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

FEMA

R227

Dear National Fire Academy Student:

We are looking forward to your arrival at the U.S. Fire Administration's National Fire Academy (NFA), as well as your participation in the *Fire Protection Systems for Emergency Operations* course.

A significant portion of the course will be devoted to pre-incident planning and related training activities. These assignments and activities require your active participation. You should be proficient in developing and delivering PowerPoint™ presentations.

You are asked to bring the following items with you for use in the course:

- A sample pre-incident plan of a target hazard in your community, preferably a plan already in use;
- Photographs* of the target hazard, including:
  - √ exterior views;
  - √ nearby streets and access points,
  - √ fire hydrants or water supply locations,
  - √ fire department connections,
  - √ fire alarm control panels,
  - √ fire sprinkler risers and pump rooms (if any),
  - √ specialty fire protection systems (if any), and
  - √ fire command rooms (if any).

*Be sure to obtain permission from the building owner or occupant before you take photographs. They may have proprietary business information they do not want shared.

Photographs should be in digital format (.jpg or .jpeg), if possible. If you have only prints, we do have the ability to scan them into a digital format for class.

Note that there are precourse reading materials following this letter. Please read and be familiar with this information before coming to class.

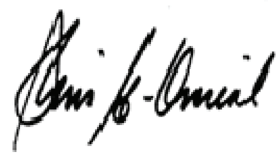
You must also complete *ICS-100, Introduction to ICS for Operational First Responders (Q462)* and *ICS-200, Basic ICS for Operational First Responders (Q463)*. Both courses can be found on our web site at http://www.nfaonline.dhs.gov. You should complete these courses before you arrive so you will be prepared for classroom activities.

It is important to note that this is a 6-day class, 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 a.m. with graduation occurring on Friday at 4 p.m. Because of this schedule, you will be provided lodging for Friday night. Evening classes may be required.

Increasing numbers of students and instructors are bringing laptop computers to campus. REMINDER: You alone are responsible for security and maintenance of your equipment. The Academy cannot provide you with computer software, hardware, or technical support to include disks, printers, scanners, etc. There is 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. Rob Neale, Fire Prevention Technical Curriculum Training Specialist at (301) 447-1209 or email at Robert.Neale@dhs.gov.

Sincerely,



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

UNIT 1: PURPOSE OF FIRE PROTECTION SYSTEMS

TERMINAL OBJECTIVE

The students will be able to recognize the value to the Incident Commander (IC) of prior knowledge of the fire protection systems in a building.

ENABLING OBJECTIVES

The students will:

1. *Identify components of common fire protection systems.*
2. *Identify 10 reasons for the use of fire protection systems.*
3. *List "indirect costs" that may result from a lawsuit against the fire department.*

FIRE PROTECTION SYSTEMS

Fire service professionals need to embrace the importance of being as prepared as possible to deal with fires and other emergencies that may occur in buildings and facilities they are responsible for protecting. This can be accomplished through a well-developed preincident planning process that helps develop and maintain current knowledge of the systems that are installed in buildings to help firefighters better deal with these emergencies.

Fire protection systems may be useful in other emergencies, too. For example, a smoke management system may be an effective tool to remove toxic fumes released during a terrorist attack. A ***total flooding*** carbon dioxide system might be used to render inert an environment containing a mixture of ***pyrophoric*** chemicals before they burst into flame. A ***water spray system*** may make an effective emergency decontamination device.

PURPOSE OF FIRE PROTECTION SYSTEMS

What is the purpose of built-in fire protection systems? While the obvious answer may seem to be, "they are provided to detect or control a fire to protect life and property," there is much more that should be considered. Fire protection systems are only one means to achieve the strategic goal of protecting lives and property.

As you will learn in this course, large numbers of fire protection systems are employed today. They range from simple ***residential sprinklers*** to highly sophisticated integrated detection, suppression, and smoke control systems. This course will focus on those most important to the Incident Commander (IC) to achieve strategic and tactical success at an event.

Fire protection systems provide substantial value in the community's overall fire protection scheme that includes fire prevention, code enforcement, fire suppression operations, and public fire safety education.

The following sections are just some of the purposes related to fire protection systems:

Life Safety

Fire protection systems enhance the chance that a person will survive a fire in a building. The advent of the home smoke alarm, although not truly a "system," has reduced the number of residential fire deaths and injuries dramatically in just one generation.

Fire protection systems help safeguard those who can't protect themselves: persons who are institutionalized or can't escape a fire on their own. Consider the fire protection requirements for hospitals, nursing homes, prisons, reformatories, nurseries, and similar occupancy uses. They are designed and installed to "defend in place" because the infirm, the very old, the very young, and those who are incarcerated may not be capable of self-preservation. Unlike us, they cannot just get up and leave the building when it's on fire.

Risk Mitigation

All communities have target hazards in their built environments. Whether it's a large manufacturing facility, a hazardous materials rail transfer yard, a ***highrise*** apartment, or even a remotely located neighborhood of single-family dwellings, these target hazards provide a challenge to the local fire forces. Fire protection systems can provide a level of immediate protection that even the best staffed and equipped fire department cannot.

Firefighter Safety

When designed, installed, and maintained properly, fire protection systems enhance firefighter safety. Whether it's early notification during the incipient stages of a fire, or fire control through automatic suppression equipment, fire protection systems add another safety margin for those who put their lives at risk entering buildings that are on fire.

Design Latitude

Architects, builders, and owners are always looking for ways to achieve cost-effective construction and design latitude. Fire protection systems can do that.

For example, in the ***model building codes***, a building's allowable size (based on use and type of construction) can be tripled if an automatic sprinkler system is installed. Likewise, in some occupancies, corridor walls, ceilings, and doors don't have to meet ***fire-resistive ratings*** if the building is sprinklered. An otherwise noncombustible building can be reclassified by the building official as "1-hour fire resistive" by the installation of a sprinkler system.

All of these options can reduce costs and increase design latitude for the owner.

Conflagration Control

Historically, building codes were adopted to prevent conflagrations in cities where closely spaced buildings created a threat from exposure fires and burning embers. Fire protection systems help confine fires to the room or building of origin, thus minimizing the likelihood of a major fire spreading from building to building.

Firefighter Efficiency

Many fire protection systems are installed to improve firefighter efficiency and effectiveness. Standpipe systems, for example, transport water to the upper stories of buildings so firefighters don't have to stretch long hose lays. Fire department connections to sprinklers and standpipes provide a convenient method for the firefighter to supplement water pressure and volume. Stationary fire pumps can be used strategically as an additional water supply, almost like adding another pumper to the fire scene.

Community Economic Health

Those communities that have suffered a major fire in their primary industrial or retail core, with the correlating loss of jobs, business, and tax revenues, know the value of fire protection systems. Keeping businesses viable and operational 24 hours a day is an essential part of the community's overall economic health and vitality.

For example, in the 1980's, two major hotel fires in Las Vegas, Nevada, caused a significant drop in tourist and casino revenues. The Nevada State legislature adopted a comprehensive, mandatory sprinkler retrofit law as a result of the fires, hoping to attract tourism back to the area. Now, no casinos or hotels are built without substantial fire protection features.

Cost Sharing

Many communities are faced with increased costs for municipal services. Law enforcement, garbage collection, water and sewer fees, and fire suppression costs continue to rise as equipment, fuel, and other consumables, and labor costs rise as well.

Built-in fire protection systems can be a cost-effective hedge against increased municipal costs. Many of the cities that have adopted mandatory sprinkler ordinances realize that as new construction arrives, it brings additional risks. Building owners and occupants should be responsible for sharing the costs of protecting that risk.

Durable Built Infrastructure

How many buildings constructed during the late 1800's and early 1900's survive today? In older communities, what is the leading threat to these structures? Fire.

As communities recognize the value of these older structures, and the importance of protecting new ones, built-in fire protection systems give them yet another tool to protect these buildings. Drive through any older city's downtown core, and you can see parking lots where buildings once stood. Look closely at the adjacent buildings, and often you can see smoke stains and fire damage on the exterior: lasting marks of the fire that destroyed the building where the parking lot now stands.

Communities recognize that rehabilitated structures, new buildings, and those under construction have more value than paved parking lots.

Historic and Cultural Resources

Not many people remember that in the late 1940's a basement fire in the White House in Washington, DC, forced President Harry S Truman and his family out of the building while significant repairs were made. One item was added during the repairs: an automatic sprinkler system.

America is blessed with significant historic, cultural, and social resources that define our Nation. Losing these to a fire can have long-lasting cultural implications.

Even structures that may not be historically significant but are destroyed by fire can affect a community's well-being. Look at the impact on a rural area if the region's only high school burns to the ground. Talk to churchgoers who have lost their houses of worship, and ask them how the incident affected them.

Crime Control

While the benefit of fire protection systems to deter or control arson fires is obvious, there is another, less apparent benefit. Buildings that have been damaged severely by fires often become havens for criminals: drug dealers, prostitutes, gang members, and others congregate in abandoned buildings out of the community's view. While the crimes that may occur here are considered social problems, they are related indirectly to the result of the fire: a crumbling built environment that could have been better protected from fire.

Less obvious, but certainly of contemporary concern, is the usefulness of built-in fire protection as a terrorism deterrent or mitigating factor. Given a choice between attacking an occupied structure without any fire protection, and one that is thoroughly protected with detection, suppression, and control features, a terrorist is likely to select the former because he or she will see more significant damage to achieve his/her political aims.

Environmental Hazard Control

Every day, more and more hazardous materials are developed, manufactured, and introduced into our environment. Unfortunately, during fires, some of these environmental threats escape, causing air, water, and ground pollution.

Adequate fire protection, in conjunction with appropriate hazardous materials mitigation measures, can minimize the likelihood of unwanted environmental contamination.

Acceptable Level of Risk

Municipal governments must assess ***risk*** on a daily basis. As risks increase, more and more resources are diverted in response.

Local governments can minimize risk and mitigate its consequences by requiring built-in fire protection. By mandating early detection and automatic suppression, municipal leaders are saying they are not willing to accept the risk of major fires with the correlated risk to people, property, jobs, tax base, the environment, and the infrastructure.

Development Disincentives

Unfortunately, some jurisdictions mandate fire protection equipment as a disincentive to development. The argument is that if the city or county forces additional costs onto a developer or builder, the project proponent will get discouraged and take the proposed development elsewhere.

Eliminate Human Error

There is an old saying in the fire protection field that the three leading causes of fires are men, women, and children. While intended to be humorous, the statement illustrates the fact that as humans interact with their environment, the fire risks increase. This is true in the home, at work, or outdoors.

A properly designed and well-maintained fire protection system may eliminate--or mitigate--the impact of that human error.

DIRECT AND INDIRECT LOSSES

Historically, the fire service has tracked life and property losses attributed directly to fires. Lives lost, injuries sustained, and property that has been damaged or destroyed (structures and contents) are common factors reported in local or ***National Fire Incident Reporting System (NFIRS)*** data categories.

These data quantify America's fire problem, and provide impetus for change. Fire officials and others strive to reduce the number of fire deaths, injuries, and property damage totals that occur locally and across the country.

Indirect Losses

Although direct losses provide a yardstick for measuring the scope of the work ahead, **indirect** losses also measure fire's impact on a community. Indirect losses are those social and economic costs that may not appear on a tally sheet or NFIRS report.

The list of indirect losses may be long depending upon the nature and extent of a fire, but here are just a few:

Property Insurance Costs

Anyone who has suffered more than one motor vehicle accident in a short time period knows what happens to personal insurance rates: They rise. The same is true for fire insurance rates. However, not only will an individual's property insurance rates rise due to continued losses, a community's overall insurance rating will be affected too. Insurance companies may be reluctant to write policies in communities that suffer a number of fires--especially large commercial losses--and may increase premium costs to protect their risk.

Medical and Funeral Costs

Special medical care provided for fire victims can easily cost hundreds of thousands of dollars. Emergency room treatments and specialized on-going care in hyperbaric facilities or burn units is expensive. Patients treated at that level of care often take months or years to recover from the physical injuries they suffer.

Likewise, funeral costs for those who expire from fire-related injuries may cost tens of thousands of dollars. These are "costs" that don't appear in the direct fire loss statistics.

Public Safety Tax Costs

Although jurisdictions normally budget and may tax for their overall fire protection service costs (personnel, apparatus, tools and equipment, supplies, etc.), there are times when the predicted expenditures are exceeded. If a fire apparatus is destroyed by a falling wall or radiant heat, is its replacement price added to the fire loss statistics? Are overtime costs included for large fire responses? Do we include the cost of response from mutual- or automatic-aid companies? How about the amount of water that is used to suppress the fire, or even the wear and tear on public streets as we respond to the incident?

All of these items have a "cost" associated with them that seldom, if ever, is included in the direct fire loss statistics.

Lost Tax and Business Revenue

Many communities in America are "company towns" that rely on one or more large companies to sustain the local income. If a significant business is destroyed, the tax revenue that the community collected is gone too. The result may be severe cutbacks in community services, or increased taxes distributed across other sectors of the jurisdiction to make up for the lost revenue.

Business income, the lifeblood of any enterprise, disappears when the business operation is out of service. Many companies that suffer fires never recover and go bankrupt or simply close their doors forever.

Lost Business Opportunities and Jobs

Devastating fires in commercial occupancies, no matter how small the business, often have significant impacts on the business. Employees who report to work find they have nowhere to go, and may have to apply for unemployment benefits. Skilled laborers may be lost to other companies. Suppliers lose a customer in the form of the business that burned, and--if the damaged business supplied others--it, in turn, may permanently lose a client.

Psychosocial Impacts

There are some indirect losses that can't be calculated on a ledger sheet. When a community loses a school, church, historic building, or other cultural significant artifact, the social impact can be devastating. When a family or large number of people dies in a single fire, the emotional effect ripples through a community.

Environmental Damage

Smoke contributes to air pollution, and fire control runoff may contaminate ground water or nearby waterways. Despite our best efforts to control pollutants resulting from an unwanted fire, there always will be some environmental damage. The scope and cost of this damage may not be evident for years, and seldom is included in the fire loss data that is accumulated shortly after an incident.

Lawsuits Arising From Losses

More and more, property insurance companies and other "injured" parties want to recover the money they pay for insurance claims or related damages. Negotiated settlements and lawsuits occur every day to restore money lost from a fire.

Historically, fire departments were "off limits" from lawsuits: They were protected by either law or courtesy. In recent years, however, fire departments and municipalities are viewed as "deep pockets" in lawsuits. If an aggrieved person or company can recover damages from the jurisdiction, the settlement must be paid by the taxpayers. Lawsuits usually do not involve a building's potential for fire or building code violations; instead they are more likely to involve fire department operations at an incident.

POTENTIAL FIRE DEPARTMENT LIABILITIES

There are many potential legal issues related to the fire department and IC's knowledge and use of fire protection systems during an emergency.

The IC should know that people always will "second-guess" command decisions made under the duress of an emergency. Was the IC aware of the fire protection system? Did he or she use it effectively and in accordance with national standards and practices? Did the system operate as designed? Did the decision to ignore or use it affect the incident outcome? Was the loss less or greater due to the fire department's use of the fire protection features? Sometimes, this second-guessing evolves into litigation that involves the local fire services.

As illustrated in the following article, the Montreal, Canada, Fire Department was held partially liable for a substantial fire loss in a highrise building.

Appeals Court Upholds $58-million Award for High-rise Fire

A Quebec (Canada) appeals court upheld a multi-million dollar trial court verdict that a building owner and city firefighters must share the blame for a huge fire in a Montreal high-rise office tower.

The October 1986 fire at the Alexis Nihon Plaza was the most serious fire ever in Canada. Insurance companies who wanted to recover some of the claims they paid out launched the $32.2-million lawsuit.

The fire, which broke out on Sunday evening, raged for thirteen hours because firefighters were unable to get enough water up to the tenth floor of the building. They couldn't find the outside connection to the standpipe system, which was incorrectly labeled "sprinkler system." Unable to find the right pipe, firefighters put so much pressure on another connection that it broke, according to a lawyer involved in the case. The upper floors from 10 to 16 were burning, while stores in the retail concourse were being flooded.

The trial court ruled that Alexis Nihon Plaza should have remedied the problem and should have routinely checked the system. Accordingly, the building owner was held liable for 75 percent of the damages.

But because the City of Montreal's fire department had known for more than three years that the sprinkler connection was mislabeled, they were held liable for 25 percent of the damages.

> The trial court fixed damages to the building and its occupants at $22.2 million. The appeals court found no fault with the ruling of the trial court judge and upheld the findings of the lower court. With legal bills and 16 years of pre- and post-judgment interest, damages now exceed $58 million.

As more and more structures are outfitted with fire protection systems--some of which may be very complex--the fire department must increase its knowledge of these systems to use them for effective incident outcomes.

TYPES OF FIRE PROTECTION SYSTEMS

Two types of fire protection systems are installed in buildings, based on the codes adopted by the local community. These sometimes are referred to as being either ***Active Systems*** or ***Passive Features***.

Active Systems

Active systems generally are considered to be those that a fire company will use during a fire emergency. A wide variety of systems and designs usually are matched to specific hazards. As you can see from the following list of terms, there is a lot to know about the number and types of systems, how they operate, and their capabilities and limitations. It takes many years of study and experience to be proficient with all aspects of active fire protection systems. They include

- fire sprinkler systems:
  - ***wet pipe***:
    - ***alarm check valve***, and
    - ***shotgun risers***;
  - ***dry pipe***:
    - ***accelerator***, and
    - ***exhauster***;
  - ***preaction***:
    - ***single interlock***, and
    - ***dual interlock***;
  - ***deluge***;
  - ***foam***: ***water***:
    - high, medium, and low expansion; and
    - antifreeze;

- standpipe systems:
  - ***automatic standpipe***,
  - ***semiautomatic standpipe***,
  - ***manual standpipe***,
  - ***Class I***,
  - ***Class II***,
  - ***Class III***,
  - ***single zone***, and
  - ***multiple zone***;

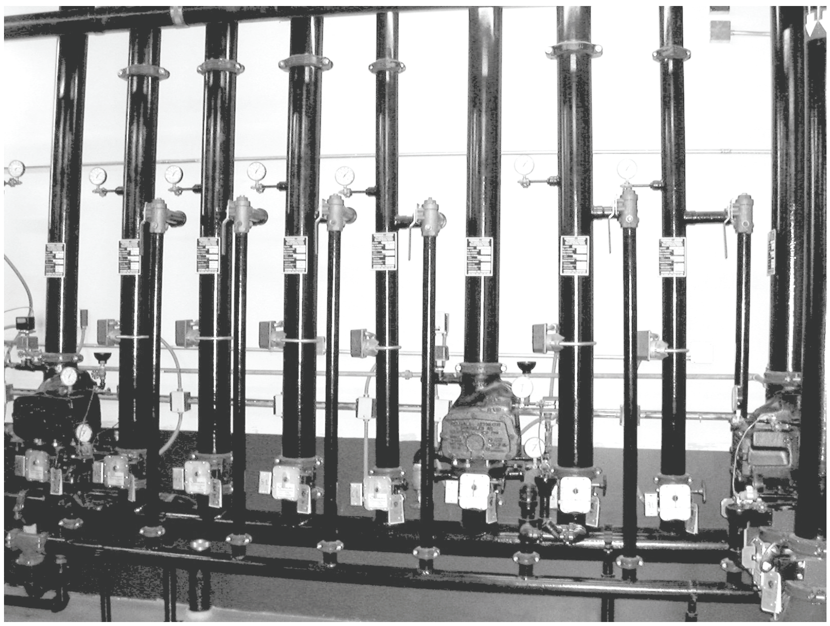


Figure 1-1
Sprinkler risers in the Venetian Hotel, Las Vegas, are an example of active fire protection systems.

- ***stationary fire pumps***:
  - ***single stage***,
  - ***multistage***,
  - ***electric drive***,
  - ***diesel drive***,
  - ***steam drive***, and
  - ***controllers***;
- ***fire alarm systems***:
  - ***manual***,
  - ***automatic***,
  - ***zoned***, and
  - ***addressable***;

- ***smoke management systems***:
  - ***dedicated***,
  - ***nondedicated***,
  - ***pressure method***, and
  - ***exhaust method***;
- ***specialty fire protection systems***:
  - ***spot applications***,
  - ***total flooding***,
  - ***Halon™***,
  - ***clean agents***,
  - ***Inergen®***, ***FM 200®***,
  - ***carbon dioxide***,
  - ***high or low pressure***,
  - ***hand-held hose***,
  - ***dry chemical***,
  - ***sodium bicarbonate, potassium bicarbonate***,
  - ***wet chemical***,
  - ***potassium carbonate***, ***potassium acetate***, and
  - ***high- or low-pressure water mist***.

It is important for IC's to understand that many automatic fire protection systems are engineered and installed to suppress a fire effectively without human intervention. This means the IC should be thoroughly familiar with the systems (and let them do their jobs as designed) before employing traditional manual suppression strategies and tactics.

Passive Systems or Features

Passive systems or features are structural elements that, when properly installed and maintained, assist in the control of fire and smoke movement in a building and contribute to the structural stability of a building under fire conditions. These systems include, but are not limited to:

- ***firewalls***;
- fire-rated ***floor and ceiling assemblies***;
- other fire assemblies (e.g., ***fire doors***, ***fire dampers***, rated exit corridors); and
- ***firestopping***, ***draft stops***, ***draft curtains***, and ***fire safing***.

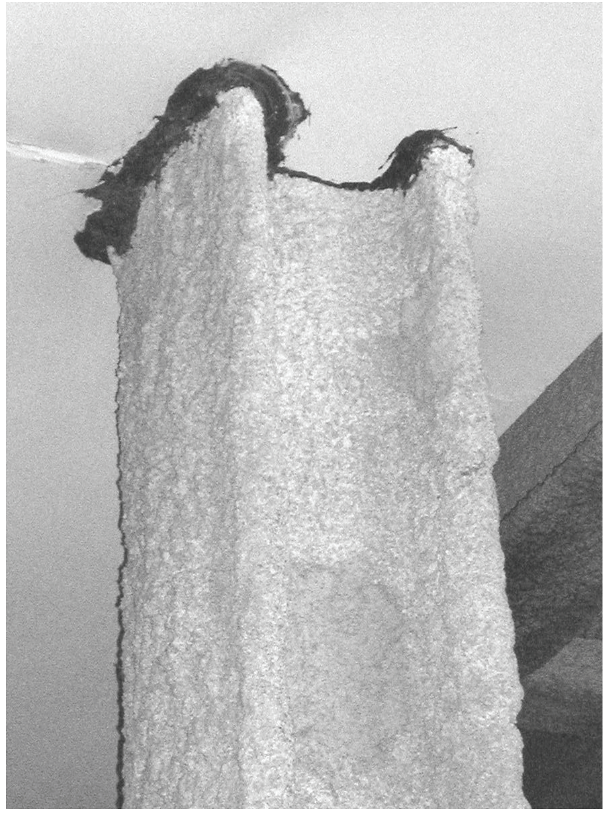


Figure 1-2
Spray-on fireproofing and smoke-seal caulking are two examples of *passive* fire protection.

SUMMARY

The purpose of this course is to provide IC's with fundamental information on fire protection systems and construction features, their components, and how they function to mitigate or control a fire or other emergency. The foundation for identifying and documenting this information is the PIP process. This is where we will start our journey to understand the capabilities and limitations of fire protection systems.

UNIT 2: DECISIONMAKING

TERMINAL OBJECTIVE

The students will be able to recognize the importance of preincident planning in making appropriate decisions in specific emergency situations.

ENABLING OBJECTIVES

The students will:

4. Distinguish between classical and naturalistic decisionmaking.

2. Determine when to use each approach.

INTRODUCTION

Decisionmaking is an integral part of every Incident Commander's (IC's) responsibilities. The process each IC goes through has been studied and evaluated, and research has shown that what the IC decides to do is based on knowledge gathered from training, experience, case studies, conversations with officers who have had relevant experiences, and pre-incident planning, which is the focus of this course. We use a cue-based decisionmaking process that employs the ***Primary Factors Chart*** (discussed in Unit 3: Benefits of Preincident Planning).

Two primary methods are used by incident scene decisionmakers to reach conclusions, determine results, and initiate actions. They are the classical method and the Naturalistic Decisionmaking Method (NDM).

CLASSICAL DECISIONMAKING

The classical decisionmaking method is a time-consuming process where the decisionmaker:

- gathers information;
- analyzes the information;
- determines the problems that are present, and selects and prioritizes those problems in order of importance;
- identifies and prioritizes the possible solutions;
- selects tactics from one or more possible options; and
- issues directives to have the tactics implemented.

The Command Sequence

Over time, the use of this system--called the **command sequence**--becomes a habit. When this happens, the Company Officer (CO) tends to use the technique under unfamiliar emergency conditions, thus structuring the decisionmaking process and reducing stress.

Using the command sequence also helps the CO stay proactive. The IC may use the steps to anticipate upcoming or urgent needs.

Using the Classical Method in Training

Decisionmakers need the classical method when they are in the training mode. In the training mode, they will be taught to look for cues, draw conclusions, consider results, and take action for an incident type not previously learned, or learned incorrectly.

Whether the cues, conclusions, results, and actions are learned must be tested in an application format. Such a format can be an exercise or simulation, provided by an expert in the specific incident type. For example, an urban or city fire officer would learn wildland firefighting techniques from a wildland expert.

Using the Classical Method in Evaluation and Planning

The classical decisionmaking method also is used for evaluating and planning when time is not a factor.

Decisionmakers need to use the classical method when they are evaluating and comparing the critical cues used, conclusions and results determined, and actions taken by other decisionmakers.

This form of training typically employs case studies. Here, the student uses a case study to examine the obvious and subtle cue differences. The examination provides optional conclusions, results, and actions based on the cue differences. By using a case study and the classical method, students are able to evaluate whether or not the cues match the conclusions and actions of the decisionmaker at the actual scene. If they do not, then students will learn specific actions to avoid.

Using the Classical Method at an Emergency

It is appropriate to use the classical decisionmaking method at an actual incident scene where there has been little or no previous experience or training with this specific incident type, or with the variables that are present at an incident. The decisionmaker must formulate a basic plan before directing tactical actions. A process that does not include an evaluation of the incident information, a risk/benefit analysis, and appropriate strategies and tactics is not a plan--it is a design for disaster.

Base the plan on incident information (critical cues), real problems, and appropriate broad solutions (strategies). Choose the best solutions (tactics) from several options.

NATURALISTIC DECISIONMAKING

The NDM is a more rapid and intuitive process in which the decisionmaker very quickly:

- looks for certain critical cues (visual, audio, touch, smell);
- conducts a sizeup;
- relates the critical cues to previous similar situations (from experience or training);
- recalls the previous conclusion, results, and actions that most fit the new situation; and
- issues directives to have the tactics implemented.

Obviously, basing decisions on the understanding gained from previous experience can produce results much faster than following the step-by-step classical process.

The Role of Experience in NDM

The more experience the fire officer has had on similar types of incidents, the greater his or her ability will be to read the subtle differences at the incident, draw refined conclusions, and direct the most appropriate actions to provide a solution.

Also, the more familiar an IC is with a building, the better able he or she will be to make appropriate decisions at a fire event involving the building. Using preincident plan information and having a working knowledge of the building's fire protection systems will help the IC to make better decisions. Preincident planning is an important part of NDM.

When to Use NDM

An IC will use NDM when he or she has adequate experience or training on the incident type, or on the variables within the incident type. This method relies on an almost instantaneous recall of previously learned conclusions, results, and actions. It includes the interrelationships of specific information with conclusions, results, and actions based on whether or not they worked before. Therefore, it provides a direct, lightning-fast transition from what the IC sees, hears, feels, and smells to conclusions and resulting actions.

Time-Sensitive Nature of Decisionmaking

Because of the time-sensitive nature of emergency-scene decisionmaking, the choice between naturalistic and classical will not be conscious. The decisionmaker's brain will attempt NDM first. This is the way the brain operates, even though the decisionmaker is not aware of it.

The decisionmaker must recognize when he/she possesses insufficient information to use this method. Some cues for this recognition are

- It is obvious to the decisionmaker that there has been little or no experience or training on the specific incident type.

- The decisionmaker recognizes that the incident cues are very unfamiliar and do not immediately result in appropriate action decisions.

- The decisionmaker feels lost or overwhelmed, cannot think, or is in a panic. In these cases, the classical method is the appropriate response.

By recognizing these cues, the decisionmaker can determine that he or she needs to convert to a different decisionmaking method. That is the classical method. If this conversion is not done, the decisionmaker often is left with what has sometimes been called "brain-lock."

Continuing Sizeup

If NDM was used on the incident scene, the decisionmaker still will use the classical method to evaluate the actions taken using NDM, to ensure that what is being done is achieving the desired result. This is called **continuing sizeup**.

The IC asks such questions as:

- Is what I have directed to be accomplished actually solving the problems?

- Is the information I am receiving from other officers consistent with what I know, and what the preplan says about this building?

SUMMARY

Classical decisionmaking requires time and is best used in training, post-event evaluation, and preincident planning. It is used at a fire scene only if necessary knowledge and experience are lacking. However, the knowledge and experience acquired in preincident planning and training are keys to being able to make critical decisions using NDM at a fire.

UNIT 3:
PREINCIDENT PLANNING BENEFITS

TERMINAL OBJECTIVE

The students will be able to describe the benefits of preincident planning and the relationship between these activities and the effective use of fire protection systems.

ENABLING OBJECTIVES

The students will:

1. *Describe the key factors evaluated in a preincident plan.*
2. *Describe how preincident plans are used before, during, and after a fire.*
3. *Identify a list of information sources for completing preincident plans.*

PREINCIDENT PLANNING

Noted fire protection specialist and author Francis Brannigan often repeats the quote "The building is your enemy. Know your enemy! Know your building!" This phrase is his way of warning fire service personnel of the importance of gathering good information before an event ends in disaster.

Clyde Pfisterer, a 46-year veteran of the Indianapolis Fire Department, reminds firefighters that if "you don't control the building, the building will control you."

Collecting information about your enemy is known as "intelligence gathering." In this era of terrorist threats from chemical, biological, nuclear, and explosive or incendiary hazards, the fire service must be vigilant about intelligence gathering. "Infrastructure protection" refers to guarding the essential functions and built environment that sustain our way of life and economy. Thus, preincident planning describes the means of infrastructure protection intelligence gathering: the process of information collection, sorting, evaluation, and dissemination of facts, probabilities, and mitigating factors relating to all hazard emergencies in buildings or facilities.

Effective fireground operations depend on the Incident Commander (IC) developing good objectives, strategies, and tactics (OST's). IC's develop OST's for virtually every incident to which they respond. Sometimes we don't realize we are doing this, but it is a mental process that is inherent in essentially all fireground commanders, whether they are chief officers, Company Officers (CO's), or acting CO's.

A quality preincident planning process will greatly assist a fire officer/IC in developing good OST's. Using established preincident planning forms to document important information on a particular target hazard lays the foundation for developing quality OST's. The next step is to capture this information in a format that will be readily available to the IC, prior to and on arrival at a fire in a particular building or hazard.

Two National Fire Protection Association (NFPA) Standards, 1710, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments;* and NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments* strongly emphasize the need for formal **preincident planning** efforts.

As IC's we must continuously reflect on the importance of the role we play in successful incident outcomes. Therefore, we must ask ourselves:

- Why is it important to have an IC for an emergency?

- Have you ever had a fire where quicker, more effective use of the building's fire protection system would have aided in the outcome?

- Where do **you** get your information on a building's fire protection systems, and how is this information kept for future reference?

- What are some the building fire protection systems that IC's likely would use during a fire?

- What are the benefits of preincident knowledge on fire protection system locations, what they do, how they operate, and what limitations they pose when managing a fire?

- Where do preincident planning and fire protection systems knowledge merge?

- Do you, as a potential fireground commander, have a method to identify control OST's for use at incidents involving target hazards?

- How and where do you document your preincident plan information?

VALUE OF PREINCIDENT PLANNING

Most fire departments conduct some form of preincident planning or hazard assessment. The question one must ask is "How well do we (my agency, my company) conduct this planning process?"--and, more importantly, "How effective are we at using this information in emergency situations?"

IDENTIFYING TARGET HAZARDS

Although familiarity with all structures in a district is important, an emphasis on target hazards should be the top priority. In the National Fire Academy (NFA) course Command and Control of Fire Department Operations at Target Hazards, a target hazard is defined as:

> Any building or potential incident site (e.g., outside hazardous materials storage site, bulk fuel storage facility) that has the potential for significant life loss, high property dollar loss, and/or the ability to overwhelm local resources.

Some examples of target hazards identified in the NFA course are nursing homes/convalescent homes/human care facilities, educational institutions (including colleges and universities), penal institutions, bulk storage facilities, grain elevators, large public assembly occupancies (churches, theaters, airport, bus and train terminals), buildings under construction, large mercantile occupancies (malls), highrise and midrise buildings, and large manufacturing and storage facilities (e.g., mill buildings).

Buildings or facilities need not be large to overwhelm an agency's resources. This definition makes every department in the country responsible for some type of target hazard. A fire in a midrise building (three to six stories) might not tax the resources of the Fire Department of New York City, but a small community in a rural area with two three-person engines and a two-person truck--and outside help 20 to 30 minutes away--likely would find a fire in this type of facility tremendously taxing.

The fire service needs to embrace the importance of becoming familiar with target hazard occupancies in response areas. There are documented fires where a lack of knowledge regarding fire protection systems, or a failure to properly use them resulted in fires getting out of control and seriously damaging or destroying buildings.

Preincident preparation will not eliminate the challenges presented by target hazards, but it will set the stage for how an officer--as IC--will prioritize fireground operations at all three incident management levels: **setting incident objectives, prioritizing incident strategies,** and **developing and implementing incident tactical operations**.

Figure 3-1(a)

For a Small Community, a Target Hazard may be a Historic Building

Figure 3-1(b)

A Hazardous Materials Tank Farm Nearly Always is a Target Hazard

Figure 3-1(c)

Highrise Buildings Are a Challenge for Any Agency

The preincident planning process is critical to successful outcomes in a challenging situation. Fire officers always must remember that they start out working behind, because the incident has already started and gained headway prior to being reported.

The methods officers can use to help catch up are quality preparation, pre-identification of the challenges a building presents, and a working knowledge of the support systems it contains that can help manage the control process.

DATA GATHERING FOR THE PREINCIDENT PLAN

Knowledge of a building's fire protection systems will aid in the decision-making process, provide a safer climate for firefighters to work in, and ultimately should lead to better outcomes. It is the goal of every firefighter when he or she responds to a fire emergency to prevent loss of life, minimize property damage, and assist the building owner in resuming normal operations as soon as possible after the fire. Knowing a building's fire protection systems, how they operate, their operational readiness, and how to secure them and then placing them back in service are all keys to these better outcomes. It is part of our responsibility, and we must become more proficient in this area.

THE PREINCIDENT PLANNING PROCESS

The Formal Process: Completing Forms

Preincident planning takes on essentially two different forms. The first is the more formal process, which involves the use of forms developed for this purpose (those found in NFPA 1620, Recommended Practices for Pre-Incident Planning, the NFA Quick Action Prefire Plan (QAP) Form, or other forms adopted by your organization). This method involves the documentation of critical information related to a building's occupancy and use, construction, systems, utilities, access, and other information vital to effective emergency operations.

The Informal Process: The Walkthrough

The second form of preincident planning is less formal, but very important. It involves a crew walking through a building, reviewing the documented preincident planning information for changes or alterations, and noting these changes. This process allows a company to maintain its knowledge of a building, and to look for and identify any deficiencies in the building's fire protection systems that may have happened since the last walkthrough.

Another valuable use of and reinforcement of the information gathered during preincident planning is to conduct drills at these critical facilities. This allows emergency responders to apply the knowledge they have obtained during the building preincident planning visit and to test their knowledge of the systems, their locations, and how they fit into the overall emergency operations plan.

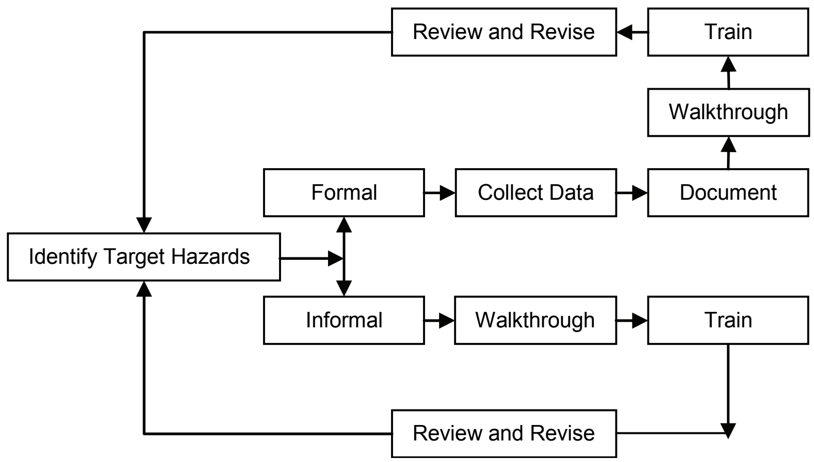


Figure 3-2
The Preincident Planning Process

LOCATION OF THE PREINCIDENT PLAN

In general terms, the fire service has established that preincident planning is a normal function for emergency response units. Engine and truck companies go through an information gathering process and develop these plans, most often in written form, and they are carried on engines and trucks for use during a fire. Some departments have gone so far as to put these plans in a database that can be accessed through a unit's mobile data terminal. This is generally where the process ends.

Technology is available for the drawing, storage, and retrieval of preincident plan information. Although somewhat costly, these programs, working in conjunction with apparatus mobile data terminals (MDT's), have proven very valuable in many communities. Since many communities already have the data available, it is a matter of developing, formatting, and programming the information into a computerized database that can be retrieved using MDT's in the field.

Some of these electronic programs include

- Microsoft Visio®;
- CAD Zone Fire Zone® or First Look PRO®;
- Pictometry Visual Intelligence®;
- ESRI Arcview®; and
- Mapping Solutions FireBase®.

It must be clearly understood that multiple units respond to these same buildings on the same or different shifts, or even from other jurisdictions. The officers and personnel on these crews need to be familiar with the fire protection components of these buildings. One cannot assume that the same units or the same personnel will always be at the fire when it occurs. Sharing the preincident information and having periodic drills at the more critical buildings are two keys to effective outcomes when fires happen in these buildings.

Fire departments should consider their particular needs when purchasing computerized preincident planning tools, but not forget they should consider the potential need to share this information with neighboring agencies.

Departments also must consider how they expect to share preincident plans with incoming apparatus and mutual-aid companies during an emergency. Is there an adequate number of current paper copies available for all key personnel? If stored electronically, how can they be retrieved and shared? Are all companies working on like radio frequencies (a key to interoperability) that can transmit or receive data? Are fax machines or other printing devices ready to download plans? Is there an adequate supply of paper and printing cartridges? These and similar contingencies should be resolved before an incident, not while the IC is standing in front of a burning structure asking for help.

PREINCIDENT PLANNING TOOLS

The preincident planning process is outlined in the nationally recognized document NFPA 1620. It is strongly recommended that it be used as the basis for preincident planning.

The major factors that should be evaluated during preincident planning as listed in NFPA 1620 are

- construction;
- occupant characteristics;
- protection systems;
- capability of public or industrial response personnel;
- availability of mutual aid;
- water supply; and
- exposure factors.

As of the writing of this course, the NFPA committee on NFPA 1620 has recommended moving this document from a ***Recommended Practice***, to a ***Standard***. The committee is attempting to make the change outside of the normal 3-year cycle (within the next 3 years), but has not completed the draft document as of the development of this course.

If the committee moves forward with this recommendation and it is approved on the floor during NFPA's hearings, the new Standard will require that those jurisdictions that adopt 1620 either by reference or specific reference during the code adoption process will be required to follow this Standard, or be exposed to significant legal liability for failure to do so.

As demonstrated in the Appeals Court ruling in Canada for the Montreal, Quebec, Alexis Nihon Plaza highrise fire, fire departments are being held to a higher standard than ever before for knowing how to properly use fire protection systems in buildings. Because local jurisdictions require these systems to be installed as part of the construction process, and then to be properly maintained for use under fire conditions, it is imperative that fire departments throughout this country evaluate the readiness of these systems and know in advance of a fire how to properly use them.

Proper preincident planning will greatly assist departments in adhering to these expectations and help avoid the liability that might arise if a department has difficulty with system components during a fire emergency.

The plan should be developed in consultation with other professionals involved in the site or facility development, such as fire protection engineers, sprinkler contractors, building architects or engineers, water authorities, and insurance professionals, as well as by conducting site surveys. Other sources such as governmental agencies should be consulted for existing emergency plans they might require.

Historical information on similar occupancies involved in emergencies should be reviewed for issues that could cause problems in the structure being surveyed. The information should be recorded based on what information is needed and how it is to be used.

NFPA 1620 Recommendations

NFPA 1620 also says, "The preincident plan should be coordinated with an incident management system," which is also an essential element of this course. NFPA 1620 also recommends that the preincident planning process should begin before construction and actual occupancy of the building. The use of training for developing familiarity with the plan, with an emphasis on those portions of the plan that involve unique or unusual evolutions or operations, also is highlighted.

NFPA 1620 recommends that "The preincident plan should be the foundation for decision-making during an emergency situation and provide important data that will assist the incident commander in developing appropriate strategies and tactics for managing the incident. The preincident plan should help responding personnel identify critical factors that will affect the ultimate outcome of the incident, including personnel safety."

Primary Factors Chart

The NFA has developed a form called the Primary Factors Chart, for use by fireground commanders in developing their OST's. The Primary Factors Chart is a quick reference guide for managing a fire incident. When used in conjunction with, and completed during preincident planning, it becomes an even more meaningful tool.

A second version of the Primary Factors Chart has been developed for incidents involving hazardous materials or hazardous materials sites. The appropriate form to use should be based on what hazardous conditions will confront the IC. Both charts are shown in Appendix B to this unit.

How the Primary Factors Chart is Used

The Primary Factors Chart is a tool that can be used by command officers to help organize and manage an emergency incident, and some of this work can be done before the incident, or during the preincident planning process. When used as a preincident planning tool, the Primary Factors Chart gives the IC the foundation for dealing with the incident, without having to process a significant amount of information under very trying and hectic circumstances.

The Primary Factors Chart is divided into four areas. The first, or column #1, lists the **Pertinent Factors** about a building or hazard area, and includes consideration for life safety, building properties and exposures, auxiliary appliances (fire protection systems), and weather.

Column #2 is set aside for establishing **Incident Objectives** and, although final objectives cannot be developed until the real incident occurs, objectives based on critical pertinent factors, such as supplying sprinkler and standpipe connections and knowing the location of fire alarm ***annunciator*** panels, can be critical to effective early emergency operations.

Column #3 is dedicated to **Strategies**; planning these strategies based on the **Pertinent Factors** listed in Column #1 will assist in managing the flow of the incident to a successful conclusion.

Column #4 is set aside to remind the IC to evaluate the effectiveness of his or her strategies continually in meeting overall incident objectives.

Types of Issues that Can be Evaluated

Many building features and concerns can be surveyed. As an example, when dealing with a large public assembly occupancy, life safety is a pertinent factor. Fire protection systems are an essential component for protecting the lives of the occupants of the public assembly. Making sure these systems are operating properly and supported should be a primary strategy in carrying out the incident objective of the **safe removal of all occupants** from the building.

A secondary issue, and one of the unrecognized, but extremely important fire protection systems in these buildings, is the exiting features. Although not a principal element of this course, exiting features (corridors, fire door assemblies, ***exit passageways***, etc.) play a significant role in the **safe removal of all occupants**, as well as serving as access for firefighting personnel.

Knowing how the exiting systems are configured, the principal routes building occupants will use, and how to best use them for emergency personnel without creating a conflict with evacuation, is an essential part of the preincident planning process. Knowing which stairwells in a high-rise building are pressurized or designed to maintain a tenable environment for occupant evacuation is critical to overall effective management of a fire emergency in the building.

The Primary Factors Chart also helps establish in advance of the fire the amount and types of resources that might be needed to combat a fire in the particular building. You can plan alarm levels (resources) that may be required based on level of fire involvement.

Knowing what systems the building does and does not have will help in allocating and assigning available resources, based on the priorities established during the development of your incident objectives. For example, if the building has a fire sprinkler system, it may be more effective to have a limited staff company--two or three personnel--supply the sprinkler system, rather than attempting to lay and supply a 2-1/2-inch hoseline for initial fire attack. Immediately checking the fire alarm annunciator panel for fire location (when no fire is initially showing) will expedite routing of resources to the location of the fire.

Making notes, identifying specific **Pertinent Factors** on the Primary Factors Chart, and developing some basic **incident objectives** and **strategies** during the preincident planning process will begin laying out an IC's action plan for managing a fire emergency in the building. If this documentation is kept with the preincident planning information, the responding officer can use it to begin developing the overall Incident Action Plan (IAP) prior to arrival at the incident.

This process also allows the fireground commander the opportunity to identify specific hazards areas, exposure problems, and areas where structural integrity may be in question. The process helps IC's to identify methods to reduce firefighter exposure to heat, smoke, fatigue, fire, and other hazards. Ultimately, this should contribute to a reduction in the potential for both fire and property loss.

Other Data Sources

It must be emphasized that the formal preincident planning process is extremely important. However, the formal process is just one element of quality preincident preparation, and the formal documentation and building familiarization visit is not the only source of information that needs to be collected for a building, particularly on its target hazards.

Other sources include the building's architect, the owner, engineers, safety director, and the maintenance supervisor, as well as the insurance carrier/underwriter/risk manager or loss control specialist.

It is important for fire officers to review building plans submitted during construction, and then periodically check the plans normally kept in the building department's records to determine whether changes or modifications to the building have been made, by checking on permits that have been issued by the building or fire department, hazardous material operations permits, and Material Safety Data Sheets (MSDS) records, and county or jurisdictional records collected by the zoning and/or planning departments.

A fire agency's relationship with its fire code enforcement organization is an important one. Independent fire companies may have to work with a building department or fire marshal's office that is not legally bound to consider the suppression personnel's needs. In those cases, the fire department may need to work hard to build a close working relationship, but the efforts could be well rewarded. Code enforcement officials have the authority to make decisions that can make the IC's life easier. They enforce rules and regulations on water supplies for fire protection, fire apparatus access roads, and built-in fire protection systems. Likewise, their permanent records and reports may provide a wealth of information for the IC: building and fire protection system plans and specifications, site plans, construction details, and inventories of hazardous materials or operations.

Preincident Planning Stages

The preincident process planning should not begin after a building is constructed and occupied. It should begin when the concept of the facility is proposed and needs the input of the fire department. Responding companies should be involved with the building during the conceptual or planning stage, and all the way through the construction phase. (Fires do occur in buildings under construction.) It should continue as the building is being occupied (and modified for the occupants) and then be an on-going process after the certificate of occupancy is issued and full operations are up and running.

Preincident planning lasts over the lifetime of a building, because as long as it is standing, the fire department must be prepared to deal with a fire or other emergency that may occur in the building.

Testing

Part of the preincident planning process should be verification that regular testing of all systems is being conducted in accordance with applicable adopted codes for your area. If this information is not available, or the building owner/manager cannot produce it, the reasons why these tests are not being conducted or documented should be requested. If there is reluctance on the part of the building representative to provide this information, the problem should be forwarded to your code enforcement official for corrective action.

Figure 3-3
Regular Inspection and Testing Should Correct Conditions Like This

According to the national fire codes and standards, most fire protection systems need to be inspected, tested, and maintained on a regular schedule, some as often as quarterly. These tests can identify significant deficiencies that should be corrected in a timely fashion.

These tests and records also can be used to identify trends that might not otherwise be obvious. For example, one regularly required test of automatic sprinkler systems, called a "main drain test," monitors the conditions of a neighborhood's water supply. If regular tests reveal a continual decline in water pressure or volume, this information should be identified on the preincident plan and reported to the water purveyor to make needed improvements. (The "improvement" may be as simple as checking the status of all street valves to ensure they are fully opened, to something as complex as re-engineering and installing new water storage facilities and mains.)

ACTIONS TO BE TAKEN BEFORE, DURING, AND AFTER THE INCIDENT

NFPA 1620 recommends a process for the development, use, and maintenance of a preincident plan. The process covers the time periods before the incident, during the incident, and after the incident**.**

Before the Incident

Before the incident, determine the following:

- the risks associated with the property, and what data should be collected for the preincident plan;
- what strategies might be employed for this property; develop a range of options;
- what to do with the information;
- what training is needed to assure all personnel are familiar with the plan; and
- what steps are needed to update and revise the plan.

Keep each plan simple enough to remain useful. Copies of the plan should be distributed to the appropriate potential responding units. The plan should be tested and practiced periodically, to provide an opportunity to review the data and refine the plan.

The preincident planning process should include a provision for training in those portions of the plan that involve unique or unusual evolutions or operations. Training should be used to communicate the preincident plan expectations to individuals or agencies included in the plan that do not normally work together.

During the Incident

The IC should

- establish an incident Command Post (CP);
- develop OST's;
- retrieve data from preincident plan; and
- make arrangements to share the information with responding companies.

During the incident, the preincident plan should be the foundation for decisionmaking and provide important data that will assist the IC in developing appropriate strategies and tactics for managing the incident. The plan should help responding personnel to identify critical factors that will affect the ultimate outcome of the incident, including personnel safety.

The plan should provide information on available facility personnel and how to contact them, to advise responding personnel of current conditions. The IC should use the information contained in the plan to anticipate likely scenarios. The IC also should review the plan continually throughout the incident, to remain aware of factors that might affect the success of the operation for strategic or tactical adjustments.

After the Incident

The IC should

- review the incident;
- critique the outcome;
- evaluate the plan effectiveness, and the overall program effectiveness; and
- modify the plan as appropriate.

After the incident, the effectiveness of the plan should be re-evaluated. The incident should be analyzed and the performance of responding personnel, facility owners, and occupants evaluated for their effectiveness in relation to the plan. The plan then should be modified based on this evaluation.

The preincident plan also may be useful as a postincident investigation tool. Fire investigators; insurance investigators; and other local, State, or private entities may find the information useful for a "virtual reconstruction" of the occupancy and conditions that existed before the incident.

Relating the Plan to Incident Management

Preincident planning gives the IC and other personnel the opportunity to assess risks and develop strategies under non-emergency conditions. It's often stressful when the alarm sounds and emergency personnel must make critical decisions in only a matter of minutes or even seconds.

One tool the fire service has embraced--which now is endorsed by the Department of Homeland Security (DHS)--is the National Incident Management System (NIMS). The Incident Command System (ICS) is an integral part of NIMS and, when successfully employed, increases fireground safety, accountability, and efficiency.

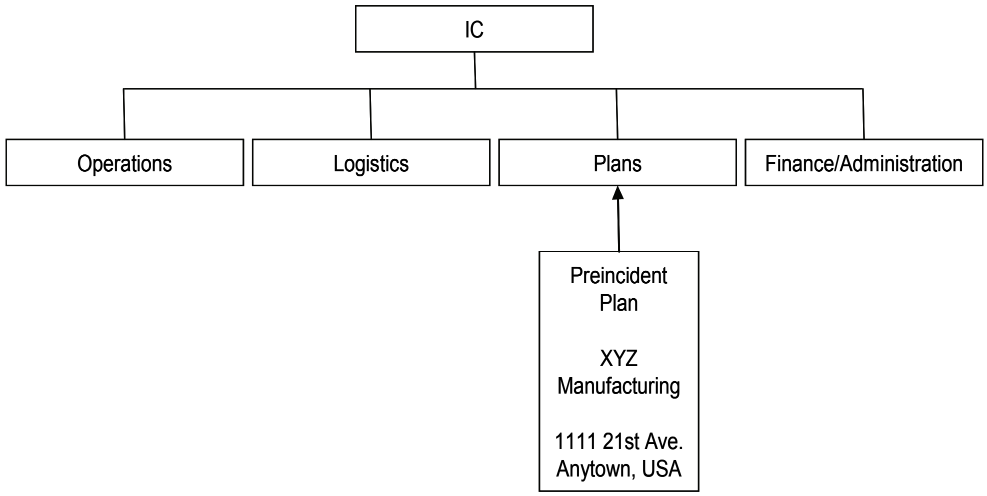


Figure 3-4
Preincident Planning/NIMS Relationship

Traditional preincident plans typically summarize a building or facility's hazards and the resources that may be necessary to control them. Why not "preplan" the ICS as well? The IC who anticipates the staff, groups, divisions, and resources he or she may need to control a target hazard event is better prepared to handle an emergency in a disciplined manner. This does not mean that every block on an ICS chart must be completed beforehand with names and radio identifiers, but wouldn't it make life easier if the IC expected he or she might need a Plans Chief, Foam Group Leader, or some other specialty resource person who specifically could help control the incident?

If they are not already, State and local fire officials and emergency first responders need to become familiar with NIMS and its elements. Many Federal programs and funding will be contingent on those agencies adopting and employing NIMS in their day-to-day operations. Additional information, and a copy of the NIMS plan, can be downloaded from http://www.dhs.gov/interweb/assetlibrary/NIMS-90-web.pdf

Preincident planning and NIMS go hand-in-hand. Agencies should train regularly with both tools.

Elements to be Considered Before the Incident

The following are just some of the elements that should be considered before an incident.

- the physical elements of the site and specific site considerations including access and road widths;
- construction type;
- capability of the public and industrial response personnel;
- fire hydrants and their locations;
- occupant considerations;
- fire protection systems and water supply, including needed fire flow for both sprinkler systems and handlines;
- fire department connections and their locations;
- fire sprinkler systems, type, number, and location of riser room, areas served by each riser, extent of sprinkler coverage;
- fire pumps (where required);
- fire alarm systems, type, location of annuciator panel, type of detectors, area of coverage (***addressable**, **zoned*** or not);
- standpipe systems, type, intake, and outlet locations;
- pressure restricting devices and pressure-reducing valves;
- special hazard considerations;
- emergency operations considerations;
- exposures;
- special or unusual characteristics of common occupancy;
- transient conditions (things that may change on a regular basis);
- building services, (heating, ventilating, and air conditioning (***HVAC***), elevators, moving stairs (escalators), conveyors, boilers, chillers;
- utilities and their importance to supporting other fire protection systems;
- emergency and standby power;
- compressed and liquefied gases; and
- communication systems.

Having this information available will answer many of the questions that routinely arise during fire emergencies. It also will assist in identifying the number of resources that must be called, the type and capacity of the equipment needed, specialty equipment needed, where to position this equipment most effectively at the emergency scene, and essential actions that must be taken very early in the incident (e.g., Who will hook up to the sprinkler or standpipe system? Who will go to the fire control or building engineer's room?).

Figure 3-5
Knowing the Hazards Prior to an Event is Critical for the IC

Identifying Points of Contact

The plan also must detail and maintain current information on points of contact such as:

- owner or operator;
- maintenance personnel or building engineer;
- facility fire brigade personnel;
- facility risk manager or safety director;
- alarm company contact;
- sprinkler system maintenance contact;
- elevator/escalator maintenance contact; and
- specialty contact (e.g., hood-range systems, Halon™ or clean agent systems).

STRUCTURE OF NFPA 1620

The preincident planning forms recommended by NFPA 1620 are structured so that information is listed in an organized manner for ready reference by an IC. Appendix C to this unit contains sample formats and hypothetical examples.

Quick Access Prefire Plan

The QAP is intended to provide a simple data collection and display tool for emergency responders. It is arranged so that responding companies can perform a quick check of the building layout, fire protection features, hazards, and required fire flow. For many occupancies, it may be all the detail needed to provide preincident plans.

The first page of the document lists information on a building using this format:

- plan number (assigned by the local agency);
- address;
- name (of occupancy or business);
- response district (e.g., Battalion 1);
- emergency contacts;
- construction type;
- fire protection (systems, features);
- water supplies available;
- water supply needed (based on fire involvement);
- initial dispatch (units on the first dispatch assignment);
- special resources that might be needed (foam, air units);
- exposures;
- strategies; and
- comments.

Page two of the QAP form is for a diagram of the building or complex layout. This page also lists the address, name, preplan number, and district.

A typical diagram would show hydrant locations, main sizes, and access points; separation distances between buildings; locations of sprinkler/standpipe system connections; ***fire alarm control panel*** location; a brief construction description of both the buildings and their roofs; building use (e.g., warehouse, apartments); and size of each building.

The Preincident Plan Data Collection Sheet

Another form that can be of great benefit to an officer in gathering preincident planning information is the *Preincident Plan Data Collection Sheet,* which is shown with a hypothetical example in Appendix D. This form can be used in the field to collect preincident plan data about a property. It is much more detailed than the QAP.

Data Collected on the Preincident Planning Data Sheet

This form gathers data related to:

- fire company district;
- date (of preplan);
- preplan number;
- occupancy location:
  - address,
  - building name, and
  - telephone number;
- operating information and access:
  - emergency contacts and titles,
  - operating hours,
  - primary access:
    -- what side would be designated Side A (for fireground operations purposes?),
  - key box location and contents,
  - exterior access concerns:
    -- obstructions to aerial operations, and
    -- exterior door concerns;
  - interior roof access;
- occupancy--information on the overall occupancy:
  - high fire load locations,
  - life safety concerns, and
  - evacuations assembly plan--assembly point location;
- hazards:
  - trash and waste hazards:
    -- (if an) incinerator or compactor inside,
  - locations:
    -- incinerator or compactor chutes,
  - (are) chutes sprinklered,
  - outside compactors or dumpsters:
    -- locations: compactors or dumpsters attached or exposed to interior,
  - hazardous materials present:
    -- location of MSDS sheets,
    -- hazardous material inventory attached, and
    -- location for use in an emergency,
  - materials reactive with air; water; or other materials present,
  - type of materials; typical locations,
  - reactive materials present; typical locations, and
  - process hazards present; typical locations;
- construction:
  - number of stories,
  - number of basements; full or partial,

- average square footage per story,
- penthouse; occupancy,
- roof construction; trusses,
- deck material; covering,
- floor construction; trusses,
- wall construction,
- combustible concealed spaces; location:
    - -- attic,
    - -- cockloft, or
    - -- crawl space,
- interior fire barriers and walls; locations,
- wall penetrations:
    - -- locations, and
    - -- openings protected by doors, shutters, sprinklers, nothing,
- interior stairs:
    - -- number, and
    - -- location,
- obstruction to stairways,
- elevators:
    - -- number,
    - -- location,
    - -- area served, full/partial,
    - -- fire service mode,
    - -- elevator key location, and
    - -- elevator controls location,
- unprotected vertical openings; type and locations;

• water supply:

- primary water supply:
    - -- test results,
    - -- location, and
    - -- date,
- static pressure/residual pressure/flow rate,
- alternative supplies private supply, type:
    - -- gravity tank,
    - -- other tank,
    - -- cistern,
    - -- process system,
    - -- reservoir, and
    - -- other,
- fire pump,
- supplied by:
    - -- public supply, or
    - -- private supply,
- start-up; automatic/manual,
- number of pumps; location,

- onsite hydrants,
- location of hydrants,
- supplied by public/private,
- size of outlets and threads,
- which system supplies what protection system,
- nearest large volume water supply greater than 2,000 gallons per minute (gpm),
- needed fire flow calculations and factors, and
- largest single fire area;

The United States Fire Administration (USFA's) NFA has an online self-study course called "Testing and Evaluation of Water Supplies for Fire Protection." It can be found at: http://training.fema.gov/

The course explains water supply calculations for fire protection, how to perform a water supply test, and rural and urban water supply systems. Students who successfully complete the 6-hour course can obtain a certificate from the NFA.

- protection systems:
  - fire alarm system,
    - -- panel location, and
    - -- annunciator location,
  - types of alarms,
  - extent of coverage,
  - monitored system,
  - fire alarm company,
  - sprinkler system,
  - location of fire department connection; size of threads,
  - type of system,

- extent of coverage--full or partial: areas protected (if partial),
- location of main valves,
- system coverage plan at valve,
- standpipe and inside hoses,
- combined with sprinkler system,
    - -- fire department connection (FDC) same as for sprinkler system,
    - -- location of FDC, and
    - -- size of FDC threads,
- type of standpipes:
    - -- extent of coverage--full or partial,
    - -- outlet locations; stairway, open floor, other, and
    - -- outlet size and type,
- special; protection systems,
    - -- type of systems,
    - -- locations, and
    - -- extent of coverage, full or partial;

Figure 3-6
Preincident Planning Fire Department Connections Eliminate Confusion

- utilities:

- water, gas, storm and sanitary sewer, telephone, data communications;
- exposures:
  - distance, construction type, occupancy type, openings;
- special resource considerations:
  - special apparatus, equipment or personnel that might be needed;
- technical rescue exposures:
  - high-angle, confined space, swift water, ice; and
- remarks.

The Preincident Plan Form

In addition to the first two pages of the preincident plan, there is a **Preincident Plan Form** that lists information in more detail. This form is structured so that important information is immediately available to the IC:

A copy of the Preincident Planning Form and a hypothetical example is included in Appendix D. This form lists the types of information that could be provided in a preincident plan.

Site Access and Restrictions

- fences: (height and construction);
- security: (guard services);
- guard house location: (number on duty, knowledge, areas where guards do not have access);
- guard dogs;
- lockbox;
- fire command center;
- emergency operations center;
- remote annunciator: (location); and
- fire alarm panel.

Life Safety and Occupant Considerations

- hours of operation;
- number of occupants: days (8-4), evenings (4-12), nights (12-8);
- handicapped/special needs;
- areas of refuge: (defend in place strategy);

- emergency contacts: name, title, telephone;
- site emergency response plan; and
- emergency coordinator.

Occupancy or Special Hazards

- type of hazard and location;
- special shutdown procedures: (complex or extended operations); and
- controlled environments (clean rooms, hyperbaric chambers, etc.).

Building Construction

- building access: doorways, locking devices, accessible windows, fire escapes, tunnels, breachable walls;
- length, width, height, number of stories;
- walls: interior finish materials;
- floors: (raised floors);
- ceilings: (multiple/suspended ceilings);
- roof and roof coverings: (concealed spaces/multiple levels);
- vertical and horizontal openings: large, undivided areas, unprotected openings between floors, stairwells, elevator shafts, utility shafts, escalators, type of fire doors;
- smoke and heat venting or smoke management: (manual or automatic), control locations; and
- atriums: location in the building, number of stories connected, number of stories open to atrium.

Building Utilities

- electricity: enters property, (overhead or underground) at, disconnects located at, transformers: (PCB);
- emergency power supplies;
- natural gas: for (building heat) (processes), shutoff located at;
- Liquefied petroleum gas (LPG): for (building heat) (processes), storage tank(s) located at, shutoff located at;
- domestic water;
- steam;
- elevators: number, floors served, type, restrictions and location, fire service override, locations of keys; and
- compressed air.

Exposures

- north;
- south;
- east;
- west; and
- environmental concerns.

Protection Systems

- automatic sprinklers: ceiling/roof systems, in-rack systems, other systems, system demand (gpm @ pounds per square inch (psi));
- water supplies: type of supply, fire pump (diesel) (electric), rating (gpm @ psi);
- available flow: static, residual, flow available, (gpm @ psi) residual;
- required fire flow;
- hydrants;
- FDC: location, FDC supplies;
- standpipe and inside hose connections: type of system, hose outlets, pressure available, control and sectional valves, FDC, risers;
- fire extinguishers; and
- special protection features: type of system, (CO_2, Halon™, gaseous extinguishing agents, foam-water, dry chemical, and wet chemical); hazard or area protected by the system; location of control panels; location of all protective agent supply and reserve containers; activation method; personnel hazards of protective agent.

Fire Alarm and Communication Systems

- detection systems: method of system activation (manual, automatic); area of coverage; fire alarm control panel and remote annunciator panels; type of automatic detectors provided (smoke, heat, other); off-site alarm transmission; name of, and contact number for, off-site monitoring agency;
- occupant notification: voice alarm or public address system, method and extent of occupant notification;
- onsite communications system: stairway telephone system; radios; and
- contact person or company responsible for system maintenance: telephone number.

The Preincident Plan Walkthrough

As the preincident plan walkthrough is being conducted, you should capture this important information, using the forms referenced above or those used by your department.

Once the information has been gathered, a plan should be developed and it should be updated for currency on a regular or planned schedule.

Deficiencies or problems identified (even though this is not a formal code enforcement inspection) must be noted and referred for corrective action. These deficiencies, if not corrected, could hamper the fire department's ability to properly deal with a fire when one starts.

It may involve only bringing the problem to the attention of the safety or risk manager, or it may appropriately be referred to your fire marshal or to the fire prevention division or other code enforcement official for further corrective action.

Best Practices

A system must be in place so that, not only is corrective action taken, but also you are notified when the corrections are completed, so that your preincident planning information will reflect this. A system of "Best Practices" notification should be established for your jurisdiction so that proper referral, action, and followup notifications take place, so that corrections are made and responders are advised that these corrections have been completed.