

BEFORE THE FIRE FIRE PREVENTION STRATEGIES FOR STORAGE OCCUPANCIES*

**Report of Ad Hoc Task Force,
National Fire Protection Association,
U.S.A.**

Devastating fires in a number of warehouses and distribution centers have resulted in a disturbing number of multimillion-dollar losses. In a significant number of cases the warehouses were equipped with automatic sprinkler systems and other built-in fire protection systems, yet fast-spreading fire overpowered these systems and was beyond control when local fire departments arrived. This has been especially disturbing to those who were familiar with the exemplary record of successful sprinkler operation.

The problem can be traced to lack of hazard awareness and human behavior that has compromised the protection offered by sprinkler systems and other safeguards. Although the built-in protection was specifically designed

for a certain storage environment, passing years often result in a changing storage environment more hazardous than originally planned. This may be due to an increased quantity or height of storage as well as a change in the type or arrangement of materials stored.

Improved risk management can begin with more awareness of storage-related hazards and with better communications among groups most concerned with the fires and the fire losses: warehouse owner operators, local fire departments, insurance car-

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riers, and organizations such as the National Fire Protection Association. Each segment has a vital interest in improving the record, and cooperation is more effective than separate individual efforts.

This account of the fire is a summary of a more detailed NFPA fire investigation report. The summary is not intended to be taken out of context. For the full report, see NFPA's **Fire Journal**, March/April 1988.

It was a warehouse specifically designed for storage of paints and related flammable liquids.

The main storage area was about 180,000 square feet, or the size of five football fields. A fire wall subdivided the warehouse into two separate areas.

Protection was provided by an automatic sprinkler system and a fire pump capable of delivering 2500 gallons of water per minute.

A well-trained, well-equipped fire department served the city of 200,000, in which the facility was located.

Yet one night in May, 1987, a fire destroyed the entire warehouse. The loss—\$49,000,000—includes damage to the building itself, all of the contents, and the cost to remove the useless

debris.

Like many catastrophes, this one started as a relatively small incident when only eight to ten gallons of flammable liquid—out of an estimated 1,500,000 gallons of paints, resins and solvents stored in the warehouse—were accidentally spilled while some of the storage was being moved by a lift truck.

The spilled liquid spread out in a puddle about twelve feet in diameter and spread under other storage.

One unlikely event was followed by another. A spark from the lift truck ignited the liquid.

Portable extinguishers and hose stations were available for employee first-aid fire attack, while the fire department was en route. Water flow detection systems were in place to sound an alert and this system worked as planned. The automatic sprinkler system began operating before the fire department arrived.

The warehouse managers had developed and enforced a program to prepare employees for emergency response. But this fire spread faster than expected. The clothes of one of the employees began to burn, diverting attention from the extinguishment ef-

fort. Problems grew with the fire: neither use of the portable extinguisher nor operation of the sprinkler system stopped the fire before it spread to other storage.

Employees began to evacuate, but already some of the nearby 1,000,000 16-ounce and 220,000 6-ounce aerosol containers began to explode and fall outside amid the evacuating employees.

The fire department pumper arrived six minutes after dispatchers sounded the alarm, and the fire fighters began their preparations for an offensive attack.

When the first pumper arrived the fire fighters found huge clouds of thick, black smoke. Worse, flames already extended through the roof several hundred feet into the air. Fire fighters heard explosion-like sounds inside the warehouse, and exploding aerosol cans were flying from the building.

The building's fire pump was operating. One fire department task was to connect to the sprinkler system siamese to augment water flowing through the open sprinkler heads.

The intense heat from the fire and the danger of rocketing aerosol cans prevented fire fighters from

approaching the building to hook up to the sprinkler system siamese pumper connection. In the meantime, although the building fire pump maintained adequate pressure, the sprinkler system did not appear to have any effect on the fire.

The fire spread throughout the approximately 180,000 square feet within 28 minutes after ignition. This rate was roughly equivalent to fire spreading completely over the area of a football field in less than six minutes.

Although the fire department was trained for an aggressive attack wherever possible, in this case it was forced into a defensive operation of protecting exposures. This decision was dictated by fire spread that had developed before the fire department even arrived.

This fire occurred in the Sherwin-Williams Automotive Paint Distribution Center in Dayton, Ohio. But this was not the first large and seemingly well-protected warehouse to be destroyed by fire.

The Warehouse fire record

In the last ten years a disturbing number of notable fires in modern warehouses have resulted in similar catas-

trophes. Including the Sherwin-Williams warehouse, the total loss from these seven fires in 1988 dollars is in excess of \$750,000,000.

Because of the size and value of each of these facilities, they should have fit the definition of a Highly Protected Risk (HPR) [described below]. However, at the time of their destruction the warehouses could not have qualified as an HPR property because the sprinkler protection was, in fact, no longer capable of controlling the initial fire. The consequences were inevitable.

Highly Protected Risk (HPR)

A Highly Protected Risk (HPR) occupancy is one which has a loss-prevention-responsive management and the following performance specifications, as relates to storage occupancies.

- is protected by automatic sprinklers with adequate water supply.
- the sprinkler system is capable of controlling a fire incident without human intervention.
- sprinkler system alarms are supervised to give early notification to the fire department.
- the early detection and alarm system gives the responding fire department a manageable

opportunity to extinguish the fire.

Supermarkets General

Edison, New Jersey, 1979: This sprinklered distribution center contained 290,000 square feet of rack storage for supermarket health and beauty aids, including many aerosol cans. The center supplied more than 100 stores.

Employees discovered a small fire which spread rapidly through cardboard boxes containing aerosol cans. Exploding aerosol cans prevented employees from attempting early extinguishment.

The sprinkler system was overcome, and an exterior wall collapsed soon after the fire department arrived. Estimated loss: \$50,000,000. More than 200 workers lost their jobs because of the fire.

Montgomery Ward

Bensenville, Illinois, 1978: This 200,000-squarefoot fully sprinklered central warehouse of a department store chain was destroyed by a fire of suspicious origin. More than 100 fire fighters attempted to control the blaze, but the warehouse was a total loss with damages of \$30,000,000.

Ford Motor Company

Cologne, West Germany, 1977: This sprinklered building provided over 1,000,000 square feet of storage for automobile spare parts. The metal, glass, plastic and textile parts were packed in wood, cardboard, paper and plastic containers. Lubricants and motor oils were also stored in cans that were packaged in cardboard cartons.

The fire, believed to have been started from careless smoking, spread through rack storage, overtaxing the sprinkler system. Then, collapsing of roof sections destroyed sprinkler piping.

A report on the fire noted the increased combustible load in the building compared to when the sprinkler system was designed, noting. "The question therefore arises as to whether the system, installed in the 1960s, was still adequate to cope with the changed risk situation in the fire outbreak area".

Loss of several buildings in the warehouse depot pushed damage estimates over \$100,000,000.

K Mart Distribution Center

Falls Township, Pennsylvania, 1981: At the time of this incident it was called "the most costly single building fire in U.S. history." The five-year-old

sprinklered warehouse with 1,200,000 square feet of storage, supplied 375 K Mart stores from Maine to Virginia. Grading had been started for an additional 923,000 square feet of storage.

The fire began when some aerosol cans (among more than 1,000,000 in the warehouse) fell, burst and were ignited by a lift truck spark. An employee discovered the fire immediately after ignition and attempting to use a portable extinguisher. It was not effective, nor was the operating sprinkler system.

Within three minutes after the fire department arrived, flames were reported through the roof. Exploding aerosol cans, some trailing flames, rocketed through the roof and doorways protected by deluge curtains. Complete extinguishment took seven days. The loss of building and contents exceeded \$100,000,000.

MTM Partners (Mitsui)

Elizabeth, New Jersey, 1985: This sprinklered warehouse had 530,000 square feet of storage subdivided for five separate companies. New York Bronze used almost 114,000 square feet in the storage and distribution of aerosol cans filled with various petroleum-based products. The aerosol cans were stored in racks.

The fire, believed to be accidental, started in an unattended part of the building. An alarm system notified the central station, which alerted the fire department. While still *en route*, the department reported seeing flames already through the roof.

The loss from the fire was estimated at a whopping \$150,000,000.

Service Merchandise

Garland, Texas, 1987: This 200,000-square foot sprinklered warehouse supplied 50 Service Merchandise stores...before the fire.

Employees smelled smoke during a second shift, but no fire was immediately found. More than 30 minutes later, an employee found flames reaching up cartoned stock on pallets. Portable extinguishers were not helpful in containing the fire, nor was the operating sprinkler system, which seemed to be blocked by high storage.

Fire fighters arrived within four minutes of the alarm and attempted an interior attack. The first-in captain investigated and found a fire he thought could be contained by the sprinklers until hose lines were laid.

Before this could be done, however, smoke banked down to the floor and the lights went out. Falling debris

trapped two fire fighters. Fortunately, they were able to free themselves and leave the building.

All interior fire fighting efforts ceased. The building was a total loss of \$ 30,000,000.

Warehouse Fires: Common Factors

A look at these and other fires in storage and distribution facilities reveals certain similar characteristics that are worth noting.

- The warehouse occupancy changed over time, until the existing sprinkler protection could not control the fire. (see *When is a Sprinklered Warehouse Not a Protected Warehouse?* below)
- Fork lift trucks have often been involved in the initial ignition scenarios. This is not a condemnation of lift trucks but a reminder that ignition sources are commonly introduced into even the cleanest storage areas.
- Even in the early stages, fire development is usually beyond the manual control capabilities of plant emergency response teams.
- Fire spread is often beyond public fire department sup-

pression capability by the time of arrival even with sprinkler activation, immediate alarm and timely response.

- Fire fighting inside a very large facility covering acres under one roof is extremely difficult and dangerous.
- Substandard "fire walls" have not stopped a fire once it has gotten beyond the initial area of involvement.
- Many warehouse operators do not separate flammable liquids and aerosol container storage from general merchandise storage even though this is a recommendation of NFPA and the insurance industry.
- Traditional metal product and paper packaging materials have been replaced with more-hazardous packaging materials, including plastics.
- In many warehouses, operators and employees are not generally aware of the fire hazard of the commodities they are handling.

The fires described here were included because they represent the potential for total loss of any large warehouse, but it would be wrong to assume that major fires, however costly, occur only occasionally. Consider that in one recent year, 1985, there were 159

large-loss warehouse fires, each with losses of at least \$1,000,000.

When is a Sprinklered Warehouse Not a Protected Warehouse?

The definition of a Highly Protected Risk begins with the assertion that a warehouse has a sprinkler system and that the sprinkler system will deliver enough water to control an expected fire without human intervention. An "expected" fire is defined by the amount and quantity of storage.

If change occurs in the occupancy, the sprinkler system may not be able to control the fire. Examples of these changes are:

- Storage commodity changes
- Flammable liquids are introduced
- Storage quantity increases
- Storage height increases
- Storage arrangement changes
- Temporary storage in aisles
- Use of solid rack shelves

If the storage situation changes to the point where the sprinklers can no longer perform their control function, the warehouse should be viewed as an unsprinklered warehouse, with all the consequences that it implies.

How Widespread is the Problem?

The loss statistics of three prominent HPR insurers—Factory Mutual, Industrial Risk Insurers, and Kemper—appropriately quantify the warehouse fire problem. Keep in mind that their data reflect only *reported* losses and are in abbreviated description of the total problem.

Loss Statistics (3 companies) 1982-1986

Total of All Fire Losses

Number	13,845
\$ Property Damage	\$1,229,500,000
\$ Business Interruption	\$256,200,000
Total Dollars	\$1,485,700,000

Fire Losses in Storage Facilities

Number	1,961
% Number Fire Losses	14.2%
\$ Property Damage	\$514,760,000
\$ Business Interruption	\$54,890,000
Total Dollars	\$569,650,000
% of Total \$ Fire Losses	38.3%

Storage Fire Losses Greater than \$500,000

Number	167
% Number Fire Losses	1.2%
\$ Property Damage	\$418,950,000
\$ Business Interruption	\$50,170,000
Total	\$469,120,000
% of Total \$ Fire Losses	31.6%

Today's Warehouses

Our society is made up of such voracious consumers of so many products

that it should be no surprise that warehouses have grown bigger and more sophisticated to handle the huge distribution demands of this consumption. Bigness is clearly more profitable.

And it should be no surprise that the risks of fire to these warehouses have grown bigger, too.

This is not a newly discovered trend. *The Sentinel*, published by Industrial Risk Insurers, noted in 1968, "Without question, bigness [in warehouses] has many advantages... However, we will be in grave trouble if we fail to recognize or fatalistically accept one inevitable fact. Bigger industry means bigger potential fire, explosion and windstorm damage... In designing complete protection, even the best of fire extinguishing control 'hardware' is not enough by itself. Remote as the possibility of failure may be, the consequences are too great a risk for plant management or perhaps even the insurers to assume."

Warehouses contain the possibility of a nightmare for three important reasons: content, quantity and arrangement.

- The content of our warehouses—as in our homes—is

made up of an increasing amount of higher-hazard materials such as plastics, flammable liquids and gases, and chemicals. Traditional packing materials even for non-combustible products are often being replaced with plastics. A large quantity of combustibles provide the fuel for a major fire.

The arrangement of storage into higher and deeper piles with narrower aisles inherently limits access and movement of hose lines in a warehouse, at the same time as it blocks the extinguishing discharge of the sprinkler heads.

As warehouses have evolved, so has the technology of sprinkler protection. The basic formula remains the same: *Put the water on the fire*, but computers have allowed considerable refinement in the name of efficiency.

If computer efficiency is applied to design a sprinkler system that only meets a minimum standard, however, almost any change in conditions could leave the system inadequate for the new conditions.

Modern technology has provided the fire protection community with many new tools to assist in fire protection,

but the human factor has not changed very much. And unfortunately, the computer cannot predict future human behavior.

The public is literally bombarded by thousands of messages every day, from coworkers, family, advertisers and news outlets. The accumulated noise would be worse than trying to think next to a jet engine. An individual copes with all this activity by ranking some messages and by tuning out the rest. Unfortunately, sometimes the important lessons of past fires can also be missed or tuned out by warehouse employees and managers.

At the same time we need to recognize that a fire officer-after seeing a warehouse sprinkler system and assuming that the overall risk is under reasonable fixed protection-could fail to inspect a warehouse closely enough to notice excess storage in a far aisle.

We all need to understand some psychology, remembering that human behavior is more closely tied to fire safety than technology and hardware.

The Hazards: Not Only in the Big Warehouses

The dangers addressed by the report are not limited to the largest warehouse complexes. The same fire protection risks of improper storage and

overtaxed sprinkler systems can be found whenever storage is encountered, including:

- Storage areas within a manufacturing plant. The rapid-spread nature of storage fires can send a crippling fire into the heart of a manufacturing process.
- Shipping and receiving areas of any business.
- General storage facilities renting space to individuals. The high number of people increases the risk of unsafe practices.
- Storage areas adjacent to consumer retail sales areas.
- Outside storage areas adjacent to openings that could allow fire spread into the building.

Factors in Judging Risk

Psychologists have studied fear and the way people assess risk in their lives. One Washington, D.C. researcher became interested in attitudes about risk when he noticed that a fear of flying is much more common than a fear of riding in an automobile-although automobiles are the leading cause of death for every age group between one and 40 (roughly 50,000 deaths per year on average) while perhaps 100 die on average in commercial aviation. The fear didn't

match the actual risk.

Applying this to the problem of warehouse fires, this question could be asked: Why do warehouse managers sometimes fail to take normal fire precautions?

The Washington researcher explained that such apathy was rooted in three psychological perceptions-however irrational they may be-that govern risk assessment.

1. Whether the individual thinks he controls the risk. Temporary aisle storage or extra high racks may be allowed without fear in a warehouse because the managers believe it will be or could be removed promptly. The same persons may fear flying because total control rests with someone else.
2. Whether the hazard shows up as "one big event." Statistically, most warehouse fires are caught while still small and easily controlled-on the order of a trash can fire. Many are never reported. Although we have seen how quickly a small fire can become very big, the perception is that future small fires will similarly be controlled. Flying accidents, on the other hand, usually show up as a big event.
3. Whether the risk is familiar or unfamiliar. Familiar dangers are

harder to fear over a long time, while "unfamiliar risks are almost impossible not to fear," according to the research. Thus, a warehouse manager surrounded by familiar storage has a tendency to ignore possible dangers because they are so familiar. The unfamiliar workings of a distant nuclear power plant, however, might cause considerable fear.

This suggests that it is not sufficient to merely present the facts of a fire hazard. Beyond that, we must make a sincere effort for improved communications on a personal level among representatives from the fire department, the warehouse company and the insurance carrier.

Ten Mistaken Assumptions Related to Warehouse Fires

1. Warehouse managers believe a sprinklered storage area is automatically safe from catastrophic fire.

Sprinkler systems do indeed have a well-deserved reputation of successful operation and control of many, many fires that would otherwise have destroyed the building of origin. But an automatic sprinkler system cannot be expected to overcome the effects of a fire in a commodity more hazardous than it

was designed for, or improper storage and handling practices. For example, ignition of an accidentally spilled flammable liquid may very well overtax the sprinkler protection.

2. When an occupancy hazard changes, the fire department routinely becomes aware of it.

This would help any fire department stay at a higher state of training and readiness if it were true, but in fact the fire department is seldom informed about storage hazard changes that could very much affect the particular tactics and strategy used if a fire is reported in a warehouse. In fact, unless a warehouse manager is diligent in supervising commodity changes and storage arrangements, even he or she may not be aware the hazard has increased.

3. When a warehouse storage hazard increases, recommendations by the insurance carrier to upgrade the built-in fire protection systems are routinely approved by the warehouse management.

Budgeting money is rarely a simple matter in a business, and upgrading fire protection can be a time-consuming process. This is especially true if those who appropriate the money do not fully understand the costly lessons of these notable fires.

4. When the insurance carrier is aware of a recently increased storage hazard and wants to keep the fire department informed and prepared, it is simple to place a call to the fire department directly.

Corporate management conducts its business with an insurance carrier on a confidential basis. This confidentiality is in effect even when the carrier might otherwise wish to share information related to fire safety with a fire department. The insurance inspector must have the permission of warehouse management to discuss the details of a warehouse's fire protection with anyone.

5. Because of the high value of many storage occupancies, the fire department will make frequent inspections to determine any hazard change for itself.

Fire departments operate under budgetary constraints, the same as commercial operations. The result is that a fire department may not have the personnel or the time to inspect all occupancies as frequently as may be desired.

6. Because of the high value of many storage occupancies, warehouse managers are more concerned than anyone else about fire protection.

In fact, warehouse management

may be distracted by a business level that is unusually high or low. If business is especially good, higher amounts of commodities may be in the warehouse than usual, and extra energies are used in trying to cope with the pressures of business. If business is not good, there may be extra temptation to cut corners in a number of areas, including fire protection.

7. Fire department officers believe that any fire in a sprinklered warehouse will be held under control until they can begin their suppression attack.

(See Number 1 above)

Again, sprinklers are not a panacea to be depended upon, given all the other problems of improper storage that can be introduced into a warehouse. It is perhaps understandable that fire fighting personnel who benefit so much from sprinkler systems might expect to rely on them and miss other warning signs of an overchallenged system.

8. It is OK for warehouse managers to bring in additional storage-even beyond that anticipated by the sprinkler design-if the additional storage is temporary.

Many accidents of all types happen when someone incorrectly assesses the risk. Allowing "tem-

porary" storage might seem like a reasonable risk, but if the manager guesses wrong everything could be lost. Also, temporary storage has a tendency to become accepted and ignored, again leaving an overloaded sprinkler system in the event of fire.

9. Warehouse employees trained and equipped in first-aid fire suppression-combined with the sprinkler system-will be able to hold any fire until the fire department arrives.

Trained employees usually have not seen the speed with which some fires spread, such as those involving aerosol cans and flammable liquids. Even the most realistic training cannot recreate all likely fire-spread scenarios. In the real "heat" of battle, first-aid fire fighting equipment and training is often outdistanced as soon as the fire begins to spread.

10. On arrival, the fire department's primary responsibility will be to protect the warehouse building and contents.

The fire department may have responded quickly to the warehouse because the contents were in danger, but on arrival there is an established priority of activities that should be understood. The first concern of the fire fighters is determining the need and then

performing any rescues of warehouse personnel. The next concern is protecting exposures, then to assure the safety of the fire fighters themselves. Although they know that theirs is a dangerous activity, fire fighters cannot be expected to go beyond a reasonable level of risk in protecting property.

Where Higher Levels of Protection Are Indicated

- The storage facility is critical to operations and/or contains unusually high values.
- There is a combination of such adverse conditions as excessive clearance from stock to sprinklers, roof construction (such as peaked and sawtooth roofs) that will produce uneven or erratic migration of hot gases, dry pipe sprinkler protection, reliance on a public fire department that may be remote from the location or otherwise delayed in responding.
- There is unusually high loss potential resulting from:
 1. High value of commodities per cubic foot.
 2. High susceptibility of smoke, heat, or water damage.
 3. Limited possibility of salvage recovery.
- There is a possibility of change in

occupancy to include higher hazard commodities.

Working together to eliminate the Myths

The best way to avoid allowing major warehouse facilities to become unacceptable fire risks is to open up better lines of communication among those we are most involved with the problem.

Working alone each participant is unlikely to assure the best possible fire protection.

- As we have seen, the *local fire department* is unlikely to have enough personnel or the time to stay aware of every change in every warehouse that might affect fire prevention or suppression activity.
- *Warehouse managers* cannot be expected to maintain expert knowledge of the history of warehouse fire losses as well as the application of modern fire protection technology.
- *Insurance carriers* provide warehouses with insurance coverage and identify fire-related problems, but they can-

not be the enforcers of safe practices, nor can they communicate changing details to fire departments without permission.

One way to begin improving the situation is to create opportunities to establish rapport among the leadership of the fire department, the warehouse management and the insurance carriers.

Meetings held on neutral ground away from the warehouse and the fire department, and attended by representatives from all segments, can serve to increase the appreciation of all participants for the concerns and problems of others. Local Chamber of Commerce meetings might provide the right environment for an open discussion of roles and responsibilities. A more social dinner might also be useful in establishing the personal relationships that help open up more dialogue.

When the sense of mutual trust grows, it might be time to organize special meetings among insurance carriers, warehouse owner-operators and the fire department to discuss common matters more specifically. The creation of a local task force made up of these representatives will more formally establish the goals and benefits of cooperation and mutual trust.

For Fire Departments: Evaluating the Warehouse Fire Hazard

The fire service needs the ability to correctly assess the fire-related hazard in a warehouse. This can be obtained in several ways, including:

- Using properly trained staff, fire departments should inspect and assess the fire potential.
- The relevant information could be supplied by the warehouse managers themselves. They should understand the technical details of the building, its fire protection systems, and the commodities being stored.
- If the warehouse managers lack particular types of information, they could provide reports from insurance carriers or other consultants retained to evaluate conditions. Insurance carriers may participate in joint meetings with the fire service and warehouse manager to assure an effective exchange of information.

Key to Success: Fire Departments

1. Prepare pre-incident plans for

all warehouses.

Perhaps the most important tool a fire department can have is a pre-incident plan that is tailored for the conditions at each warehouse. The more information available, the easier it is to make correct decisions during planning and during any fire suppression.

Course material-*Preparing for Incident Command* developed at the National Fire Academy in Emmitsburg, Maryland, emphasize three points regarding pre-incident plans:

- The ability of an incident commander to function effectively at an emergency incident is affected by prior knowledge of conditions that may be encountered.
- This pre-incident information has a definite impact on decisions that are made and actions that are taken during an emergency.
- Besides making the job of incident commander easier, pre-incident information fosters additional safety considerations.

2. In order to create a pre-incident plan, fire department officers need to have knowledge of these details, among others:

- The building's construction. Sample questions: Is the interior compartmented? Will the roof's material add substantially to the fire load or create an exposure problem? Is the roof safe for operations? etc.
- The type of materials stored.
- Water supply sources.
- Realistic capability of built-in protection.
- Environmental concerns. Fire suppression attempts at the Sherwin-Williams fire were affected by the knowledge that water run-off from fire fighting would contaminate the city water supply.
- Number, location and emergency training of warehouse personnel.
- Exposure risks to nearby people and property.
- Organizational communication. Will someone from the warehouse be assigned to meet the arriving fire apparatus during an emergency to communicate important information?
- Education. Where will fire personnel get special technical information that will help them handle the situation at this particular warehouse?
- Plant layout. A detailed map is essential in planning fire

suppression activities and developing fire prevention and fire suppression strategies.

- Interagency information. The potential for using support assistance from other agencies exists at most fire incidents.

3. During the inspections, do not assume that the sprinkler system was designed to control the current hazard.

The built-in fire protection systems should be evaluated with the total current storage configuration in mind. Is the design and the water supply still adequate? Are in-rack sprinklers needed to supplement the ceiling sprinklers?

4. Consider warehouse owner-operators as allies rather than enforcement targets.

As has been demonstrated, some warehouse fires are out of control before fire department arrival. The best chance for success is through prevention, and prevention is dependent upon the awareness and willing participation of the owner-operator.

5. Understand that the fire chief's responsibility now extends well beyond fire suppression and fire prevention.

Chief Glenn Alexander, writing in *Fire Chief* magazine after his involvement with the Sherwin-Williams warehouse fire, says, "New

federal legislation now requires fire departments to be notified of local industry contingency plans and material safety data sheets to be filed with the local fire department. Suddenly fire chiefs are scrambling to understand a new accountability. Fire chiefs are also under the gun to exercise new responsibilities should an event occur in which successful conclusion revolves around the newly acquired information. Those mandates are a liability, and more importantly, a newly emerging activity."

Keys to Success: Warehouse Owner-Operators

1. "Success stories" of corporations that seem especially prepared to protect the enormous investments they have in their storage facilities show similarities in three areas of corporate management.

- Awareness of the storage fire problem. An attitude of open communication must exist within the corporation, and the flow of information must flow freely both up and down the internal channels.
- Commitment to loss prevention. An executive-level fire protection engineer is an im-

portant person who can evaluate and advise with regard to the technical issues of loss prevention, while at the same time remaining aware of the realistic financial resources. Also, consulting fire protection engineering firms are available to assist a corporation.

- Commitment of financial resources. Properly considered fire protection initially costs more than incomplete fire protection. The success stories usually are associated with corporations that consistently commit money for properly considered fire protection.

2. "Success stories" of individual warehouses that seem especially prepared to avoid major fire losses show similar characteristics in the attitude of local operating managers.

- Awareness of the storage fire problem. When operating managers are aware that changing commodities and storage configurations can negate the ability of the sprinkler systems to control a fire in their warehouses, they are more likely to keep the fire department as well as corporate management fully informed of current conditions.

- Attention to insurance carrier recommendations.
- Preparation of pre-incident information and planning.

3. Study the fire loss record.

The availability of relevant warehouse case histories will allow busy corporate executives to quickly become more aware of possible failures and the desired success stories. The effect of different management actions seen in the failures and the successes can be studied and compared, leading to more prudent choices relevant to fire protection.

This kind of information is available from a number of sources.

For whatever reasons, having the feeling that the details of a warehouse's fire protection features must be restricted even from fire department use can be counterproductive. It is much more useful to consider the local fire department and the insurer as allies.

4. Build in complete protection with the future as well as the present in mind.

No business manager would design plumbing, HVAC or electrical systems to be only marginally acceptable. But too often, fire protection systems, which are not

used every day, are not given the same considerations and are subject to marginal or minimum design.

5. Anticipate the effects of change.

One of the biggest hazards is change itself. A corporate executive may be satisfied that a warehouse is built with fire protection in mind. But if it is a dynamic facility, as it will be in a dynamic company, then change will be a fact of life. And the changes could introduce dangerous practices.

But hazardous change is usually a slow, creeping process, and corporate executives are rarely informed of the changes. They should be.

6. Consider the local fire department as an ally.

Owner-operators can heed the words of Factory Mutual's *Record*, in a 1984 article: "Working with your local fire department to prefire plan your facility can ultimately make the difference in the fire's destructiveness.

"Prefire planning is a partnership between your local fire department and your company. Through prefire planning inspections, a fire department gathers information on your building's layout, occupancy, protection systems and shut off. Should a fire ever occur at your facility, the department then knows

how to fight the fire quickly, efficiently and safely with the least amount of dollar loss to your company."

7. Learn more about fire protection factors.

Among the topics the owner-operators can become more familiar with are the fire protection implications of:

- Storage configurations: How does a change in storage quantity or arrangement affect the fire risk?
- Commodity classes. What types of storage present the greatest hazards, and how can the danger be controlled?
- Fire areas. How does the size of each open area of storage affect possible fire spread?
- Fire walls. When is a fire wall inadequate to separate a fire area? And what effect do the openings have?
- Building construction. What construction features contribute to early collapse when a fire starts?
- Material handling. What kind of practices are often associated with fire ignitions in warehouses?
- Manual fire fighting. Is the training adequate and realistic, and what is the limitation of first-aid fire fighting?

- Environmental impact. Will water runoff threaten to contaminate a public water supply, forcing the fire department to withhold water and let the fire burn itself out?

- Pre-incident information. Has all possible information been shared with those who also want to avoid total destruction of a warehouse?

8. Learn more about fire prevention

Control of ignition sources can be more important than fire suppression. Other items to check are housekeeping, maintenance of electrical systems and lift trucks, and supervision of valves and pumps.

9. Support codes and standards through research.

Promote and actively participate in national research projects to investigate improved fire protection technology which can be incorporated into codes and standards to help solve the warehouse fire problem.

Keys to Success: Insurance Industry

1. Share the available technical information.

Insurance carriers can serve as an important technical resource.

They have a vast wealth of knowledge and experience that can be useful to the local fire department as well as warehouse management.

The experience comes from long exposure to the lessons from warehouse fire protection success stories as well as failures.

The knowledge comes from exposure to the details of a particular warehouse, coupled with the technical expertise to evaluate the condition of the warehouse.

2. Work to educate the warehouse owners and managers about the benefits of mutual trust and sharing information with the local fire department.

Confidentiality remains an issue, however, and the insurance carrier cannot share information without permission from the owner-operator. But the insurance carrier can work to educate the owner-operator about the benefits of open communication. Then the insurance carrier can provide useful information to help the owner-operators in their communications with the fire department. Also, insurance carriers have the ability to conduct specialized warehousing storage seminars.

3. Continue to support research on warehouse fire protection.

The insurance industry has been a leader in state-of-the-art fire research testing programs going back to the 1950s. This research is a valuable resource to the fire service and warehouse owner-operators. Many of the test programs are a joint effort with the corporations which manufacture or warehouse the commodity being examined.

4. Continue to provide leadership in codes and standards development addressing warehouse and other fire problems.

The insurance industry has had active involvement with the National Fire Protection Association since its formation in 1896. Insurance industry representatives bring to the various codes and standards committees a balance of knowledge and a broad exposure to loss experience. The codes and standards guide the warehouse owner-operator both in preventing losses and in protection of facilities as well as give support to the fire service in mitigating the fire emergency.

