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FIRE FIGHTERS SAFETY: NIOSH 2005-132/NIOSH 2010-153

By Richard Schulte

Charleston, South Carolina-June 18, 2007

On the evening of June 18, 2007, a driver on Savannah Highway in Charleston, South Carolina noticed a fire in a pile of trash adjacent to the loading dock at the Sofa Super Store. According to the draft report of an investigation of the fire by the National Institute of Standards and Technology (NIST), the time was 6:56 p.m. The driver reported the fire to store employees and the manager of the store attempted to control the fire using a fire extinguisher. Roughly 12 minutes later, at 7:08 p.m., an employee at the store reported the fire using the 911 system and the Charleston Fire Department was dispatched to the building.

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As early as 7:27 p.m., and certainly by 7:31 p.m., distress call radio transmissions from fire fighters inside the one-story building were heard. At around 7:31, a "Mayday" radio transmission was heard. At roughly 7:35 p.m., the front windows of the store were broken out by fire fighters to vent smoke from the building. At first, the smoke venting from the windows was brown, but in less than a minute, the color of the smoke changed to black. At 7:51 p.m., a portion of the roof structure had collapsed.

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Nine fire fighters were lost in the smoke in the Sofa Super Store and failed to make it out of the building. The cause of death of all nine was determined to be smoke inhalation or burns. All of the fire fighters had succumbed to heat and smoke prior to the collapse of the roof construction.

Chicago, Illinois-December 22, 2010

Shortly before 7 a.m. on December 22, 2010, the Chicago Fire Department responded to a fire in an abandoned one story building (with a basement) on the southeast side of Chicago. The building was last utilized as a laundry. The fire was located in the rear portion of the building. While fire fighters were conducting operations inside the building and on the roof, the roof over the rear section of the building collapsed. Two fire fighters in the building were fatally injured, while another 17 fire fighters were injured less severely.

The following are excerpts from the news coverage of the Chicago fire:

Chicago Sun-Times, December 22, 2010

> "*That's because despite all of mankind's technological advancements of the last century, despite improvements in firefighting equipment and tactics, despite greater knowledge about the science of fire and how to prevent it, despite all that, the job of the firefighter is still essentially the same.*"

> "*But they certainly knew long before the roof of the former Sing Way Laundry collapsed on top of them that a roof collapse is one of the grave dangers of going into a burning building — and they went in anyway.*"

> "*This was not one of those situations where the firefighters were attacking the fire so aggressively as to call into question their approach or running into the flames for the obvious purpose of saving a young child. As described by* [Fire Commissioner Robert] *Hoff, this sounded more like routine mop-up work, in case any squatters were occupying the building when the fire started.*"

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> "*Snippets from his remarks captured the essence of the stunning day. The fire crews arrived on the scene and "were making good progress," Hoff said. The roof collapsed "without warning." "Despite our best efforts" to rescue them, the two men died. All procedures had been followed "by the book." He couldn't say for sure whether the fire had even caused the roof to collapse, suggesting it might have been the snow and ice.*"

> "*. . .All procedures had been followed "by the book. . .*"

Source: *When tragedy strikes, no one knows the drill*, Mark Brown, Chicago Sun-Times

Chicago Tribune, December 23, 2010

"*Concerned that homeless people may have been taking refuge from the cold, Stringer and Ankum were among the firefighters searching the burning building a-round daybreak when a roof came crashing down on them. Both men died of blunt force injuries, while 17 others were hurt in the department's deadliest fire in more than a dozen years.*"

"*Though the front of the structure had a flat roof, the truss covered the back. There was no indication of structural damage when the firefighters entered, offi-cials said.*"

"*City building inspectors had ordered the building's owners in 2007 to repair the roof, deeming it structurally unsound, court records show. Unable to pay for the repairs or mounting code enforcement fines, the building's owner, Chuck Dai, told the Tribune that he simply tried to keep it boarded up, but vagrants kept finding a way to break in.*"

"[Fire Commissioner Robert] *Hoff said firefighters always check abandoned build-ings because it's common for people to take shelter there during the winter.*"

Source: *'Devastating'*, Joel Hood, Annie Sweeney and Stacy St. Clair, Chicago Tribune

CNN-December 24, 2010

"*An "open-flame ignition of ordinary combustibles," such as wood or rubbish, led to Wednesday's blaze, Chicago Fire Department spokesman Larry Langford said in a news release. There had not been any gas or electric service in the abandon-ed building -- located on the city's south side -- for months, he added.*"

"*The commissioner identified those killed as Corey Ankum, who had been with the department less than two years, and 12-year veteran Edward Stringer. Both were inside the structure. Other firefighters were working the blaze from the roof.*"

Source: *Fire set at building's rear caused deadly Chicago fire, official says*, CNN Wire Staff, CNN

According to the Fire Commissioner, "*all procedures had been followed "by the book"*", so let's take a look at "*the book*". The following are excerpts from NIOSH Alerts developed and published by the National Institute for Occupational Safety and Health (NIOSH) for structural fire fighting operations. These two Alerts are referred to as NIOSH 2005-132 and NIOSH 2010-153.

NIOSH 2005-132 (April 2005)
Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures

"***WARNING!***

Fire fighters may be injured and killed when fire-damaged roof and floor truss systems collapse, sometimes without warning."

"***The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing injuries and deaths of fire fighters due to roof and floor truss collapse during fire operations. Roof and floor truss system collapses in buildings that are on fire cannot be predicted and may occur without warning. . .***"

"***NIOSH requests that the information in this Alert be brought to the attention of all U.S. fire departments and fire fighters. . .***"

"*. . .Pre-incident planning involves evaluating occupancies before an incident to identify information critical for fire fighting operations in case an incident occurs. . .*"

"NIOSH requests that the information in this Alert be brought to the attention of all U.S. fire departments and fire fighters. . ."

"*The number of fire fighter fatalities related to structural collapse could be significantly reduced through proper education and information concerning truss construction. . .*"

"*Unfortunately, fires are not predictable: conditions often deteriorate quickly, and fire-damaged building components, including trusses, can collapse with little warning. . .*"

"*. . .Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses. . .*"

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"*Enter preplan information into the dispatcher's computer so that when a fire is reported at preplanned locations, the dispatcher can notify by radio all first responders with critical information [Dunn 2001].*"

"*Use defensive strategies whenever trusses have been exposed to fire or structural integrity cannot be verified. . .*"

"***Ensure that fire fighters performing fire-fighting operations under or above trusses are evacuated as soon as it is determined that the trusses are exposed to fire (not according to a time limit.)***"

"*Use extreme caution when operating on or under truss systems.*"

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NIOSH 2010-153 (July 2010)
Preventing Deaths and Injuries of Fire Fighters using Risk Management Principles at Structure Fires

"***WARNING!***

Fire fighters are often killed or injured when fighting fires in abandoned, vacant, and unoccupied structures. These structures pose additional and sometimes unique risks due to the potential for fire fighters to encounter unexpected and unsafe building conditions such as dilapidation, decay, damage from previous fires and vandals, and other factors such as uncertain occupancy status. Risk management principles must be applied at all structure fires to ensure the appropriate strategy and tactics are used based on the fire ground conditions encountered."

"***Fire fighters are often killed or injured when fighting fires in abandoned, vacant, and unoccupied structures . . .***"

"*Fire departments should work with Federal, State, and local authorities to develop and implement a strategy to identify, mark, secure, and where possible demolish unsafe structures within their jurisdictions. The IAAI/USFA Abandoned Building Project, conducted by the International Association of Arson Investigators and the US Fire Administration [IAAI / USFA 2006] is one example of a program that can be utilized to aid fire fighter safety and health by identifying, marking, and removing unsafe structures. The Abandoned Building Project Toolbox can be found at the Web site*[:]

http://www.interfire.org/features/AbandonedBuildingProjectToolBox.asp."

"*. . .The incident commander is responsible for recognizing and evaluating those risks and determining whether the level of risk is acceptable or unacceptable. However, risks taken to save property should always be lesser than those to save lives [Grorud 2009]. Risks to fire fighters versus gains in saving lives and property must always be considered when deciding whether to use an offensive or defensive attack. . .All offensive strategy incident action plans should be based on adequate support work (water supply, ventilation, lighting, utility control, accountability, RIT, etc.) to insure safe operating conditions on the interior.*"

"*Offensive operations should not commence or be performed unless they can be safely performed by the personnel available at the scene and within the fire department's established safety procedures and SOPs. Incident command should be established by the deployed supervisory chief officer outside of the hazard area for the overall coordination and direction of the interior operation. An incident safety officer should be present to assist the IC and to ensure that the health and safety system is established before the interior attack. Interior operations require the establishment of an uninterrupted water supply to provide an effective water flow for at least one attack line and one backup line. For interior operations, adequate ventilation (either horizontal or vertical) is required to minimize the risk of thermal insult to interior forces as well as to improve interior tenability, survivability, and visibility [Phoenix Fire Department 2009]. And for the safety of all personnel on the scene, interior operations should not commence or continue to be performed without personnel accountability in place or without the availability of an on-scene Rapid Intervention Team. The above tasks are key components of an offensive strategy in any building whether occupied or not [Klaene and Sanders 2000, Duffy 2009].*"

"*Results of these NIOSH investigations suggest that fire departments, incident commanders, incident safety officers, and fire fighters may not fully consider information related to building occupancy, structural integrity, and fire involvement before entering structures to initiate interior operations and while performing offensive operations. . .*"

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"*. . .Risks to fire fighters' lives must be balanced against gains when deciding whether to use an offensive or defensive attack . . .The challenge for the incident commander is to recognize when the level of risk becomes excessive and to call for a defensive strategy in situations where no lives are at risk.*"

"*Maintain crew discipline, avoid obvious safety hazards, avoid unnecessary risk taking and encourage your crew members to do the same.*"

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"*Abandoned and vacant buildings should be known in advance, based on preplanning and knowledge of local jurisdictions.*"

"*Include the age of the structure, structural integrity, the type of roof structure and supports (i.e., lightweight trusses, bowstring trusses, and heavy timber construction), the type of interior support structures (i.e., floor trusses, wooden I-joists, and support columns), the type of materials used in the structure (i.e., wood, steel, plastics, foam, or materials that produce toxic gases when subjected to heat), storage of flammable or toxic materials, the amount of load on roof structures that could weaken the supports (e.g., heavy heating and cooling units), water supply, and the presence of automatic sprinkler systems.*"

"*Ensure the availability of adequate resources, such as a rapid intervention team (RIT), backup hose lines, and emergency medical services (EMS) personnel.*"

"*Consider all manual fire-suppression activities within the collapse zone to be an offensive attack. No personnel should operate in offensive positions during a defensive attack.*"

Analysis

In the news conference which took place on the afternoon of December 22nd, Fire Commissioner Robert Hoff said that *"all procedures had been followed "by the book.""* It's seems pretty obvious that the procedures which resulted in two fire fighter fatalities at an abandoned building on that day did not comply with the recommendations of either NIOSH 2005-132 or NIOSH 2010-153. While that much can be said, it should be noted that compliance with these two NIOSH Alerts is not mandatory, but merely represents good fire fighting practice.

While the Chicago Fire Department (CFD) may have followed its protocols on fighting fires in abandoned buildings on December 22nd, it would seem that the protocols being used are archaic. NIOSH 2005-132 and NIOSH 2010-153 represent the compilation of the latest work and thinking regarding fire fighter safety in the fire service.

The recommendations contained in NIOSH 2005-132 and NIOSH 2010-153 are not new. The FDNY adopted policies similar to the NIOSH recommendations in 1986 and many fire departments throughout the United States have adopted specific policies for fire fighting in abandoned buildings intended to protect the safety of fire fighters. Chicago is not such a unique community that policies used by the fire service throughout the United States cannot be adopted for use in the city.

Unfortunately, the Chicago Fire Department is "steeped in tradition" and the fire department appears to be 20 years behind the rest of the fire service in the United States. This is not really all that surprising given Chicago politics. At present, the City of Chicago is near bankruptcy and has squandered both its assets and its tax receipts on boondoggle after boondoggle. Given the portion of the budget of the City that the Chicago Fire Department absorbs, it would seem that taxpayers deserve an efficient and modern fire department.

The two fire fighter fatalities which occurred on December 22nd should serve as a wake-up call to the fire department. It's time for the Chicago Fire Department to catch up with FDNY and the rest of the fire service throughout the country. There is no reason why the Chicago Fire Department can't modernize (and at the very same time reduce its budget).

There is no reason why Chicago should be the last city in the United States which continues to write its own building code.

One place to start this modernization project is with the building safety ordinances adopted by the City of Chicago. At present, the Chicago Building Code is archaic. Almost every city in the United States, if not every city, uses a model building code. There is no reason why Chicago should be the last city in the United States which continues to write its own building code. Even the City of New York has recently adopted a model building code.

If New York City, Los Angeles, Houston and Phoenix can use a model building code, so can the City of Chicago.

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