 1½-inch handline (previously stretched) had been burned through and water was free-flowing. It is believed that the three victims were hit with a thermal blast of heat before the handline burned through. The three victims failed to exit as 12 additional fire fighters arrived on the scene began fire suppression and search-and-rescue operations. Victim #2 was located, removed, and transported to a nearby hospital, where he was pronounced dead. Victim #1 and Victim #3 were later found and pronounced dead on the scene.

NEAR MISS REPORTS

Report#07-908

All hands were working at a 4 alarm fire, involving three, balloon framed, three story, 30'x75' tenement houses. Heavy structural damage was sustained by the center (origin) structure. Exposure "B" experienced exterior fire damage as well as a fully involved attic space. The "D" exposure received exterior fire damage. A crew of three firefighters was operating an exterior handline between the original structure and the "B" exposure. At this time the major body of fire had been controlled, leaving several stubborn pockets of fire to deal with. **The Incident Safety Officer (ISO) noted the crew's position and evaluated the safety of the operation against the risk involved. The center building had been severely weakened by the fire and it was determined that the benefit did not merit the risk. The ISO ordered the crew to move the line to the adjacent yard at the rear of the building.** This would place them safely out of the collapse zone. **Approximately five to ten minutes later the structure suffered a sudden, catastrophic collapse**, sending most of the debris to the area where the crew had been operating before the move. This could easily have resulted in death for our members. Instead it was a non-event.

Report#05-418

Units responded to automatic alarm at church. While enroute, incident was upgraded to full alarm assignment on reports of fire in the "red brick" building. First alarm assignment consisted of Q(X), E(X), E(XX), E(XXX), E(IV), B(X). Q(X) and E(X) **arrived 1st with nothing visible from large church.** Q(X) took command and positioned on the south side, and E(X) positioned on the North-side. **On investigating E(X) reported working fire on second story and was stretching line to attack fire. Approximately 1 minute after arrival command requested 2nd alarm and sent Q-crew in to assist with evacuation and investigation. At 2 minutes in command advised that smoke condition had changed, and warned interior crews that they possibly had a "well charged attic".**

E(X) acknowledged and proceeded to attempt to locate and extinguish a fire located in 1 room (per radio report). **At approx 4 min in E(XX) reported fire at an exterior porch and ceiling starting to come**

in on the north side. As B(X) arrived and assumed command, radio time was hampered with the request for additional resources such as police and our laundry list of things. At approximately 6 minutes in we had approximately 3 big boosters and 1 super booster operating. Units on the interior were requesting more pressure. **At approximately 8 minutes in, units were not reporting any progress and command was debating a switch to defensive operations. At this point a total of 3 maydays were transmitted by interior crews with members lost and off of hose lines.** E(X) firefighter ended up outside the building and was out of air. His lieutenant was left in the building.

At this point the decision to go defensive was made, and all members were ordered out. E(XX), knowing the situation, decided to stay and was able to find E(X) lieutenant, who was lost and low on air. All companies were able to exit and after a large aerial assault the fire was brought under control.

Report#06-234

Multiple companies operating at a residential fire that started in the walk-out basement. The 1st due Engine arrived and stretched a 2 1/2" through a garage that led directly into the basement area. Other companies stretched 2- 1 3/4" lines into the first floor. I arrived and was assigned by the IC to assist in the basement. **After operating for the life of my 30 minute SCBA, I exited to change bottles and observed that conditions had not improved, but deteriorated. As I re-approached the scene, the IC (B/C) pulled everyone out, and an aerial was used to darken down the fire.** While this was being set-up the Company Officers met, and **the comment was made by one that the first floor had a hole in it that you could put a car in. This information was never relayed to the IC or other companies operating on-scene.** After using the Aerial, some company officers wanted to re-enter even though additional portions of the interior structure had collapsed.

Ensure Accurate Accountability of All Firefighter Location and Status.

Objective: To cause the incident commander, and command organization officers, to maintain a constant and accurate accountability of the location and status of all firefighters within a small geographic area of accuracy within the hazard zone and be aware of who is presently in or out of the building.

All fire departments must adopt a legitimate and recognized firefighter accountability system.

Key components of a recognized system include the ability to accurately know who is presently in the building and who is out.

The system must be able to identify, within a small geographic area of operation, where every firefighter is located.

It means that in order to maintain accuracy, accountability must be managed at the point(s) of entry by a dedicated command organization officer and that officer must remain on the exterior

A recognized system includes tags, passports, or documentation that starts with the first companies on scene that are initiated and maintained at points of entry. (A collection of tags at the command post only means the IC has a collection of names of potential fatalities).

The system must include "Personnel Accountability Reports" (PAR's) at appropriate bench marks during the incident. These include a PAR at 30 minutes on scene (about the time the first wave of firefighters will be running out of air), anytime a hazardous event occurs (i.e. flashover, partial collapse, immediately after crews are ordered out of the building, when the fire is declared under control, or anytime the incident commander desires.

Accountability starts with the initial incident commander- often the first company officer on the scene.

In addition to the accountability system, the incident commander must initiate a "tactical worksheet" at the outset of operations and document where crews are assigned on the fireground.

Once the 360 degree size up is completed the incident commander must assume a stationary position at a command post. This will allow more convenient documentation of the tactical worksheet.

*The best location for a command post is in a vehicle. This may be the cab of an engine or ladder company initially and later in a chief officer's vehicle or specialized command vehicle. These vehicles provide more powerful radios, better lighting, and a quieter environment for communications (i.e. away from diesel engine noise). The incident commander **MUST** be able to listen and hear communications clearly and **MUST** be able to hear a May Day call.*

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which the lack of an accountability system or the command organization lost awareness of firefighter accountability became a contributing factor to fire fighter LODDs including:

Career Fire Fighter Dies of Carbon Monoxide Poisoning after Becoming Lost While Searching for the Seat of a Fire in Warehouse - New York

<http://www.cdc.gov/niosh/fire/pdfs/face200404.pdf>

On December 16, 2003, a 30-year-old male fire fighter (the victim) died after he became separated from his crew members while searching for the seat of a fire at a furniture warehouse. His crew exited due to worsening conditions and a missing member announcement was made. At one point while inside the warehouse, members of an engine crew thought they heard a scream but could not identify the source. After an evacuation order was given and as engine crew members were exiting, **the victim's officer mistakenly identified one of them as the missing member and cancelled the emergency message.** Once fire fighters had exited, a personnel accountability report (PAR) was taken several minutes later on the street which revealed that the victim was still missing. The victim's officer initiated a second emergency message for a missing member and a search was begun. The victim, who had a working radio, was found lying face down with his face piece removed and 900 psi left in his self-contained breathing apparatus (SCBA). His Personal Alert Safety System (PASS) alarm was reported by fire fighters to be inaudible. His carboxyhemoglobin (COHb) level was 74.8% in the emergency room. The victim did not declare a May Day and did not activate his radios emergency alert button. **The victim did not declare a May Day and did not activate his radios emergency activation button.**

If, After Completion of the Primary Search, Little or No Progress Towards Fire Control Has Been Achieved - Seriously Consider a Defensive Strategy.

Objective: : To cause a benchmark decision point, requiring the incident commander to determine if it's safe to continue offensive interior operations if there is no progress in controlling the fire and there are no lives to be saved following the completion of the primary search.

If it's determined there are no lives to be saved, and the primary search has been completed, and the first wave of fire operations has not made progress on controlling the fire, operations have now entered a marginal and very risky period for the firefighter.

No building is worth the life of a firefighter. If control cannot be obtained, withdrawal crews!

Be sure the order withdrawal occurs early enough to allow adequate time for fire crews to safely exit the building.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents at which incident commanders delayed converting to a defensive strategy or where a defensive strategy was undertaken, then switched back to offensive operations, resulting in fire fighter LODDs including:

Nine Career Fire Fighters Die in Rapid Fire Progression at Commercial Furniture Showroom – South Carolina;

<http://www.cdc.gov/niosh/fire/reports/face200718.html>

On June 18, 2007, nine career fire fighters (all males, ages 27 – 56) died when they became disoriented and ran out of air in rapidly deteriorating conditions inside a burning commercial furniture showroom and warehouse facility. The first arriving engine company found a rapidly growing fire at the enclosed loading dock connecting the showroom to the warehouse. **Within minutes, the fire rapidly spread into and above the main showroom, the right showroom addition, and the warehouse. The burning furniture quickly generated a huge amount of toxic and highly flammable gases along with soot and products of incomplete combustion that added to the fuel load. The fire overwhelmed the interior attack and the interior crews became disoriented when thick black smoke filled the showrooms from ceiling to floor. The interior fire fighters realized they were in trouble and began to radio for assistance as the heat intensified. One fire fighter activated the emergency button on his radio.** Officers working outside the structure initially did not hear the radio Mayday until an off-duty officer responding to the scene in his personal vehicle heard the Mayday and advised the Chief that a Mayday was being called over the radio. The front showroom windows were knocked out and fire fighters, including a crew from a mutual-aid department, were sent inside to search for the missing fire fighters. Soon after, the flammable mixture of combustion by-products ignited, and fire raced through the main showroom. Interior fire fighters were caught in the rapid fire progression and nine fire fighters from the

first-responding fire department died. At least nine other fire fighters, including two mutual-aid fire fighters, barely escaped serious injury.

Two Career Fire Fighters Die and Captain is Burned When Trapped during Fire Suppression Operations at a Millwork Facility – North Carolina

<http://www.cdc.gov/niosh/fire/pdfs/face200807.pdf>

On March 7, 2008, two male career fire fighters, aged 40 and 19 (Victims #1 and #2 respectively) were killed when they were **trapped by rapidly deteriorating fire conditions inside a millwork facility** in North Carolina. The captain of the hoseline crew was also injured, receiving serious burn injuries. The victims were members of a crew of four fire fighters **operating a hoseline protecting a firewall in an attempt to contain the fire to the burning office area** and keep it from spreading into the production and warehouse areas. The crew separated when a fire fighter ran low on air and followed the hoseline to the outside. **The captain attempted to radio for assistance as the conditions deteriorated but fire fighters on the outside did not initially hear his Mayday.** The captain sent a second fire fighter (Victim # 2) outside to relay information about their condition. Victim # 2 talked with the Incident Safety Officer, and then returned to re-join his crew. Once it was realized that the crew was in trouble, multiple rescue attempts were made into the burning warehouse in an effort to reach the trapped crew as conditions deteriorated further. Three members of a rapid intervention team (RIT) were hurt rescuing the injured captain. Victim #1 was located and removed during the fifth rescue attempt. Victim #2 could not be reached until the fire was brought under control. The fourth crew member had safely exited the burning warehouse prior to the deteriorating conditions that trapped his fellow crew members.

NEAR MISS REPORTS

Report#09-257

Rapidly expanding fire involving three single family structures (wood frame). The initial fire unit was in the middle and fire was spreading in both directions, but more to the “B” exposure. Defensive handlines were operating on the fire unit (middle) while aerial operations were being set up. At the same time, crews were asked to search the exposures. **After completing the primary search on the “B” exposure, crews re-entered the structure to fight the fire that had now spread to the interior of the “B” exposure. The Division Supervisor was aware of this, but the IC was not.** Aerial master stream operations began and the fire unit (middle) was controlled. The aerial master stream then swept over to the B exposure and pushed fire and roofing material down on to the interior crews. After discussing this with the Division Supervisors, the Incident Commander and the Officer of the elevated master stream, it was evident that clear objectives were not communicated. The Officer of the elevated master stream did not have a clear understanding of what their objective was and who they reported to; the Division Supervisor and the IC were not effectively coordinating the attack.

Always Have a Rapid Intervention Team in Place at All Working Fires.

Objective: To cause the incident commander to have a rapid intervention team in place ready to rescue firefighters at all working fires.

A Fireground operation is a risky business. Always have a rapid intervention team(s) in place.

This includes compliance with the OSHA “two-in, two-out” rule for initial operations followed by assigning a fully staffed Rapid Intervention Team.

The incident commander must understand that it will take several RIT members to rescue a downed firefighter. Research conducted by the Phoenix and Seattle fire departments in buildings of approximately 5,000 square feet determined that an average of 11–12 members were required to rescue a downed firefighter. Additionally, it took an average of 19-21 minutes to complete a rescue and extract the victim.

It should be noted that the research was conducted in simulated NON- FIRE conditions. The time involved to complete a rescue can be expected to be longer and the resources required greater.

An expanded RIT may be required utilizing more than one crew and supervised by a chief officer.

Any May Day should mandate the request for the next level of alarm or adequate mutual aid (or more) as well as maintaining adequate resources in staging.

Firefighter rescue is also risky. Research by the Phoenix Fire Department found that one in five rescuers tended to get disoriented and got in trouble during simulated RIT operations. This could be life threatening to a lost RIT member.

Back up the RIT once they are committed in order to rescue the rescuers if needed.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents where a rapid intervention team was not in place to immediately initiate rescue operations which may have made a difference in the outcome, including:

Career Fire Fighter Dies After Becoming Trapped by Fire in Apartment Building – New Jersey

<http://www.cdc.gov/niosh/fire/reports/face200118.html>

On May 9, 2001, at 2037 hours, Central Dispatch received a call from a civilian reporting a structure fire. The career department was notified at 2037 hours, and the following apparatus responded: Engine 1

(Lieutenant, driver/operator, and fire fighter), Engine 2 (Lieutenant, driver/operator, and fire fighter), Engine 3 (Lieutenant, driver/operator, fire fighter), Truck 2 (Captain, Fire Fighter #1 [driver], and victim [tiller operator]) and Deputy Chief 4 (DC 4). Engine 2 was the first to arrive on the scene at 2039 hours, followed immediately by Truck 2. The Lieutenant of Engine 2 reported to Central Dispatch that they had **a working fire in a three-story brick building with fire showing in the rear**. He requested that all companies make hydrant connections. The driver of Engine 2 parked the apparatus to the north of the incident site on the A-Side of the building. Truck 2 parked directly behind Engine 2. The Lieutenant of Engine 2 then pulled the 200-foot, 1¾-inch preconnect "minute-man pack" from the passenger's side of the apparatus. As the Lieutenant from Engine 2 stepped back off the apparatus, he fell, twisted his ankle, and dropped the "minute-man pack." He then picked up the pile of hose and proceeded toward the street level door on the A-Side of the building. The fire fighter on Engine 2 proceeded toward the corner hydrant, to the north (approximately 160 feet) of Engine 2, with 400 feet of 4-inch supply line. Engine 3 arrived on the scene. At 2040 hours, DC 4 arrived on the scene, assumed incident command (IC), and conducted his initial scene size-up. A police officer approached him and reported that civilians were trapped on the second floor in Apartment #7. *Note: Other reports from civilians were that the trapped civilians were a mother and her two children.*

The IC informed the Captain of Truck 2 of the trapped civilians. Fire Fighter #1 and the victim were standing near Truck 2 when they **heard civilians yelling that there were people in Apartment #7. They proceeded to the building to conduct a primary search.** The Lieutenant from Engine 3 made forcible entry to the street-level door on the A-Side of the building. The Lieutenant from Engine 2 then followed the Lieutenant from Engine 3 into the first floor of the building with the preconnect from Engine 2. *Note: Fire fighters and officers reported to NIOSH investigators that the conditions on the first floor were clear with little to no heat, and that the conditions encountered on the second floor were light smoke with some heat.*

At 2041 hours, Engine 1 arrived and was ordered by the IC to stand by. The IC then called Central Dispatch and requested another engine. The Lieutenant from Engine 3 proceeded up the stairwell to the second floor and to the rear (C-Side) of the building. Following the Lieutenant from Engine 3, the Lieutenant from Engine 2 entered the building and dropped the "minute-man pack" in the stairwell. He proceeded with the nozzle to the second-floor landing and down the hallway toward the rear (C-Side), where he met the Lieutenant from Engine 3. At 2042 hours, Engine 4 (Lieutenant, driver/operator, and fire fighter) responded to the scene. **The Lieutenant from Engine 3 forced open the door to Apartment #8 and encountered heavy heat, fire, and smoke.** *Note: Fire fighters and officers reported to NIOSH investigators that no civilians were seen or found inside the building at any time.*

The Captain from Truck 2 followed the hoseline into the building, unkinking the hoseline as he proceeded to the second floor to join the two Lieutenants at Apartment #8. The IC radioed the Lieutenant from Engine 3 to ascertain that they had made entry into the apartment. Replying in the affirmative, the Lieutenant then radioed to the pump/operator of Engine 2 to charge the line. He began hitting the fire in the rear of the apartment but was having problems with low water pressure on the line. At 2043 hours, the pump/operator radioed the Lieutenant of Engine 2 that he was having problems with the throttle at the pump panel. *Note: The low-pressure problem resulted from throttle problems at the pump panel and the kinks in the charged line in the stairwell.*

The victim (carrying a sledgehammer) and Fire Fighter #1 (carrying a flathead ax) conducted a primary search of three second-floor apartments (#5, #6, and #7) while the two Lieutenants (from Engine 2 and Engine 3) and the Captain (Truck 2) were attacking the fire in the fourth apartment (Apartment #8). No civilians were found on the second floor. At 2044 hours, the interior attack team called for more water pressure. The Engine 2 pump/operator replied that he was still having problems with the throttle mechanism. Engine 4 arrived, and the IC ordered them in for additional manpower. **The victim and Fire Fighter #1 ascended the stairwell toward the third floor where they encountered heavy smoke and high heat.** The victim and Fire Fighter #1 descended the stairwell to the second-floor landing. Fire Fighter #1 told the victim to stay on the hoseline and to help the Lieutenants in Apartment #8 while he went to get some box lights from the truck. *Note: The box lights were to be placed at the top of the third-floor landing as a reference for their point of egress.*

At 2045 hours, fire fighters stretched a 1¾-inch backup line from Engine 2 to the second floor. At 2046 hours, members of a mutual-aid company began responding to the incident. At 2047 hours, the IC called Central Dispatch and requested Truck 1, which responded with a Lieutenant, driver, and a fire fighter. The victim radioed Engine 2 that he was trapped on the third floor. *Note: For approximately the next 70 seconds, the only radio traffic was between the IC and the Truck 1 officer, who were discussing the assignment and placement for Truck 1 upon their arrival. The IC and the Truck 1 officer did not discuss the victim. The fire department has only one radio channel available to be used as the tactical and fireground channel.*

At 2049 hours, the victim radioed Truck 2, reporting that he could not breathe and that he was trapped on the third floor. The victim radioed a third transmission that he was on the third floor, trapped, and needed help. The Lieutenant from Engine 3 heard the victim's third radio transmission and called "Mayday - Mayday" over the radio. The victim made a fourth transmission that he was on the third floor, trapped, and needed help. Central Dispatch transmitted, "We got a Mayday, Mayday. Dispatch, Dispatch to Deputy 4. We got a Mayday calling from the third floor." Command acknowledged Central Dispatch's notification of the Mayday. Trying to determine the victim's location, the Lieutenant from Engine 3 maintained radio contact with him. The victim responded that he was on the third floor, upstairs, and to the right. At 2050 hours, the victim radioed that there was heavy fire and that he couldn't get out. Approximately 1 minute later, he radioed that he was running out of air. The Lieutenant made numerous calls for a line to be brought up to the third floor. At 2052 hours, Truck 1 arrived and parked in the lot on the D-Side of the fire building). **Approximately 13 minutes after the victim had arrived on the scene, at 2053 hours, he made his final transmission that he was out of air. At 2054 hours, the IC radioed for the mutual-aid company to report in as a fire fighter assist and search team (FAST).** The Lieutenant from Engine 3 told Fire Fighter #1, who had just returned to the second-floor landing, that the victim had radioed that he was trapped in a third-floor rear apartment. The Lieutenant from Engine 2 attempted to stretch the initial attack line up the stairwell to the third floor but found that the line would not reach the rear apartments. *Note: The line was still fully charged and kinked in the stairwell between the first and second floors.*

Fire Fighter #1 followed the Lieutenant from Engine 2 to the third floor; however, he was forced to exit the building because he was low on air. The Lieutenant from Engine 3 advanced a handline down the hall toward Apartment #6 where he received an electric shock while attempting to knock down the fire. *Note: The department's SOPs list the shutting off of utilities as a Truck company function.*

At this incident, Truck 2 was immediately assigned to conduct a search for trapped civilians. Two fire fighters assisted the Lieutenant from Engine 3 out of the building, and emergency medical technicians (EMTs) provided him medical attention. Fire Fighter #1 got a ladder off Truck 2 and proceeded to the D-Side of the building. He positioned the ladder beneath the window of the third-story apartment where he believed the victim was located. Fire Fighter #1 broke the window, which was located in the kitchen of Apartment 12. He was unable to gain entry because a refrigerator blocked the window. At 2055 hours, a radio transmission was sent out asking the victim if he was still on the radio. The victim did not reply. The Administrative Director of the department arrived at this time to provide logistical support. At 2100 hours, the Chief of the department arrived and assumed command from the IC. Mutual-aid also arrived at this time. The IC radioed Central Dispatch requesting another engine and truck company for manpower. At 2102 hours, the fire fighter in the bucket of Truck 1 radioed that heavy fire was coming through the roof and the third floor rear. At 2103 hours, Engine 2 (additional mutual-aid) arrived. At 2104 hours, the IC radioed Central Dispatch for an additional ambulance. At 2105 hours, the fire fighter in the bucket of the ladder of Truck 1 radioed the IC that the rear of the third floor was fully involved. The Lieutenant from Engine 2 radioed from the interior that the rear of the second floor was fully involved. At 2107 hours, the fire fighter in the bucket of Truck 1 radioed the IC to get the fire fighters out of the building because "the whole rear of the roof is lit up." At 2110 hours, the fire fighter in the bucket of Truck 1 reported to command that the roof had partially collapsed into the third floor. At 2111 hours, the IC radioed Truck 1 on the status of the roof, and the fire fighter replied that "the rear of the building has collapsed and the front is lighting up." **The IC then ordered an evacuation of the building and a personnel accountability report (PAR) from all units. Truck 1 and Engine 2 knocked down the fire with master streams, allowing the fire fighter assist and search teams (FAST) several attempts to locate the victim.** *Note: The FAST was comprised of the on-duty personnel on the scene and not the mutual-aid company. While the FAST was operating on the interior of the building, the Administrative Director ordered Truck 1 to hit the fire on the roof with the aerial appliance. Fire fighters reported to NIOSH investigators that during one of the search attempts, **water applied to the roof by the aerial appliance forced the FAST to retreat down the hall.***

With each attempt by the FAST to locate the victim, the fire spread and conditions deteriorated in the building. The IC called for additional evacuations. On the fourth attempt by the FAST to find the victim, a Captain was using a thermal imaging camera when a member of the team heard a PASS device coming from Apartment #12. The FAST entered Apartment #12 and discovered the refrigerator door open in front of the door to the bedroom where the victim was found. The victim was lying face down on his PASS device, which was activated but barely audible. The victim was unresponsive and not breathing. *Note: There was a wall-mounted mirror in the bedroom that had been broken by the victim. The victim had struck the mirror and the wall numerous times with his sledgehammer. The mirror may have appeared to the victim to be a window.* Paramedics responded to the third floor where they pronounced the victim dead. The victim was then removed from the building at approximately 2300 hours.

A Volunteer Mutual Aid Captain and Fire Fighter Die in a Remodeled Residential Structure Fire – Texas

<http://www.cdc.gov/niosh/fire/pdfs/face200729.pdf>

On August 3, 2007, a 19 year-old male fire fighter (victim #1) and a 42 year-old male Captain (victim #2) responding from the same volunteer mutual aid department were fatally injured during a residential structure fire. While enroute, the fire district's Assistant Chief requested mutual aid from two neighboring departments due to dispatch updating the report to a fully involved structure fire. The Assistant Chief (Incident Commander) arrived on scene with four other fire fighters in an engine. The first interior attack crew entered the structure with flames visible in the foyer, approximately 1 minute later. The initial attack crew ran low on air, withdrew, and briefed a new interior attack crew (the victims) from the second mutual aid department on the location of a few hot spots to be knocked down and the presence of light smoke. Soon after, the IC requested ventilation. Horizontal and vertical ventilation was conducted and a powered positive pressure ventilation fan was utilized at the front door but little smoke was pushed out. Minutes later, heavy dark smoke pushed out of the front door. The IC made several attempts to radio the interior attack crew with no response. **Approximately 21 minutes after entry, an evacuation horn was sounded. A rapid intervention team (RIT) had been previously designated, then assigned to other tasks. A three member RIT was organized, made entry and located one of the victims, but was unable to fully extricate him. Ultimately, several RIT teams were necessary to recover the victims.** Both victims died of smoke inhalation and thermal injuries.

A Career Captain and an Engineer Die While Conducting a Primary Search at a Residential Structure Fire - California

<http://www.cdc.gov/niosh/fire/reports/face200728.html>

On July 21, 2007, a 34-year-old career captain and a 37-year-old engineer (riding in the fire fighter position) died while conducting a primary search for two trapped civilians at a residential structure fire. The two victims were members of the first arriving crew. They made a fast attack and quickly knocked down the visible fire in the living room. They requested vertical ventilation, grabbed a thermal imaging camera, and **made re-entry without a handline to search for the two residents known to be inside.** Another crew entered without a handline and began a search for the two residents in the kitchen area. A positive pressure ventilation fan was set at the front door to increase visibility for the search teams. **The second crew found and was removing one of the civilian victims from the kitchen area as rollover was observed extending from the hallway into the living room. Fire fighters became concerned for the air supply of both victims who were still in the structure. Crews conducted a search for the victims and found them in a back bedroom where they had been overcome by the rapid fire event.**

NEAR MISS REPORTS

Report#06-083

After arriving at a structure fire in a single family home, and having initiated the incident command system, I ordered two fire fighters that arrived on a call back apparatus to initiate a rapid intervention team. We had a well-involved structure with reports of a person trapped, and the fire was communicating to a second structure. **After the initial attack team entered, I noticed the RIT team putting their masks on and preparing to enter the building. Apparently, a Captain had ordered them into the building. The RIT team leader was upset he was "just standing around" so he solicited the Captain to go to work.** I questioned the Captain and had them withdrawn from the building. The RIT

team leader did not take the job seriously, and did not communicate his assignment to the Captain, leaving us without a RIT team at a very dangerous fire.

Report#09-1020

It was about 11:10 pm, when companies were dispatched to a reported structure fire in a detached single-family dwelling. Upon arrival, it was reported that light smoke was showing and all occupants were evacuated. Crews began searching for the fire. Conditions at the time were minimal and crews decided to search without stretching a hoseline.

At approximately 11:40, **conditions deteriorated and heavy smoke began to fill the second floor. Two crews were operating inside without a RIT established or any back-up crew waiting outside.** The officer reported they were having difficulty locating the attic access. A three man crew went back to the second floor to search again. Within a minute of reaching the floor, heavy smoke filled the hallway extending to the floor. The officer indicated that he could not see his hand in front of his mask, even at floor level. The officer ordered his crew to evacuate the second floor. He had reached the top of the stairs as the last person came off the floor. At that point, **an explosion occurred and fire blew into the stair well burning a firefighter who was on the steps. The firefighter was rendered unconscious and fell to the bottom of the steps.** The officer fell backwards onto the landing and was momentarily disoriented. Upon gaining orientation, he proceeded down the steps and was joined by another firefighter who assisted in dragging the unconscious firefighter out of the structure.

The cause of the explosion was later determined to be a result of the other crew operating inside the structure, who had decided to breach an interior wall in search of the fire. Fortunately, the firefighters were in full PPE, but they did experience some minor burns.

Report # 10-273

We responded to a 2-story wood frame residence with heavy fire showing at the B/C corner. The fire was extending to the 2nd floor and the attic. The initial attack line was advanced through the front door towards the B/C corner. **A secondary back-up line was positioned by the front door by the Rapid Intervention Team (RIT). The RIT was ordered by Command to advance their line to the 2nd floor. No additional RIT had been established prior to the order. While the RIT was advancing their line to the top of the stairs, the building started to shake and a loud crash was heard. Conditions in the building changed from heavy black smoke to heavy fire over our heads. We immediately directed our line towards the fire and a Mayday was called by the companies on the initial attack line downstairs.** Command ordered all companies to evacuate the building. We dropped our nozzle and followed our line back downstairs to the front door. Once we arrived at the front door we found that the ceiling in the great room had collapsed. We exited the building and gave a PAR to command. We then asked if we needed to go back in to find the companies who initiated the Mayday, only to find out that they had exited the building on the C side. A second alarm assignment was requested and we were ordered to rehab. One firefighter received second degree burns to the face.

Always Have Firefighter Rehab Services in Place at All Working Fires.

Objective: To insure all firefighters who endured physically strenuous activity at a working fire are rehabilitated and medically evaluated for continued duty.

Annually, approximately half of the Line of Duty Deaths (LODD's) experienced by firefighters is related to cardiovascular events. Most occurred on the fireground or immediately following an incident that required some level of strenuous activity.

Firefighting is very labor intensive placing a high cardiovascular burden on the body. This includes excessively high pulse rates and related high blood pressures.

Even in cooler climates, firefighter core body temperatures rise dramatically during a firefight causing rapid loss of body fluids. Dehydration can quickly lead to heat exhaustion quickly and the potential for heat stroke is ever present. Fluid loss and high core temperatures can be substantially higher in high heat environment and summer temperatures.

For all working fires where firefighters engaged in strenuous physical activity the incident commander must insure that firefighters are properly re-hydrated with fluids and medically evaluated by paramedics or other qualified medical personnel before returning to the next cycle of firefighting or released from the scene.

For a more significant incident, a rehab unit or group should be established and firefighters rotated through the unit for rehydration, cool down, and medical evaluation for return to the next work cycle.

Those firefighters not fully recovered and meeting acceptable medical parameters should be retained in rehab until recovered or transported to a medical facility for further evaluation.

Several National Fire Protection Association Standards address the need for firefighter rehabilitation and require that rehabilitation operations **shall** be provide in accordance with fire department Standard Operating Procedures (SOP's). Applicable standards include NFPA 1500, Standard for Fire Department Occupational Safety and Health Program and NFPA 1561, Standard on Emergency Services Incident Management System. NFPA 1584, Rehabilitation Process for Members During Emergency Operations and Training Exercises establishes the minimum criteria for developing and implementing a rehab process for fire department members at incident scene operations and training exercises.

The NIOSH Fire Fighter Fatality Investigation and Prevention Program has identified a number of incidents in which firefighters died following strenuous physical activity during emergency operations or training exercises where rehab may not have been conducted.

Fire Fighter Suffers a Heart Attack and Dies Several Hours After Assisting at a Structure Fire – Illinois

<http://www.cdc.gov/niosh/fire/pdfs/face200713.pdf>

On July 29, 2006, a 43-year-old male paid/call Fire Fighter (FF) responded to a residential fire at 1917 hours. The fire occurred on a very hot (81 degrees Fahrenheit [°F]) and humid (77% relative humidity) evening. On-scene, the FF assisted in stretching the booster hose from the engine and setting up a positive pressure ventilation fan. During fire suppression operations, the FF and two other crew members had symptoms consistent with heat strain. About 2 hours later, units returned to their fire station, and the FF returned home for the evening. Crew members called the FF at about 2130 hours to check on him, and he stated that he was feeling better. About an hour later, a crew member called the FF again, but this time the FF did not answer the telephone. The crew member asked his spouse to drive over to the FF's house and check to make sure he was alright. After ringing the doorbell and not getting any response, she entered the house and found the FF collapsed on the floor. She called 911 and began cardiopulmonary resuscitation (CPR). An ambulance arrived at his home 14 minutes later. Paramedics attached a cardiac monitor which revealed asystole (no heart beat). The coroner was notified and pronounced the FF dead via telephone. The NIOSH report included recommendations that fire departments institute incident scene rehabilitation (rehab) during extensive structural fires, to perform pre-placement and periodic medical evaluations consistent with National Fire Protection Association (*NFPA*) 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments*, and to develop a structured wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity.

Fire Fighter Suffers Sudden Cardiac Death During Live Fire Training – North Carolina

<http://www.cdc.gov/niosh/fire/pdfs/face200836.pdf>

On June 6, 2008, a 50-year-old male volunteer fire fighter (FF) taught a morning class that consisted of fire suppression topics and personal protective equipment use at the fire training center of a local community college. After lunch, in stressful environmental conditions (i.e., high temperature and high humidity), he stretched 100 feet of uncharged 1½-inch hoseline and prepared the fire engine for the live fire training session. He then led an interior search team during the smoke exercise in the burn building while wearing full bunker gear and his self-contained breathing apparatus (SCBA) on air. After exiting the building and taking a 15-minute break, the FF led the portable fire extinguisher evolution. About halfway through the exercise, the FF complained of not feeling well and took a break in the air-conditioned cab of the fire

engine. While the students were performing the next evolution (hose training), the FF remained at the engine and monitored apparatus operation. The FF cancelled the next exercise, the burn box, due to the heat and his not feeling well, but another instructor volunteered to lead this evolution. The FF agreed and stayed with the engine. The training ended at approximately 1530 hours. Shortly after refilling the engine's water tank, the FF collapsed. Despite cardiopulmonary resuscitation (CPR) and advanced life support delivered on scene, in the ambulance, and in the hospital's emergency department, the FF died. The NIOSH report recommendations included the need to formulate and institute a heat stress program and a rehabilitation (rehab) program in accordance with NFPA 1584, *Standard on the Rehabilitation Process for Members During Emergency Operations and Training Exercises*, and the need to provide on-scene emergency medical service with advanced life support capability during live fire training.

Paid On Call Fire Fighter Suffers a Fatal Cardiac Event Just After Completing Two Hose Training Drills – Wisconsin

<http://www.cdc.gov/niosh/fire/pdfs/face200819.pdf>

On June 12, 2007, a 42-year-old paid on-call Fire Fighter (FF) participated in mandatory Fire Department training. The training involved hose drills consisting of making a hydrant connection, advancing an attack hose line, and utilizing the nozzle. The FF participated in two drills, each lasting about 5 to 10 minutes. There was a 15 minute "cool-down" period between drills during which time the FF removed his personal protective equipment, drank cool fluids, and helped reload the hose. Following a 15-20 minute break to discuss the goals of the training, the FF collapsed. Despite on scene cardiopulmonary resuscitation (CPR) and defibrillation, continued CPR in the ambulance, and advanced cardiac life support in the hospital Emergency Department, the FF could not be revived. The NIOSH investigator considered that the physical effort associated with the hose drills performed during training in full personal protective equipment triggered a probable heart attack and the subsequent sudden cardiac death of this FF. The NIOSH report recommendations included the need to provide mandatory pre-placement and periodic medical evaluations to all fire fighters consistent with the National Fire Protection Association (NFPA) Standard 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments* and the need to ensure that incident scene rehabilitation is established for working fires and training evolutions.

SECTION EIGHT

Appendixes

Firefighter Fatality Investigation Reports

Appendix A	Charleston NIOSH Report
Appendix B	Charleston Investigation Report
Appendix C	Iowa
Appendix D	Virginia NIOSH Report, Residential
Appendix E	Virginia Investigation Report
Appendix F	Houston NIOSH Report, McDonalds Restaurant
Appendix G	Houston NIOSH Report, Residential