National Emergency Training Center
16825 S. Seton Avenue
Emmitsburg, MD 21727-8998

FEMA

R154

Dear National Fire Academy Student:

Congratulations on being selected to attend the U.S. Fire Administration's National Fire Academy's *Advanced Safety Operations and Management* course.

This 6-day course focuses on applying the risk management model to health and safety aspects of emergency services operations, including program management, day-to-day operations, and incident safety. Other areas covered include firefighter and emergency services fatality and injury problem; the risk management process; safety responsibilities of department members; regulations, standards, and policies affecting emergency services safety; and appropriate documentation and record keeping pertaining to firefighter and emergency services health and safety.

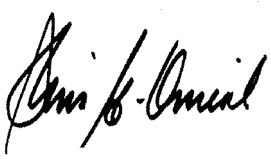
Because much of the material has been condensed into one week, the course is intensive and may require some night classes.

It is important to note that this is a 6-day course, and the first day of class will begin on Sunday at approximately 8 a.m. Subsequent classes will meet daily from 8 a.m. to 5 p.m., with graduation occurring on Friday at 4 p.m. Because of this schedule, you will be provided lodging for Friday night.

Increasing numbers of students are bringing laptop computers to campus. You alone are responsible for the security and maintenance of your equipment. The Academy cannot provide you with computer software, hardware, or technical support to include CDs, printers, scanners, etc. There are a limited number of 120 Volt AC outlets in the classrooms. A Student Computer Lab is located in Building D and is available for all students to use. It is open daily with technical support provided in the evenings. This lab uses Windows XP and Office 2003 as the software standard.

Should you need additional information related to course content or requirements, please feel free to contact Mr. Doug Williams, Acting Emergency Medical Services Curriculum Training Specialist, at 301-447-1158 or email at Doug.Williams@dhs.gov.

Sincerely,



Dr. Denis Onieal, Superintendent
National Fire Academy
U.S. Fire Administration

Enclosure

Advanced Safety Operations and Management
Pre-Course Student Preparation Requirements

Please complete the following prior to the first day of class:

- The **body** of the most current *Firefighter Fatalities in United States* report – available on the USFA Web Page at http://www.usfa.dhs.gov/fireservice/fatalities/statistics/report.shtm.
  PLEASE NOTE: Students are only required to read the body of the report--they do not need to read the individual accounts.
- Student Manual Unit 1 – The Firefighter Fatality and Injury Problem
- Student Manual Unit 2 – Risk Management Process
- Pre-course Preparation Sheet

Students are requested to bring any or all of the following Standard Operating Procedures and Policies from their departments (in electronic format if possible) to share with other students in the class. These SOPs will not be used directly in class discussions, but may be helpful in some course activities.

- Accident & Injury Investigation
- Accident and Injury Reporting Procedures
- Driving\Emergency Response
- Highway\Traffic Safety
- Infection Control
- ISO & HSO job descriptions
- Physical Fitness
- PPE
- Rehab
- Risk Management Plan
- RIT\RIC
- Safety
- Technical Rescue

ADVANCED SAFETY OPERATIONS AND MANAGEMENT
Pre-Course preparation sheet

As part of your pre-course reading assignment, you read the body of the most current *Firefighter Fatalities in the United States* from USFA. You will be discussing the firefighter fatality and injury problem the first day of class. In order to be prepared, please locate the answers to the following questions in the USFA report. Please bring your answers with you on the first day of class.

1. The report I used was *Firefighter Fatalities in the United States in* _____ (year).

2. The total number of firefighter fatalities for the year was _____.

3. The number and percent of fatalities that were volunteer firefighters were _____/_____ (#/%).

4. The number and percent of fatalities that were career firefighters were _____/_____ (#/%).

5. The number of fatalities related to wildland firefighting were _____.

6. The number of fatalities related to emergency duties were _____.

7. Assaults accounted for _____ fatalities.

8. Caught or trapped accounted for _____ fatalities.

9. Collisions accounted for _____ fatalities.

10. Struck/Contact with Object accounted for _____ fatalities.

11. Fell/Jumped accounted for _____ fatalities.

12. There were _____fatalities from stroke.

13. There were _____ fatalities due to heart attacks.

14. _____ on-duty fatal heart attacks occurred on the scene.

15. The average age of those who died from heart attack was _____.

UNIT 1:
THE FIREFIGHTER FATALITY AND INJURY PROBLEM

Terminal Objective

At the conclusion of this unit, the student will be able to describe and analyze the scope of the national firefighter fatality and injury problem.

Enabling Objectives

1. Identify the most common causes of firefighter deaths.
2. Identify the most common causes of firefighter injuries.
3. List the criteria for line-of-duty death.
4. Describe the trends related to the causes of firefighter deaths over the last decade.
5. Analyze a given case study to determine factors contributing to a fatality.

FIREFIGHTER FATALITIES

Introduction

Each year, approximately 100 firefighters give their lives in the line of duty. You should research relevant websites such as the United States Fire Administration (USFA) (http://www.usfa.fema.gov) and the National Fire Protection Association (NFPA) (http://www.nfpa.org) for the most current data.

Several organizations gather statistics on firefighter fatalities to perform analysis and identify trends to help prevent firefighter fatalities in the future. The United States Fire Administration (USFA) has tracked firefighter fatalities since 1977.

In 1998, the United States Congress established the Fire Fighter Fatality Investigation and Prevention Program within the National Institutes of Occupational Safety and Health (NIOSH). Among the goals of the NIOSH program are investigating firefighter line of duty deaths, determining contributing factors, and publishing reports on specific fatalities and special topics that relate to firefighter safety. The products of the program are available for free on-line at http://www.cdc.gov/niosh/firehome.html.

The largest number of on-duty deaths in any year has been 441 in 2001. This number includes 343 New York City Firefighters that were killed in the attack on the World Trade Center. The large number of firefighters killed in the collapse of the World Trade Center towers is the highest loss of firefighters on a single incident in history.

FIREFIGHTER INJURIES

It is important to understand there is NO national or comprehensive database on firefighter injuries. There are three organizations that track firefighter injuries in some form. These organizations are the United States Fire Administration (USFA), the International Association of Fire Fighters (IAFF), and the National Fire Protection Association (NFPA).

The United States Fire Administration (USFA) tracks firefighter injuries through the National Fire Incident Reporting System (NFIRS). NFIRS has traditionally gathered information about firefighter injuries that occur in relation to fire incidents. Recent versions of NFIRS capture non-fire incident related injuries as well, such as an injury suffered by a firefighter while providing emergency medical service.

The International Association of Fire Fighters (IAFF) tracks injuries sustained by career firefighters. Data for the IAFF is gathered through an annual survey sent to career fire departments. The IAFF data does not include injury or fatality data for career firefighters in departments where the firefighters are not represented by the IAFF or for any volunteer, seasonal, or part-time firefighters. Some exceptions may exist where a fire

department that is predominantly career reports data for injuries suffered by career and volunteer firefighters.

The most comprehensive effort to collect information on firefighter injuries is conducted by the National Fire Protection Association (NFPA). The NFPA tracks and reports on firefighter injuries through the use of statistical projections based on data gathered through an annual survey of fire departments.

An analysis of firefighter injuries reported to the USFA through NFIRS found the following:

1. The vast majority of firefighter injuries are not life threatening.

2. A significant number of the most severe injuries received by firefighters are caused by overexertion and strain, including a large number of heart attacks and cardiac problems.

3. Violent acts committed against firefighters are small in number but high in severity.

4. Sprains are the most common minor/moderate firefighter injury.

5. The most severe firefighter injuries are cardiac and respiratory in nature.

6. The vast majority of firefighter injuries occur at residential occupancies.

Summary

Several organizations gather information on firefighter fatalities and injuries, including the United States Fire Administration, the International Association of Fire Fighters, the National Fire Protection Association, and the National Institutes of Occupational Safety and Health. These organizations analyze data to determine trends that might be useful to find ways to reduce the fatality rate.

In a typical year, the majority of fatalities occur in the volunteer fire fighting community. Heart attacks and vehicle collisions are the leading causes of on-duty fatalities. Strains and sprains are the primary injuries suffered both on and off the fireground.

BIBLIOGRAPHY

Krantz, L. (2001). Jobs Rated Almanac 2001, (5th ed.) *Wall Street Journal* : St. Martin's Griffin: New York, NY.

National Fire Protection Association, (2000). 2000 U.S. Firefighter Injuries. *NFPA Journal*, November/December: . Quincy, MA: Author: 50-54.

United States Fire Administration. (2000). *Firefighter Fatalities in the United States in 2000*. U.S. Government Printing Office: Washington, D.C.

SUGGESTED READING

United States Fire Administration. (2000). *Firefighter Fatalities in the United States in 2000*. U.S. Government Printing Office: Washington, D.C.

United States Fire Administration. *Fire Death Rate Trends: An International Perspective*. U.S. Government Printing Office: Washington, D.C.

United States Fire Administration. (1997). *Fire Death Rate Trends: An International Perspective*. U.S. Government Printing Office: Washington, D.C.

UNIT 2:
RISK MANAGEMENT PROCESS

Terminal Objective:

At the conclusion of this unit, the student will be able to describe the goal and the steps involved in instituting a risk management program.

Enabling Objectives

1. Identify the primary method of detecting increased risk to a department.

2. Identify risks (current and potential) involved in both emergency and non-emergency operations.

3. Discuss the liability issues related to organizational risks.

4. Identify documentation necessary to support/defend the risk management program.

5. Use the risk management process to analyze and develop a plan for managing a significant risk.

6. Present the risk management plan to the class.

RISK

Each of us faces risks every day as we work and as we play. No activity is risk free and there is no way to escape risk completely. Every action that we take carries with it the chance that we might be injured or killed. In most cases, the risks that we take are very minor. For example, the risk of being hit by lightning is very low, yet few of us are comfortable in an open field during an electrical storm.

Insurance companies are very familiar with the concept of risk. Car insurance premiums for an 18-year-old single male are much higher than they are for the same male once he is 30 years old and married, provided he has not had any major losses. The cost of the insurance reflects the risk that is associated with the driving behavior of the same person at different times in his/her life.

As we go through life, we take steps to avoid risk. Sometimes our actions are consciously thought out and sometimes they are automatic. If you choose not to enjoy the thrill of hang gliding because you feel that it is too risky, you have consciously taken steps to completely avoid the risk. Not every risk can be completely avoided. In other cases we can avoid a significant risk but not be completely protected from it. If the law enforcement agencies in your area begin referring to a stretch of road as the "mile of death," you may choose to use another road during your travels. Although you avoid the risk on that stretch of road, there still is some risk associated with driving on any road, so you have not completely avoided the risk.

Emergency responders face significant risks. In order to deal with those risks, attempts are made to identify and control those associated with the job tasks. This activity is known as **risk management**.

RISK MANAGEMENT

Definition

Risk management is the process of planning, organizing, directing, and controlling the resources and activities of an organization in order to minimize detrimental effects on that organization.

Risk management in the fire service is not just about preventing monetary loss. It is about preventing disability, loss of life, and/or irreparable business damage as a result of the provision of services. Risk management involves direct "hands-on" provision of services as well as various indirect aspects, including the development of effective training programs and the selection of qualified personnel. Regardless of its specific focus, the overall goal of risk management is to reduce the frequency and severity of preventable, adverse events that create losses.

Risk management is comprised of many elements including liability, insurance, safety, health, security, financial impact, and several others. The risks encountered by emergency services personnel are many, such as traffic, response hazards, blood and body fluids, and violence. To control these risks effectively, a fire or EMS department must use a risk management program. **The primary focus of the internal (organizational) risk management plan is member safety and health.**

Risk management for emergency response organizations is divided into three categories: non-emergency risk management, pre-emergency risk management, and risk management at emergencies.

Non-emergency risk management looks at the hazards common to all workplaces. This type of risk management might include fire inspections of fire stations and the management offices of emergency response organizations. The risks encountered in these places are no less deadly than those encountered on the emergency scene, but their frequency and severity are lower than those risks faced on the emergency scene.

Pre-emergency risk management looks at activities that take place prior to the emergency. These activities can have a major impact on the safety of members working at the scene of an emergency.

Risk management at an emergency is the duty of every responder at every level. Firefighters apply risk management techniques to themselves and their partners. Company officers manage the risk of firefighters assigned to their company. Command officers have responsibility for everyone on the emergency scene. The Incident Safety Officer assists the Incident Commander by focusing on safety. The same basic techniques that are discussed for non-emergency and pre-emergency risk management apply to risk management at emergencies.

Risk management at emergencies will be addressed in great detail in Unit 8 – Operational Risk Management. This section discusses risk management in non-emergency and pre-emergency situations.

The safety and health component of risk management was incorporated into NFPA 1500, *Standard on Fire Department Occupational Safety and Health*, during the 1992 revision process. Simply stated, the requirements of the risk management program are:

- The fire department shall adopt an official written risk management plan which addresses organizational policies and procedures.
- The risk management plan shall be developed to address the following areas: administration, facilities, training, vehicle operations, protective clothing and equipment, operations at emergency incidents, operations at non-emergency incidents, and other related activities.
- The risk management plan shall include the following components:

- risk identification
- risk evaluation
- risk control techniques
- risk monitoring

There is an additional step that should be added or incorporated into this process, which is typically inserted between the risk identification and risk control techniques and occurs with the evaluation process. This step is called **prioritization of risks**.

Risk Management Process

Every risk management program should be viewed as a process consisting of the following components:

1) The **identification** of potential risks so that uncertainties can be controlled.
2) The **evaluation** of risks to determine the probability of potential losses.
3) The **prioritization** the risks based on the probability of potential losses.
3) The development and implementation of **control measures** to lessen risks.
4) The **monitoring** of risk management control measures to ensure their effectiveness.

These components are covered in detail in the USFA publication, *Risk Management Practices in the Fire Service*.

Risk Identification - actual or potential hazards for all job functions.

Risk identification is the process of making a list of things that might go wrong with an operation. A good rule of thumb is to anticipate the worst that can happen when identifying risks. If plans are formulated for a worst-case scenario, anything less can be handled.

Because many accepted standards in the services provided by fire departments have been validated through research, the risk manager must proactively seek out and analyze data and reports that suggest methodologies for aiding the detection and reduction of unsafe activities. Compile a list of all emergency and non-emergency operations provided by the department. There are many sources to assist with this identification process. The first, and possibly the most effective, is the department's loss prevention data. Other sources for this information may include past department accident and injury statistics, input from members of the department, injury and fatality report publications, and knowledge of the experiences of other emergency service providers.

Areas of operations that should be considered in a risk management program include, but are not limited to:

Vehicle accidents	Employee attrition
Vehicle breakdown	Continuing education
Driving skills	Dispatching procedures
Physical fitness of personnel	SOP/Protocols testing
Station inspections	SOP/Protocol deviations
Building safety	Response times
Skills retention	Non-transport times
Hazardous materials exposures	Vehicle down times
Stress management	Mutual aid interactions
Debriefing effectiveness	Controlled substances losses
Documentation	Job-related injuries
Hiring selection criteria	Probationary supervision

Risk Evaluation - the potential of occurrence of a given hazard and the severity of its consequences.

Some aspects of service provision involve more risks than others. Once the risks are identified, they can be evaluated from the standpoint of both frequency and severity. Frequency addresses the likelihood of occurrence. Typically, if a particular type of incident (such as back injuries) has occurred repeatedly, it will continue to occur until effective control measures are implemented.

Severity addresses how much damage or injury can be caused by the risk. This can be measured in a variety of ways, such as time away from work, cost of damage, cost of and time for repair or replacement, disruption of service, or legal costs. Using the information gathered in the identification step of the process, the risks can be classified based on severity.

While examining the areas posing the greatest risk, it is also important to monitor underlying causes of deviations from protocols and SOPs that have not materialized into "high" risk areas. In addition, risk management activities should examine characteristics or factors within an organization that may hinder or enhance risk management efforts. For example, asking the following questions may reveal valuable information.

- Are programs for new-member orientation and mentoring providing inexperienced firefighters with sufficient information and training?

- Are the organization's selection techniques effectively identifying the most qualified personnel for employment?

- Are continuing education/training programs consistently well attended?

In addition to studying factors within the organization, risk management activities should also monitor extra-organizational risks created by the system within which the agency functions. Sample questions for evaluating risks in this arena include:

- What scene situations are most dangerous for firefighters?
- What response types can benefit from more staffing on the scene to reduce time or risk to personnel?

Of course, numerous additional questions for consideration could be listed. The risk manager must determine what questions should be asked and then obtain answers to those questions. For risk management activities to be successful, they must include questions, answers, planning efforts, and the introduction and monitoring of programs to manage risks.

Prioritizing Risk - the degree of a hazard based upon the frequency and severity of occurrence.

Taken in combination, the results of the frequency and severity determinations will help to establish priorities for determining action. Any risk that has a high probability of occurrence combined with serious consequences, deserves immediate action, and would be considered a high priority item. On the other end of the scale, non-serious incidents with a low likelihood of occurrence are a lower priority, and can be placed near the bottom of the "action required" list.

A good tool for the risk classification step is the classic matrix pictured in Figure 2.1. Each risk should be placed in one of the four areas. For example, a severe risk that is faced frequently would appear in the upper right-hand box and a risk that was not severe and was faced on an infrequent basis would be placed in the box in the lower left-hand corner. In general, high frequency, high severity risks would be addressed first and low frequency, low severity risks would be addressed later.

The prioritization process is not a simple task. There is no one correct priority for each risk. The decision about which risk to handle first depends upon local factors such as the availability of resources, the ease of addressing each risk, and the time involved in addressing each risk.

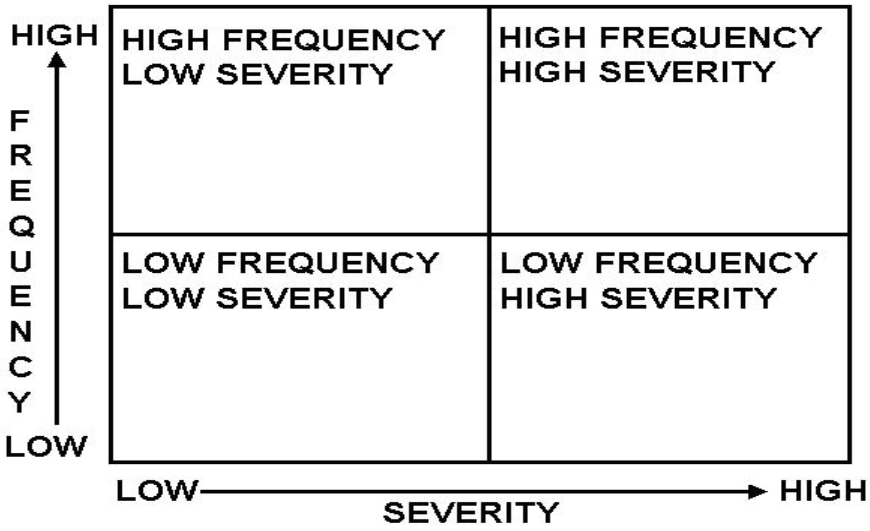


Figure 2.1: Risk Clarification Matrix

Gordon Graham, a California risk management consultant, has added a new twist to the time honored frequency/severity matrix. He maintains that high frequency events, whether low risk or high risk, are managed correctly most of the time since responders have seen this type of situation before and know what to do. More problems and danger are presented to responders in low frequency events since they have little or no experience base to call upon.

He explains that people have a "hard drive" (or a slide tray for those over age 50) inside of their head. Life and professional experiences are stored on the hard drive. Each time we have an experience, information about what worked and what did not work is loaded onto the hard drive. When we are presented with a situation, such as a structure fire, we unconsciously take what we see and attempt to match it with situations that we have seen before, situations that are stored on our hard drive. If we have a match, we take the information that we have stored about what works and what does not work and attempt to apply it to the present situation. In the vast majority of high frequency events, our past experience helps us manage the situation.

Mr. Graham is discussing a concept called **Naturalistic Decision Making** (NDM). This concept (formerly termed **Recognition Primed Decision Making)** evolved from military research in the 1980's. The military found that experienced battlefield commanders quickly analyzed a small number of variables when presented with a situation. The commander used the outcome of this rapid analysis to make decisions on what should be done, based on the "hard drive" in his head.

NDM can be used to train firefighters for infrequent high-risk situations by regularly presenting these situations in training. As the situations are managed in training situations, the experience becomes a part of the "hard drive". When the event happens, the firefighter recalls the training in the same manner that previous experiences with high

frequency situations would be recalled. NDM used in training can better prepare emergency responders to work safely.

In fire and emergency services, things are not always what they seem to be. A danger exists if we view **all** similar situations as if they are the same. There are situations where what worked fine the last time does not work well in the present emergency. That "failure" or learning event expands the base of knowledge within our hard drives. For example, many fire departments are dealing with the need to convert a "residential" fire mentality that is unconsciously applied to all structural fire events. If a set of tactics that worked well for fighting 30 residential fires is applied to a fire in a commercial structure, the results may not be the same.

Mr. Graham adds another component to the bottom right box in the frequency/severity matrix – **discretionary time**. In high risk, low frequency situations where responders have the benefit of time, such as a hazardous materials incident with no immediate life threat, there is the opportunity to back away from the hazard. The extra time affords responders the ability to research alternatives, call in technical experts, or use regional resources to address the problem. High risk, low frequency situations where there is no time to back off and make decisions pose the most extreme levels of risk to responders and response organizations. Responders are handicapped in these situations by both very little information and very little time.

Graham's risk management concepts can be applied to non-emergency and pre-emergency risk management as well as they can be applied to emergency situations.

Risk Control Measures - solutions for elimination or reduction of real or potential hazards by implementing effective control measures.

Once all of the risks facing an operation have been identified, solutions for each risk should be sought. Some risks, especially those that occur during emergencies, cannot be completely controlled, but the severity of the risk can be addressed. For example, there is no way for the fire department to control the strength of a structure. The department does have control over the severity of the risk through measures such as controlling access to the area where the structure will fall and by implementing other Standard Operating Procedures (SOPs) that dictate when it is permissible to enter a burning building.

There are several approaches for controlling risk, including risk avoidance, implementation of control measures, and risk transfer.

In any situation, the best choice is **risk avoidance.** Simply put, this means avoid the activity that creates the risk. Frequently in an emergency services organization this is not a practical choice. Lifting a patient onto a stretcher presents a serious back injury risk, but you cannot avoid this risk and still provide effective service.

An example of where avoidance has been very practical is the widespread use of sharps containers. The risks associated with recapping needles are well documented, so recapping is no longer an accepted practice. This risky behavior can be avoided through the proper use of a sharps container.

The most common method used for the management of risk is the adoption of effective **control measures.** While control measures will not eliminate the risk, they can reduce the likelihood of occurrence or mitigate the severity. When risks to emergency responders are identified before the emergency and control measures are put in place, there will be a positive impact on the safety of responders when the emergency occurs. Safety programs, ongoing training and education programs, Personal Protective Equipment (PPE), and well-defined Standard Operating Procedures (SOPs) are all effective control measures.

For example, a collision between emergency response vehicles and civilian vehicles at intersections is a risk that has high severity and relatively high frequency in emergency services. The development of SOPs that require a full stop at red lights and other negative right-of-way situations can help to control the severity and the frequency of this risk. A representative listing of hazards and control measures by subject area can be found in Table 2.1 at the end of this unit.

Risk transfer can be accomplished in two primary ways - physically transferring the risk to somebody else, or through the purchase of insurance. For a fire or EMS organization, the transfer of risk may be difficult, if not impossible. However, examples of risk transfer would be 1) scheduling a routine transfer patient in protective isolation in a newer vehicle with circulating air rather than an older vehicle, 2) contracting out the laundering of contaminated linen/clothing to a commercial laundry, and 3) contracting inspections of gasoline tankers to an outside agency. The risks associated with examples two and three have been transferred to a private contractor.

The purchase of insurance transfers financial risk only. It does nothing to affect the likelihood of occurrence or reverse firefighter injuries/fatalities. Buying fire insurance on the station, while highly recommended to protect the assets of the department, does nothing to prevent the station from burning down. Therefore, insurance is no substitute for effective control measures.

Risk Monitoring - evaluation of effectiveness of risk control measures.

The last step in the process is risk management monitoring. Once control measures have been implemented, their effectiveness needs to be evaluated. Any problems that occur in the process may result in changes to control measures. This final step ensures that the system is dynamic, and will facilitate periodic reviews of the entire program.

The intent of the risk management plan is to develop a strategy for reducing the inherent risks associated with fire department operations. Regardless of the size or type of fire department, every organization should operate within the parameters of a risk management plan. This is a dynamic and aggressive process that must be monitored and revised annually by the Health and Safety Officer.

For example, the risk to members providing care to a patient with a communicable disease poses a real hazard and should be properly addressed through a written infection control program. The infection control program should include:

- Training and education
- PPE
- Health maintenance
- Immunizations
- Exposure management
- Fire department facilities
- Cleaning, disinfecting, and disposal
- Fire department vehicles

The Health and Safety Officer, designated Infection Control Officer, Incident Safety Officer, and the department's Occupational Safety and Health Committee should ensure that evaluations and revisions to the risk management plan occur at least annually.

Safety is a major component of risk management. Most of the emphasis placed on risk management from a fire service perspective is from a safety approach. The safety component affects other risk management components in areas such as liability and finance. An aggressive, proactive occupational safety and health program will reduce accidents, injuries, occupational illnesses, and health exposures. This, in turn, reduces the department's liability claims and payments and also provides a positive effect on the financial well being of the organization. Many fire departments are self-insured, which means that the entity, jurisdiction, or the fire department generates funding for various types of insurance such as workers' compensation, vehicle, and general liability.

RISK MANAGEMENT PLAN

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, requires that all fire departments develop and adopt an official written risk management plan. The plan is required to cover all fire department facilities and operations and to use the classic risk management methods described above. Risk management plans also should be developed for other emergency response organizations such as EMS departments.

The risk management plan should look at every function performed by the organization, both non-emergency and emergency. The plan should identify risks associated with each operation, evaluate and classify the risks faced in each operation by frequency and severity, prioritize the risks associated with every operation and the risks faced by the organization as a whole, and develop risk control measures. In addition, the Fire

Department Safety Officer should monitor the effectiveness of the risk control measures that are used. Table 2.2 is an example of a risk management plan.

Table 2.2 Risk Management Plan

OPERATION AND RISK ID	FREQUENCY/ SEVERITY	RANK/ PRIORITY	CONTROL MEASURES
Emergency Mode Driving			
Collisions with other vehicles	Low/High	High	Emergency mode driving regulations Traffic control devices Warning lights/sirens Speed limitations Public education campaign Not all calls require emergency mode
Collisions with objects	Low/High	High	Emergency mode driving regulations Use of backers Automatic door openers
Injury to passengers	Low/High	High	Seatbelt provision and use Enclose equipment in cab
Injury to others	Low/High	High	Public education campaign Warning lights/sirens Traffic control devices

THE FIRE DEPARTMENT SAFETY OFFICER AS RISK MANAGER

The Fire Department Safety Officer (FDSO) should be involved in all operations of the emergency response agency. He/she brings a safety perspective to all meetings and can provide valuable input to other members of the agency concerning the safety of responders.

The FDSO is the risk manager for the fire or EMS department. He/she is acting as an internal safety consultant when involved in the specification of apparatus or equipment. The Fire Department Safety Officer may not be involved, for example, in selecting the components of the drive train of a vehicle, but it is appropriate for him/her to recommend disc brakes, antilock brakes, and a supplemental braking device such as a magnetic driveline retarder.

Documentation

It can be very difficult to identify and solve risk management problems without a "paper trail" documenting the efforts of the risk manager. Documentation serves multiple purposes. It can validate testimony, assist in testimony by refreshing recall of an event, enable retrospective review without unnecessary duplication of collection efforts, and suggest efforts to reduce risk. Although paperwork does not necessarily demonstrate that an action was taken, it can be convincing evidence. For example, vehicle maintenance logs and canceled checks do not prove a vehicle was repaired, but these documents can effectively persuade a jury.

Documentation that identifies a problem must also indicate what action was taken to correct the problem and that the task was successfully completed. Recording that a member must attend a continuing education class is effective only if the documentation also shows that the member was aware of the situation and that the assignment was fulfilled. Organizations with well-defined record keeping policies will be better prepared to identify and implement effective interventions for reducing risks.

TRAINING EXERCISES

Some of the most dangerous non-emergency activities that responders can perform are live fire training and training for special operations such as hazardous materials emergencies or high-angle rescue. Risks at these training exercises mirror the risks in emergency operations. The Fire Department Safety Officer should apply the same risk management techniques used at emergencies to these events.

NFPA 1403, *Standard on Live Fire Training Evolutions in Structures*, provides safety and operational guidance for live structural fire training and should apply the same risk management techniques used at emergencies to these events. In his/her role as the agency's internal safety consultant, the Fire Department Safety Officer should be involved in planning all training exercises. He/she should develop a safety action plan for each exercise, and review the plan with the IC of the exercise.

The safety action plan should account for:

- type of exercise to be conducted
- risk evaluation of the hazards that may be encountered
- review of any applicable standards or regulations governing this type of exercise
- preparation of a checklist of hazards to be aware of during the exercise
- speaking points for the safety section of a pre-exercise briefing of the participants

EXTREMELY HAZARDOUS OPERATIONS

Some types of operations pose an extreme hazard to responders. Special attention by the Fire Department Safety Officer is warranted. This section discusses risk management applied to these operations.

Technical Rescue and Hazardous Materials Incidents

Almost every emergency response agency responds to technical rescue or hazardous materials calls. Technical rescue calls may involve trench collapses, water rescue, ice rescue, rescue from heights, or the rescue of persons trapped by a building collapse. Hazmat calls include large flammable liquid fires, gas leaks, and other incidents involving chemicals. While every agency faces these risks regularly, their frequency is much lower than most fire or EMS operations.

Firefighters and EMS workers are task oriented and tend to make do with the tools at hand. Their natural inclination is to help those in need, regardless of personal risk. Technical rescue and hazmat situations usually require specialized equipment and training. The agency risk management plan should identify a role for first responders to control access to the scene and call in technical experts.

The Fire Department Safety Officer does not need to be an expert on all of these hazards. However, a general understanding of the risks and the methods used to control these incidents is necessary. He/she may choose to consult with experts from within or outside the agency when developing SOPs for these types of incidents. These types of operations

also tend to be heavily regulated on the local, state, and national level, and these concerns should be addressed in the SOPs.

Incidents Involving Violence

A growing risk faced by responders today is an incident that involves violence. In the past, fire and EMS workers were considered neutral in these situations. The overall positive feeling of the community toward firefighters and EMS workers provided a feeling of security. Changes in our society and the increasing role of the fire service in EMS have increased the exposure to these risks.

Some members of the community may view firefighters and EMS workers as extensions of the government. This point was brought home to all firefighters and EMS workers during the civil disturbance of 1992 in Los Angeles and the surrounding area. Firefighters and EMS workers required police or National Guard escorts in order to perform their jobs, and one firefighter was seriously injured by gunfire.

Exposure to violence can come in many forms, some much less spectacular than civil disturbance. Firefighters and EMS workers are exposed to violence when responding to bomb threats, assaults, shootings/stabbings, domestic violence, robberies, hostage situations, drive-by shootings, and in support of police operations such as raids on drug houses or drug labs.

There are at least two ways to address the increased exposure to the hazards related to violence. The first method is **community involvement**. The neighborhood fire station traditionally has been a gathering place for the people of the community. However, the downtown fire station with the apparatus doors rolled up and firefighters outside watching the world walk by is a thing of the past in many communities. Closed doors and barbed wire around the parking lot have replaced the open station. Many firefighters do not live in the community they serve. This results in a disassociation of the local firefighter from the people that he/she serves. This insulation of closed doors or lack of contact degrades the traditional bond that firefighters have enjoyed with their customers and community.

One way to prevent violence toward firefighters and EMS workers is to stay involved with the people in the first-due area or district, open the station up to visitors, and don't let the actions of a few generate a siege mentality. Many volunteer fire stations have banquet and meeting facilities attached to their stations. Some career fire departments such as the Orlando (Florida) Fire Department have added community rooms to their fire stations. These facilities provide an opportunity for the members of the department to keep in contact with the residents of their community. A caring and respectful attitude shown toward the people you serve will go a long way.

The second method of addressing the hazards related to violence is through the use of SOPs. When violence does erupt, firefighters and EMS workers have no place in the line of fire. Firefighters and EMS workers do not have the equipment or training to survive these situations and should stay out of the hazard zone until law enforcement officials have stabilized the situation. If a person is in need of medical care as the result of a violent attack, law enforcement should secure the area to allow firefighters and EMS workers to enter, or they should move the victim to a safe area so that treatment can be initiated. These options should be addressed in the agency's SOPs.

If the SOPs direct responders to stage away from **all** incidents involving violence, other problems can arise. The person in the best position to judge the safety of the scene is the company officer, in communication with law enforcement. Firefighters and EMS personnel should also wear uniforms that differ in appearance from those of law enforcement personnel to avoid any confusion about an individual's role at the scene.

Terrorism

The events of September 11, 2001 put firefighters on notice that the threat from terrorism is real. The issue of terrorism will be addressed in detail in Unit 9: Situation-Specific Hazards and Mitigation Strategies.

SUMMARY

For risk management efforts to be successful, they require support from personnel at all levels of the organization. Problem identification often requires considerable fact-finding and information-gathering activities. Risk managers will need to be seen as trustworthy in order for personnel to be forthcoming regarding risk management issues. Blindly imposing restrictions and record keeping requirements will only frustrate members and will likely defeat the very purposes of risk management. To be successful, it is important that members understand and feel that they are valuable contributors to the risk management process--as opposed to feeling the process is being forced on them.

Table 2.1--HAZARDS AND CONTROL MEASURES

Apparatus and Vehicles

- All personnel seated in enclosed areas
- Seatbelts provided for all riders
- Equipment inside the passenger compartment secured or enclosed
- SCBA's stored outside of the passenger compartment
- Driver safety training provided to all drivers on the following:
  - Stopping distances
  - Emergency maneuvering
  - Aerial operations
  - Pump operations
  - Backing hazards and the use of spotters
  - Vehicle does not move until all passengers are seated/ belted
- Vehicle conspicuity (visibility) in emergency and non-emergency modes
- Emergency mode driving procedures
  - Stop signs and red lights
  - Negative right-of-way situations
  - One-way streets
  - Speed limits
  - Challenge and response routine between the driver and the officer
  - Railroad crossings
  - Dangers posed by engine brakes, retarders, and brake limiting switches
- Weight and brake capacity
  - Loading of new vehicles
  - Weight balancing, side-to-side
  - Tank baffling
  - Military truck conversions; fuel tanker conversions
  - Antilock brakes on newer chassis
  - Automatic chains for colder climates
  - Supplemental braking devices such as jake brakes, transmission retarders, and magnetic driveline retarders
- Passenger heat and noise reduction (sirens, radios, air horns, engine, etc.)
- Patient lifting height for ambulances
- Child safety seats for pediatric riders

- Restraints for EMS providers and others in the back of an ambulance
- Compliance with the appropriate federal or NFPA standard
- Preventive maintenance and inspection program

Facilities

- Smoke detectors and automatic sprinklers
- Diesel exhaust emissions control
- Standard fire safety measures regarding storage, electrical appliances, safety with cigarettes and open flame, and regular inspections
- Dedicated area for the cleaning of EMS equipment, NFPA Standard 1581, *Standard for Fire Department Infection Control Program*

Protective Clothing and Equipment

- Compliance with the appropriate NFPA standard
- **Full** structural protective clothing: helmet, hood, coat, gloves, SCBA, flashlight, trousers, and boots
- Protective clothing for EMS operations: exam gloves, eye and face protection, drapes, gowns, and suits
- Clothing and equipment--and a means for cleaning them-- must be provided by the agency
- Uniforms compliant with NFPA 1975
- Clothing worn by volunteer firefighters under structural protective clothing
- SOPs which govern the use and maintenance of protective clothing and equipment
- Right protective clothing for the occasion: structural, wildland, proximity, hazmat, etc.

Equipment

- Proper training for all members expected to use the equipment is a basic requirement
- Weight, center of gravity, and ease of carrying - Are handles in places to make the equipment easy to carry (portable pump)?
- Consideration of noise levels produced by the equipment

Fire fighting

- Use of an incident management system
- Use of Incident Safety Officers on the scene of an emergency
- Working in teams of at least two members in the hazard area
- Use of risk management techniques on the scene of the emergency (risk versus benefit)

Emergency Medical Services

- Use of proper levels of communicable disease protective equipment and clothing
- Proper decontamination of equipment
- Scene control (Traffic accidents, violent incidents, etc.)
- Use of an incident management system
- Proper lifting techniques

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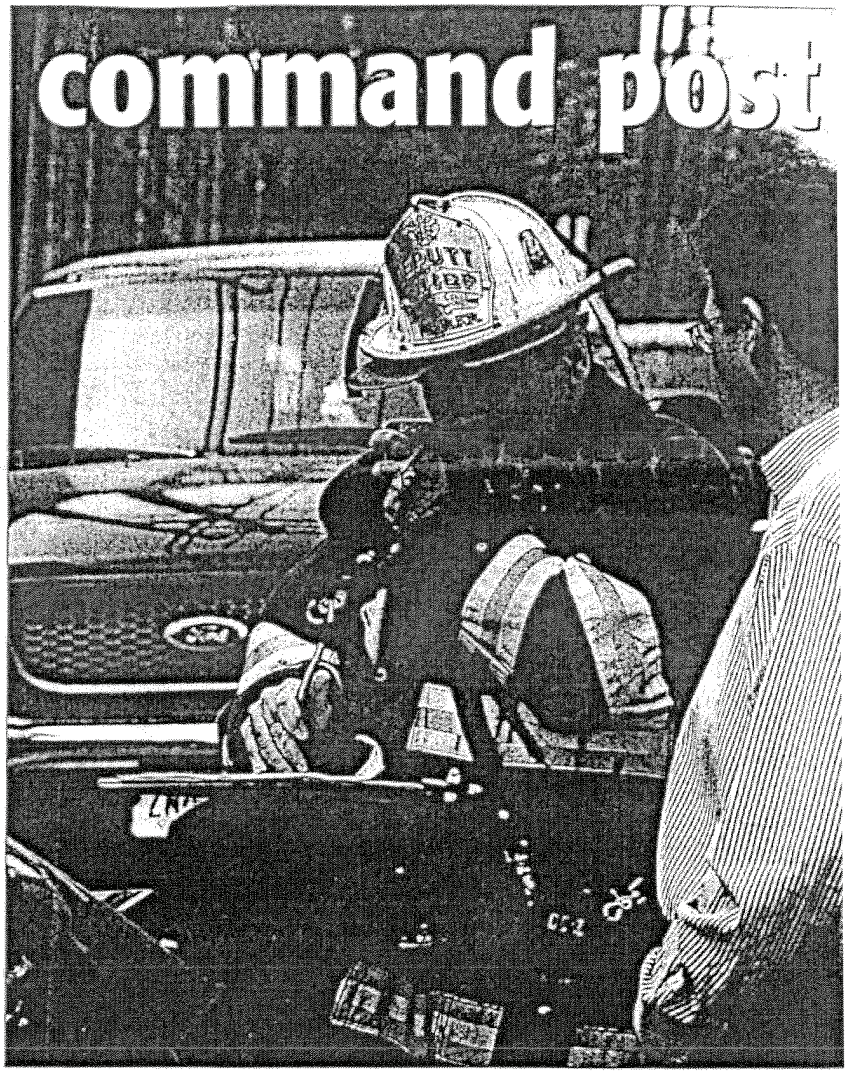
NOT YOUR Father's command post

Experience may be the best teacher, but its lessons can be ambushed by the many stimuli of the fireground. A battlefield model reveals how to streamline the decision-making process for better incident command.



By Deputy Assistant Chief Curtis Varone
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Today's fireground commander has a considerably more complex role to play than at any other time in our history. Whether we look at incident command systems, accountability procedures, two-in/two-out regulations, radio channel overload or any of a host of other factors, commanding the forces battling a fire is more intellectually challenging now than ever before.

Fortunately, we have new insight into our decision-making processes that can help us understand and prepare for the fireground problems that await us. This insight is the result of research conducted for the military into battlefield decision-making. Its significance isn't limited to command-level officers; it applies equally to company officers and line firefighters as well.

Lessons from inexperience

Let's consider an example of basic fireground decision-making. When I was a young engine company officer, we arrived first to an apartment fire in a three-story, wood-frame tenement, commonly referred to as a "three-decker." The fire was on the second floor, in a rear bedroom located off of the kitchen. I decided to take our handline through the front door and up the front stairs.

The first problem with my decision was a bicycle in the front hallway that slowed us down momentarily. Next was a baby carriage on the second-floor landing. Then our hoseline got hung up on some furniture in the living room.

The intense heat from the fire, which was extending from the bedroom into the kitchen, forced us to back up because our line was still being charged. Just as our line started to fill, I heard water striking walls and ceilings out in front of us. The backup handline, which had advanced via the rear stairs, was extinguishing the fire.

Why did I choose the front stairs at this fire instead of the rear? As I dejectedly thought about my decision after the fire, I realized I never even thought

Ron Jeffers

about using the rear stairs. Of course, I rationalized that the rear stairs were more likely to be cluttered with storage and that the front stairs made for a shorter stretch.

In my heart, however, I knew I never consciously considered the rear stairs. As a result, another company beat us to the fire, and I made some mental notes not to rush line placement decisions and to consider using the back stairs when the fire's in the rear. All in all, I had a fairly common experience for a young officer.

I didn't think much about that fire until I read *Sources of Power* by Gary Klein, Ph.D., who was hired by the U.S. military to find ways to improve the decision-making of our battlefield commanders. The results of his research surprised me, but I'm convinced that he has figured out exactly how we make decisions on the fireground.

> Chiefs fail to see how their own staffing decisions end up affecting the decision-making of company officers.

Klein and his team of researchers spent years trying to understand how military officers make important decisions while under pressure and within severe time constraints. In fact, they even looked at how fireground commanders make decisions to help shed light on the military process.

Models and slideshows

Unlike philosophers, theologians or business executives, firefighters generally aren't excited by the mechanics of decision-making. Of course, that doesn't excuse a lack of awareness.

There are a number of models that have been designed to help people make good decisions. Most decision-making models make an assumption that the decision-maker will, at some point, make a comparative analysis of available options and choose the best one.

It stands to reason that when confronted with life-and-death decisions, such as those faced by a fire officer under the typical time constraints posed by a fire, some sort of rapid identification and analysis of options should be done, followed by a prompt decision. In fact, many reputable books on fireground command advocate such an approach.

Klein's research results were both scary and enlightening in their explanation of how and why I decided to use the front stairs in the scenario described earlier. He determined that we don't make a comparative analysis of our available options when making fireground decisions. In fact, a fire officer making a typical fireground decision will choose the first course of action that comes to mind. The solution that presents itself comes from our memory of how we solved similar problems in the past.

Klein's model says that, as humans, we're hard-wired to make choices in this manner when under pressure. Such recognition-primed decision-making is predicated on people choosing a course of action based on pattern matching, a comparison of the current problem to similar problems encountered before.

Chuck Burkell and Hugh Wood from the National Fire Academy wrote about this aspect of RPD in FIRE CHIEF, comparing pattern matching to finding the right picture in a tray of slides. [*Ed.: "Make the right call," March 1999, available at <www.firechief.com>.*] They identified the critical training implications relating to pattern matching, as well as the role of training and experience in developing a good database of patterns from which to generate matches.

Consider this example. It's two hours after midnight, and you've just arrived on the scene of a single-story commercial occupancy with heavy smoke showing. The building has masonry walls and a metal deck roof, supported in some places by steel beams. Companies are operating in the offensive mode. You observe cracks forming in a wall just below the roof level. You immediately order the building evacuated.

Any firefighter with some training and experience should make a pattern match here — a picture of a similar situation encountered in the past should be found in the slide tray. Someone without training wouldn't, as they're unaware of such subtle clues. Klein says that a major difference between a novice and an expert, whether we're talking about pilots, surgeons or fire officers, is that the expert has more pattern matches in memory.

The fact that we generally choose the first course of action that comes to mind once we have a pattern match, without considering other options, isn't necessarily a bad thing. It allows us to make rapid decisions instead of freezing up while trying to analyze our options. Plus, the first course of action that presents itself is based on training and hard-earned experience.

Mental simulations

The other significant aspect of RPD is our use of mental simulation. Klein found that once we make a pattern match and decide on a course of action, our minds immediately engage in a mental simulation to determine how that option will play out. In essence, the mental simulation allows us to debug our choice. When making a recognition-primed decision, our minds will not consciously or subconsciously consider Plan B until we've completed a mental simulation of Plan A and realized it won't work.

For example, an engine company assigned to a primarily residential neighborhood arrives first to a large fire in a commercial occupancy. The officer orders the crew to stretch a 1¾-inch handline. As crew members ready the handline at the back step, the officer begins a mental simulation. He visualizes the line being stretched and charged, and it having virtually no effect on the fire. He immediately countermands his previous order, and directs the members to stretch a 2½-inch handline.

Mental simulations are Mother Nature's backup plan in case our pattern match is incorrect. Without the ability to conduct a mental simulation, we would be left to implement the first option that comes to mind, even when it won't work. What if you can't concentrate after making an RPD? What if factors beyond your control occupy your attention to the extent that you can't

perform a mental simulation of Plan A?

Mental simulations require mental concentration. In fact, a frustrating aspect of RPD is that, given the opportunity and time to reflect on a poor decision in a classroom or during a critique, we would realize that it wouldn't work. However, if we don't complete the mental simulation soon after we make the decision, we won't recognize the flaw until it's too late.

How does that apply to the problem above? The company officer probably ordered the 1¾-inch line stretched because "it's what we always do." As a result, calling for a 1¾-inch line came as second nature to him.

What if that company officer then had been personally engaged in the stretching of that hoseline, forcing of doors or raising of ladders? He may not have been able to perform a mental simulation, leaving the flaw in his decision-making undiscovered until the line was flowing water but making no headway with the fire.

A case can be made that one of the chief officer's most important roles is to re-examine the decisions made by prior-arriving company officers. That's especially true for those officers who haven't been able to re-examine their decisions because of their personal involvement in firefighting activities or in light of changes in fireground conditions.

Command-level decisions

The significance of an incident commander making a poor decision when it comes to ordering a building evacuation or switching to a defensive mode is much more critical than a single company officer making a poor line selection decision. As a result, there's a genuine need to ensure that command level officers make good fireground decisions.

ICs today are confronted with a multitude of tasks that often must be accomplished simultaneously. What if an IC is overwhelmed with these tasks and can't perform the mental simulations necessary to consider the decisions he or she is making? In other words, what if the IC is simply too overwhelmed to concentrate?

The result is that the IC will be stuck with the Plan A version of each and every fireground decision, until such time that it either works or fails. Only then will the IC be confronted with the need to consider a Plan B. Fortunately, Klein's research demonstrates that the more expert we are, the more likely that Plan A will be workable.

Nevertheless, even experts don't have a guarantee that the first course of action which comes to mind will work. To avoid being too busy to run a mental simulation, incident commanders need the mental elbow room to debug their initial decisions. This can be accomplished by providing command-level officers with aides who can assist them in managing the incident. Aides can keep the IC from becoming overloaded and free up the IC's attention so that he or she can concentrate on more critical matters. [*Ed.: See "Command's right hand," March and April 2000, available at <www.firechief.com>.*]

Fireground commanders also can provide themselves with more mental elbow room by adhering to recognized span-of-control limits. Exceeding those limits immediately places the IC at risk of being overwhelmed by communications and demands from companies and personnel who require attention. Managing an effective span of control is critical to effective scene management, because it frees up the IC's concentration by limiting the amount of direct interaction.

Physical considerations

Although mental preparedness is paramount, we also must consider the physical environment in which an incident commander operates. While the command environment is often taken into account at larger incidents where a specialized command post vehicle may be brought in, it's just as important to consider the command environment at a smaller incident.

For example, ICs often can be found standing in the street outside a fire building amidst crowds of bystanders, police officers and others. While directing firefighting operations, they have to contend with the background noise of firefighting activities and bystanders who frequently, and often with good intentions, want to talk with the IC. Both of these can impair the IC's ability to concentrate.

Even when a more formalized command post is used, little consideration is

given as to how organizing that environment will help or hinder the IC's decision-making. Computers, handheld organizers, cellular telephones, fax machines, even simple command status boards have the potential to divert the attention of the IC away from where it needs to be focused.

Klein's research found that the environment can play a significant role in RPD, pointing to several tragic incidents where poor RPD choices led military personnel to mistakenly fire upon civilian aircraft or friendly forces.

Investigations into these incidents led to a better understanding of how the environment can influence decision-making, as well as how it can be improved. These environmental improvements included more user-friendly display screens, better graphical display of critical information and environments designed with extensive input from users.

In applying this information to the fire service, the addition of any procedure or tool to the command environment, regardless of how helpful it may seem, must be measured carefully in terms of its impact on the IC's decision-making. Tools that may work well in theory or in the classroom may fail in the field.

Without an understanding of RPD, the reasons for the tools' failure may be difficult to understand or accept. In short, the command environment must be organized to maximize the availability of information without overburdening the IC in managing it.

While my primary focus has been on *the implications of RPD on command* level officers, it shouldn't escape anyone's attention that RPD raises some serious implications for company officers and company staffing levels as well.

I frequently hear chiefs complain about the decision-making of company officers, particularly in regard to their line-selection decision at larger scale fires. Yet these chiefs fail to see how their own staffing decisions affect the decision-making of these company officers.

Officers in understaffed companies are frequently called on to engage in physical tasks immediately after making a fireground decision, such as line selection or line placement. Engaging in these physical tasks can be inconsistent with our expectations of them making good fireground decisions, because the company officers may be so involved with physical tasks they may not be able to conduct the mental simulation to re-examine their initial course of action.

With such simple examples as these, it's obvious that the implications of recognition-primed decision-making at all levels of our organizations are enormous.

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