

By MARK EMERY

# The Ten Comma

*Command-ment III: Thou shall identify, factor and monitor three situations that kill firefighters.*



First the bad news, then the good news. The bad news is that a firefighter is going to die. If this yet-to-be-identified firefighter isn't killed by a physiological crash or a crash involving a vehicle, this firefighter is going to be killed by one of three situations:

1. Working below a structure fire (frequently below an attic fire)
2. Present during a hostile smoke or fire event (frequently a flashover)
3. Working above a structure fire (frequently above a basement fire)

Collectively, I refer to these three situations as "The Three That Kill" (Figure 1). "The Three That Kill" has killed and injured scores of firefighters and has produced innumerable "close calls."

## The three that kill:

- Working below a structure fire (frequently below an attic fire)
- Present during a hostile smoke or fire event (frequently a flashover)
- Working above a structure fire (frequently above a basement fire)

Now the good news. Identify, factor and monitor "The Three That Kill" and your response from the fire station is much more likely to be a roundtrip. By routinely identifying, factoring and monitoring "The Three That Kill," you have incorporated a crucial risk-management component into your square-foot (structural) fireground operations. Excluding physiologic and apparatus-related events, strategic stuff – not tactical-stuff – kills firefighters.



Figure 1.

If you read the National Institute for Occupational Safety and Health (NIOSH) firefighter injury and fatality investigation reports, you know that firefighters aren't being harmed because hoselines are improperly handled, granny knots are failing, the wrong nozzle was selected or because there wasn't a ladder available to tumble down after diving out a window. Consider this: why would firefighters need to escape a burning building by performing a ground-ladder carnival stunt? Likely because poor strategic decisions were made by a fire officer, that's why.

Prior to the hostile fire event:

- Why didn't fire officers notice that conditions were deteriorating?
- Why didn't they have a charged hoseline?
- Why wasn't there a backup team protecting egress?
- Why wasn't the operation coordinated with ventilation?

Firefighters need to know tactical stuff. Much more important, fire officers need to know strategic stuff. Borrowing from the Warren Bennis book *Leaders*, firefighters need to know how to do things right and fire officers need to ensure that firefighters

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# Commandments

## Of Intelligent & Safe Fireground Operations

are doing the right things – at the right place, at the right time and for the right reason.

Often firefighters are doing tactical-stuff right; the problem is they are doing things right at the wrong place, at the wrong time and for the wrong reason, culminating (predictably) with a survival-motivated tumble down a (hope it's there) ground ladder. A fire department should be embarrassed if there is no civilian life safety problem and its "most valuable resource" must escape deteriorating fire conditions by taking turns at a window to "save themselves."

### Background & Significance

First of all, this article will not address the two factors that most frequently kill firefighters: physiologic events and responding/returning events. This article will focus on factors that can be managed, factors that influenced by obeying the "Ten Commandments of Intelligent and Safe Fireground Operations" (*Firehouse*®, February 2007) and ensuring that none of the "13 Fireground Indiscretions" are transgressed (April 2006).

Take a look at Table 1. Notice that there are four columns. The first three columns list NIOSH investigation reports associated with "The Three That Kill." The fourth column, "Other Factors," includes a vari-

### THE TEN COMMANDMENTS

- I. Thou shall have ONE competent incident commander.
- II. Thou shall maintain teams of at least TWO personnel.
- III. Thou shall recognize THREE situations that kill firefighters.
- IV. Thou shall ensure that FOUR sides are seen and compared.
- V. Thou shall not exceed a span-of-control of FIVE.
- VI. Thou shall operate within one of SIX operational modes.
- VII. Thou shall perform the SEVEN-step action plan process.
- VIII. Thou shall make EIGHT assignments early.
- IX. Thou shall address three strategic priorities with NINE tactical objectives.
- X. Thou shall evaluate the situation, mode and plan every TEN minutes.

ety of unfortunate events such as masonry chimney collapse, running out of air, wall collapse, parapet collapse, electrocution and one fatality due to a pit bull

attack. This list does not include events that were not investigated by NIOSH.

Responsibility for time and proximity can be managed – and this responsibility can be shared. In my "Commandment II" article (April 2007), I suggested that a fireground strategic "thread" be established that connects the command post to division/group supervisors and finally to the team on the nozzle (or saw, or hook, ax, pole, whatever). This invisible thread links all three operational levels: strategic, tactical and task. An intelligent and safe fireground establishes and maintains a strategic presence at each of these three levels. The strategic presence at the task-level is the team leader (usually a company officer). Firefighter safety is compromised should this thread be severed.

A troubling factor emerges from the NIOSH reports: When firefighters perish, they are often the most valuable "thing" on the fireground. Determining value on the fireground should be a fundamental responsibility of fire officers and incident managers. At the precise moment that you declare primary search to be

### NIOSH Reports Associated with "The Three That Kill"

Table 1. The Three That Kill: 1996-2005

WORKING ABOVE A STRUCTURE FIRE	PRESENT DURING HOSTILE FIRE EVENT	WORKING BELOW A STRUCTURE FIRE	OTHER FACTORS
96-17	97-09	97-04	98-F20
98-F21	97-16	98-F17	99-F31
99-F04	98-03	99-F03	99-F06
F2000-13	98-F04	F2000-26	99-F25
F2001-03	98-F05	F2000-43	99-F37
F2001-15	98-F06	F2001-16	99-F40
F2002-32	98-F07	F2002-06	F2000-07
F2002-44	98-F32	F2002-11	F2000-37
F2002-50	99-F01	F2002-32	F2001-09
F2003-12	99-F01	F2002-40	F2001-23
F2003-18	99-F47	F2004-05	F2001-28
F2004-17	F2000-04	F2005-05	F2002-07
F2004-37	F2000-16		F2002-49
F2005-09	F2000-23	TOTAL = 12	F2003-04
TOTAL: 14	F2001-04		F2005-07
	F2001-08		TOTAL = 15
	F2001-13		
	F2001-18		
	F2001-33		
	F2001-38		
	F2002-12		
	F2002-14		
	F2002-20		
	F2002-34		
	F2003-41		
	F2004-02		
	F2003-41		
	F2004-04		
	F2004-10		
	F2004-14		
	F2005-02		
	F2005-04		
	TOTAL = 32		

Source: National Institute for Occupational Safety and Health (NIOSH)

“all clear,” your firefighters have become the most valuable fireground consideration. Once it has been determined that your fire department represents the most value on the fireground, that value must be protected. I have often told the firefighters in my battalion: “I will never lose sleep if somebody’s sofa or third-grade arithmetic paper perishes in a fire. My sleep would forever be disturbed should one of YOU perish on the fireground.”

## Working Below a Structure Fire

A frequent killer of firefighters has been operating below a fire that has compromised structural integrity above their heads. The classic “operating below a structure fire” situation involves firefighters operating beneath fire in an attic void. Parallel to this situation are incident managers/fire officers who underestimate the risk that this situation represents.

There are three key strategic factors related to “The Three That Kill”: value, time and proximity.

- **Value** – Each firefighter who died had more value than the structure that failed and the stuff that was destroyed.

- **Time** – The duration of the fire assault to exposed structural members was unknown, underestimated or ignored. (The type and quality of the structural assembly was not factored.)

- **Proximity** – The most valuable fireground factor (firefighters) was operating

## WORKING BELOW A STRUCTURE FIRE

- Typically working below an attic fire.
- Frequently lightweight roof construction.
- No risk/benefit assessment.
- Nobody watching the clock.
- Strategic and tactical alternatives not considered (offensive benefit from defensive location).
- Team leaders operating at task level.
- Roof/ceiling failure exacerbates fire conditions due to sudden increase in air supply.
- Frequently, the firefighter who is injured or killed is the most valuable “thing” on the fireground.

below structural elements that no longer had value. I encourage you to read the May 2005 NIOSH Alert: Preventing Injuries and Deaths of Firefighters Due to Truss System Failures. Pay particular attention to the recommendations offered by NIOSH, in particular the following recommendations (listed as published):

- Use defensive strategies whenever trusses have been exposed to fire or structural integrity cannot be verified. Unless life-saving operations are under way, evacuate firefighters and use an exterior attack.

- Ensure that firefighters performing firefighting 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 defensive overhauling procedures after fire extinguishment in a building containing truss construction. Use outside master streams to soak the smoldering truss building and prevent rekindling.

- Use a defensive firefighting strategy once burning of truss members is identi-

fied (unless someone is trapped).

Another factor that emerges from the NIOSH (and U.S. Fire Administration) investigation reports is worthy of reflection: When firefighters are killed, there is rarely a civilian life-safety problem (rescue situation). In other words, at the majority of these incidents, the life-safety problem was delivered to the fireground by the fire department. Life safety is always your strategic priority.

## Present During Hostile Smoke or Fire Event

Excluding cardiac and responding/returning-related fatalities, hostile fire events are the most frequent killer of firefighters (Table 1). Commandment II suggested that competent team leaders must CARE for team members. The acronym represents the monitoring of conditions, air, radio and egress. It is impossible for a team leader functioning at task-level to CARE for team members.



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## Offensive Benefit from Defensive Position



Fire officers must continually monitor three conditions: heat, smoke and visibility. Deteriorating fire conditions are not a challenge to your courage; consider deteriorating conditions as a warning shot over your strategic bow. Always survive to fight another day.

Smart fire officers always seek offensive benefit from a defensive position.

lightweight attic fire shown in photo series demonstrates offensive benefit from a defensive position. Let me repeat: smart fire officers always seek offensive benefit from a defensive position.

As mentioned previously, value, time and proximity are critical risk factors.

• **Value** – When it has been determined that firefighters represent more value than

a small house. Granted, personal protective equipment (PPE) has improved and the world has moved on, but the video provides compelling validation of that theory.

There is a subtle pattern that emerges from the NIOSH reports related to value, time and proximity to a hostile fire event. The scenario plays out like this: a team enters the structure, visibility is zero or limited, there is little or no heat, entry is not coordinated with successful ventilation, nobody knows the location of the fire, the team blindly advances into the smoke, suddenly, “without warning,” conditions deteriorate – temperature increases and visibility doesn’t improve – the team attempts a hasty retreat, but one or two members don’t make it.

Often, this situation hostile smoke/fire event is triggered or exacerbated by uncoordinated horizontal ventilation. Like opening the damper on a wood-burning stove, the fire will immediately grow and intensify. Opening the damper on a wood-burning stove is horizontal ventilation. During the majority of the NIOSH report incidents, the firefighters who didn’t make it to safety were the most valuable thing in the building.

Zero visibility is a big deal. Zero vis-

### PRESENT DURING A HOSTILE SMOKE/FIRE EVENT

- Typically present during a flashover.
- Usually begins with tolerable heat and limited (or zero) visibility, the team advances, conditions deteriorate, temperature rises, visibility degrades to zero, during a hasty retreat a member is separated ...It happens over and over again.
- No risk/benefit assessment.
- Related situation: firefighters working above a fire that flashes and destabilizes conditions on the floor above.
- Strategic and tactical alternatives not considered (offensive benefit from defensive location).
- Frequently, the firefighter that is injured or killed is the most valuable “thing” on the fireground.

That is, competent fire officers acknowledge that the primary goal of incident stabilization is to remove heat with water. The goal has never been to have firefighters mingle with the heat; firefighters don’t need to be there when the water mingles with the heat. A critical heat-removal consideration is to always ensure there is more gpm than Btu. Stabilization of the

the property they are attempting to protect, do something to protect that value!

• **Time** – On the fireground, it is important to determine how long there will continue to be value. An important question before you respond to a structure fire is “how long can I expect a full cylinder of air to last?” After you’ve been deployed offensively at a structure fire, a more im-

portant question is “how much longer will my air cylinder last?” Unless you really enjoy bagpipes and funerals, losing track of time and distance within a burning building is bad business – especially if you are the most valuable thing within the structure. Losing track of time and distance in zero visibility is Russian roulette.

• **Proximity** – Nearly 20 years ago, Chief Vincent Dunn (FDNY, retired) wrote in *Firehouse*® that if you are caught in a flashover, the point of no return is five feet. For validation of that assertion, look no further than the October 1989 American Heat video that describes the tragic outcome of an unexpected flashover within

ibility is a sign of impending danger. Zero visibility is a reliable indicator that your entry is not being coordinated with effective ventilation. Zero visibility can be a reliable indicator of the viability of unprotected occupants. Zero visibility should not be ignored or underestimated. Zero visibility is not a challenge to your ego. Zero visibility is a warning.

Allow me to offer one of my "Command Caveats": Be aware of the future so that you're not history. Consider visible fire as fire growth history; consider smoke as future fire growth (Figure 2). When you advance in zero visibility, you are swimming among sharks that have an appetite.



above a basement fire. A parallel scenario involves operating on the floor above a fire when the floor below suddenly becomes a hostile fire event, usually a flashover. This rapid fire growth can quickly change conditions on the floor above (example: up an open stairwell). This situation is the primary reason people attend the self-rescue classes. Personally, during a typical building fire, rather than have a ladder at every window, I would prefer that team leaders CARE for their team members and that the incident command has de-

## Working Above a Structure Fire

Another frequent killer of firefighters has been operating above a fire that has compromised structural integrity below their feet. Here, the typical scenario has firefighters operating on the floor

### WORKING ABOVE A STRUCTURE FIRE

- Frequently working above a basement fire.
- Frequently lightweight floor construction.
- Unprotected steel columns can be a factor.
- Nobody watching the clock.
- Strategic and tactical alternatives not considered (offensive benefit from defensive location).
- Team Leaders at task level.
- No risk/benefit assessment.
- Fire conditions escalate due to sudden increase in air supply when floor fails.

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ployed a backup team protecting egress (backup is proactive; diving down a ladder is reactive). When you are the most valuable thing in the building, having to dive down a ladder to save yourself is silly.

Again, value, time, and proximity are critical factors:

- **Value** – When it has been determined that firefighters represent more value than the property they are attempting to protect, do something to protect that value! It bears repeating – once it has been determined that firefighters represent the most value on the fireground, protecting that value is your strategic priority and your personal responsibility!

- **Time** – How long will there continue to be value and how long will an air cylinder last? Determine how long an air cylinder will last at the fire station, during training. Determine which team member depletes his or her air cylinder the fastest.

- **Proximity** – Where is the fire located and how far are you from an area of safety? Is your entry coordinated with successful ventilation? (Ventilation that is in progress is not successful ventilation.) Do you have a hoseline? Is there a backup team protecting your egress?

## Framing the Fireground

A size-up is not a warm-up lap around a building. The purpose of size-up is to identify problems and gather strategic information that will be used to make strategic and tactical decisions. During your size-up, there are specific things you should look for, including “The Three That Kill.”

Granted, there are myriad size-up considerations for a fire officer to consider. However, many of these can be identified before leaving the fire station: time of day, weather, units dispatched, occupancy type, building construction, fireload, etc. For example, where I work, if we are dispatched to a house fire, it is going to be a lightweight wood-frame structure (and it’s probably raining). After arriving on-scene and announcing a brief arrival (“windshield”) report, I recommend you exit the cab and “frame” the fireground (Figure 3). By “framing” the fireground during your primary size-up you address “The Three That Kill.” Framing the fireground will reveal key factors that will determine the operational mode and shape your incident action plan:



1. The status of civilian life safety (occupied, unoccupied, or unknown if occupied)
2. The location of the fire (fire is history, an indicator of what has already happened)
3. Where the fire is going (smoke is the future, an indicator of what can happen or is going to happen)
4. The status of areas above the fire (floors and voids above, including the attic)
5. The status of areas below the fire (floors and voids below, including the basement)

6. Exposures (attached occupancies or adjacent buildings)

For example, consider a fire within a two-story, lightweight wood-frame house. After framing the fireground, here’s what you discovered:

## Incident Safety Officer

You are the incident safety officer at the house fire just described. What are the three most important things you would monitor during this operation? The three most important things for an incident safety officer to monitor on the structural fireground are “The Three That Kill”:

1. Conditions above the fire floor
2. Conditions on the fire floor
3. Conditions below the fire floor

In fact, each time a safety officer reports to the incident commander, the status of “The Three That Kill” should be part of each report. Example: The safety officer reports “Utilities stabilized, floor 1 clear and stable, fire and smoke decreasing on floor 2, smoke from attic is now steam.” The incident commander would dove-

### LIFE SAFETY SITUATION

- Unknown if occupied (the status of civilian life safety is a critical risk-management determination)

### STABILIZATION SITUATION

- Fire venting from side C on floor 2 (notice the use of “from” and “on”)
- Smoke showing at floor 2 windows (behind the glass, not venting) and from the attic
- Floor 1 clear and stable
- No basement
- No exposure problem

### PROPERTY SITUATION

- Unprotected stuff (contents) on floor 1

You have just framed your three most significant problems: fire and smoke on floor 2; smoke in the attic; and the unprotected stuff on floor 1. Given this framing of the most significant fireground problems, your operational mode and your action plan objectives almost drop into your lap:

### OPERATIONAL MODE

- Offensive from side A on floor 2 (with two-out standby team)

### PRE-STABILIZATION (PRIMARY PHASE) OBJECTIVES

- Confine fire to floor 2
- Ventilate floor 2
- Primary search floor 2, then floor 1
- Primary salvage on floor 1
- Stabilize the attic
- Extinguish fire on floor 2

### SUPPORT OBJECTIVES

- Water supply
- Access/entry
- Backup
- Rapid intervention
- Stabilize utilities

### POST-STABILIZATION (SECONDARY PHASE) OBJECTIVES:

- Secondary search
- Overhaul
- Secondary salvage

(More on size-up and framing the fireground in “Commandment IV.”)

tail the safety officer's report with reports from division and group supervisors. Division and group supervisor reports would be based on status reports received from the teams they are responsible for. (Recall the PACT status report model from Commandment II: progress, air, conditions and team.)

### Strategic Congruency

An intelligent and safe fireground operation should be strategically congruent with other incidents you respond to: confined space rescue, trench rescue, technical-level hazardous materials, motor vehicle accident. Example: You arrive at a trench rescue. Two workers

are trapped in the trench with dirt up to their chests. Consider these questions:

- Do you have a life-safety problem? Yes, absolutely, two workers are trapped.
- Do you have stabilization problems? Yes, the trench is unstable.
- Which is your strategic priority? Life safety is always your strategic priority.
- Which is your tactical priority? Your tactical priority is to stabilize the trench.

Your first tactical intervention would not be rescue; you'd be crazy sending personnel into the trench before the trench has been stabilized. Your first action should be strategic: develop a stabilization plan and develop a rescue plan. What if the two workers are unconscious? What if they were down as a result of a hazardous materials release? Life safety problems? Yes. Stabilization problems? Yes. However, even with confirmed victims smart fire officers are going to develop a plan and stabilize the incident before directing firefighters to execute the rescue. Incident stabilization is frequently your tactical priority, even when rescue is clearly the strategic priority. The underlying theme here is to take care of your people first.

What about the "unknown if occupied" structural fireground? (No compelling evidence of a rescue.) Are you going to establish two-in/two-out before entering? Are you going to make sure that rapid intervention and backup teams are promptly deployed? The two-in/two-out mandate is about taking care of your people first during an "unknown if occupied" fireground operation.

### Call to Action

In case you missed the point, strategic congruency is about taking care of your people first. Strategic congruency is more about culture and philosophy than about strategy and tactics. Make sure your fireground operations are strategically congruent with the other types of incidents you respond to, especially when it has been determined that your firefighters are the most valuable "thing" at the incident.

So that your response from the fire station is much more likely to be a roundtrip, exercise, eat right, quit smoking, slow down, wear your seatbelt – and frame the fireground so that you identify, factor and monitor "The Three That Kill."

Next time: Fireground Commandment IV – Thou shall ensure that four sides are seen and compared. The art, science and philosophy of fireground size-up.



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