HPR
The Stamp of Success?

by Walter P. Luker

The term *highly protected risk* (HPR) is primarily associated with fire sprinkler systems, but much more is required in order to minimize industrial property losses. HPR involves complete facility protection, and its value goes beyond just the security of physical property.

One significant loss potential for an organization is the loss of a market for a product. This uninsurable danger can have devastating effects. If a company's product is destroyed by a fire, its customers simply find another supplier. When this happens, that market is sometimes never regained and the business is forced to close.

The investment in HPR status reaps benefits for all concerned—including a defense against damaging incidents

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Reality Check

Given unlimited financial resources, the development of a nearly perfect HPR building would be simple. However, most risk managers typically deal with pre-existing, imperfect facilities and budget constraints. Even though you may fall short of perfection, you can maintain HPR status by identifying, controlling and monitoring deficient circumstances, as well as using the Plus techniques. Of course, in some cases, where modification is not affordable, an underwriting impact (higher rates and deductibles) may be necessary.

that could shut a company down for good. Risk managers protect the assets and market share of their organization and expect favorable insurance rates and, in some cases, leverage in seeking to insure less attractive properties. And, for the underwriter, HPR means good business with favorable loss experience.

But does having an HPR facility ensure risk management success? Landmark large losses have demonstrated that "highly protected" can create a false sense of security. But there are also success stories. By using the COPE-Plus approach (an improved version of the traditional Construction, Occupancy, Protection and Exposure considerations), you can create or renovate your facility to make it an effective HPR.

Construction

Analyzing the risk aspects of construction involves an examination of materials and the design of both the exterior shell and the interior components.

Materials should be classified as either fire-resistive, noncombustible, approved or a combination of these, depending on the use of the building. Fire-resistive construction is composed of heavy masonry material (with no exposed steel) and will withstand fire exposure for a period of time. Noncombustible elements include steel and other metallic materials that will not burn, but will fail within a relatively short time when exposed to intense fire (1000˚F or greater). Approved construction materials will burn under certain conditions, but present a minimal hazard relative to the spread of fire and smoke. Components such as roofing materials and insulation come with an approval or listing from Factory Mutual, Underwriter's Laboratories or other building codes or authorities.

The presence of non-approved construction materials can offset other favorable HPR features and increase the magnitude of a loss. This is especially true if the presence of such elements is not acknowledged and dealt with.

The layout of your facility's interior is also an important part of HPR qualification. Depending on the use of the facility and the insurable values involved, there may be a need to segregate hazards. This is accomplished using firewalls, fire partition walls, explosion resistant walls and venting, and detachment (a separate building at a safe distance).

But fire is not the only peril that is mitigated through construction. Consideration must be extended to concerns such as horizontal wind loading on building walls, the resistance of roof covering to wind uplift and heavy hail storms, and roof load design (along with roof slope and drains) as affected by potential excessive water accumulation, snow load and drifts.

Of course, these items are best handled during the planning and design stage prior to construction. However, the proper measures can help minimize risk in a less than perfect situation.

For example, re-roofing projects present an opportunity to replace combustible Class II Metal Deck (MD) roofs with Class I MD noncombustible materials. The landmark fire in Livonia, Michigan in the early 1950s is testament to the the combustibility of Class II MD roofs, due to the adhesive used, its application and the insulating materials. A fire beneath such a roof can heat the underside of the steel deck and cause combustible vapors to escape along the seams of the decking, allowing a fire to spread above the sprinkler system and far beyond the initial fire site.

(If the roof is wood-constructed—heavy plank or plywood—the exposure can be minimized only by controlling ignition sources and providing automatic sprinkler protection. If the values are very high, you can expect an underwriting impact.)

Here is an example of how an HPR improvement might materialize:

A loss control engineer notes that the MD roof covering a large, high-value warehouse is in poor condition (leaking and subject to wind loss). She recommends re-roofing with approved Class I materials. The risk manager stresses the importance of these materials with plant management and corporate or project engineering. After appropriate specifications are included in the roofing contract, plans are submitted to the loss control consultants and the needed approvals and follow-up

inspections occur.

Now, if a high-challenge fire occurs in this warehouse, the roof would not be a negative factor. Knowing this, insurance companies should grant lower-cost coverage. Without this HPR process, the replacement roof might have ended up with unprotected polystyrene insulation, which is great for energy conservation, but even more combustible than the original roof.

Keep in mind that local building codes represent minimum standards, based on experience and practicality with various types of structures. Large collapse losses normally involve conditions that exceed those anticipated by the standard or code committee. These major incidents are triggered by a combination of abnormal and undesirable factors such as heavy snow followed by a heavy rain, a deep freeze, and then more snow, along with high wind conditions. Considering this, don't be surprised if your loss control consultants offer recommendations that are more stringent than building code. Their advice may relate to industry loss experience and merits consideration.

Occupancy

Occupancy relates to the operations, processes and storage within a facility. These issues impact other aspects of the COPE-Plus approach, the most common being combustible loading within buildings and the sprinkler protection required. Of equal importance is the facility layout relative to the separation of hazardous processes and storage. The remaining occupancy considerations concern the production process.

The manufacture of most products requires hazardous operations, both routine and specific to the product. These are referred to as common and special hazards, respectively.

Common industrial hazards include boilers and heating equipment that run on natural gas, propane, fuel oil, etc. These hazards can be controlled using the appropriate equipment design, including combustion safeguards and interlocks. Basically, a unit should be designed to automatically shut down as a result of an un-

safe condition. Using such safety control measures and properly maintaining and testing equipment significantly reduces the danger these processes present.

Other common occupancy hazards include electrical equipment and power distribution systems, air compressors and combustible cooling towers. For these, there are specific standards and maintenance procedures, such as using infrared scans to identify potential malfunctions in electrical systems.

Special hazards involve processes and equipment that present a greater potential for loss unique to a specific industry.

For example, the heat treating of metal components occurs within a furnace at around 1700˚F. Once the metal is white hot, it is moved to the next compartment of the furnace and plunged into a quench bath of combustible oil or water. Automatic doors and flame curtains are required to prevent an explosion. Some heat-treat operations also involve many furnaces in a large area, adding to the loss threat.

Other special hazards include the chemical recovery boilers used in the pulp and paper industry, and chemical reactors. Adherence to property loss control standards and guidelines can incorporate these volatile aspects of industry into an HPR system.

DON'T BE SURPRISED IF YOUR LOSS CONTROL CONSULTANTS' RECOMMENDATIONS ARE MORE STRINGENT THAN BUILDING CODE. THEIR ADVICE MERITS CONSIDERATION.

Protection

Protection, or more specifically, automatic sprinkler protection, is a requirement for HPR status, unless the risk involved is what underwriters refer to as "pig iron under water"—it absolutely can *not* burn. Additionally, there are other special protection systems required for special hazards, including deluge water spray, dry chemical and carbon dioxide.

It is important to remember that all sprinkler systems do not provide equal protection. The size of piping within the sprinkler system network can vary up to 300 percent, the opening of the sprinkler head upward of 200 percent. The system design is based on the discharge density over an area. This is measured in gallons per minute per square foot of floor space and ranges from 0.10 gpm per sq. ft. to 0.60 gpm per sq. ft.

System design must match combustible loading and any changes to that. Take, for example, a design of 0.45 gpm per sq. ft. over a 3000 sq. ft. area for a finished goods warehouse. If the commodity is changed (e.g., more plastics), the additional heat released from a fire could open heads in a 6000 sq. ft. area. As heads beyond the design area of 3000 sq. ft. open, the already inadequate density of 0.45 gpm starts to decline. The domino effect, as the fire area keeps increasing and the density keeps decreasing, results in feed mains being pulled apart as the steel load-bearing structure fails within 10 to 15 minutes.

An adequate sprinkler system also depends upon an adequate water supply. Connections to public mains are common and often sufficient to maintain HPR status. But as combustible loading and values increase, there is a need for multiple, stronger water supplies, such as booster fire pumps (arranged to increase the pressure where water supply volume is adequate) or fire pumps with suction reservoirs. Fire pump installations should be in strict accordance with recognized standards. Inspection, maintenance and weekly testing are also critical. A landmark fire occurred in an HPR facility where the power supply for the electric motor-driven pump happened to be routed through the initial fire area, and failed. Conditions became worse when the diesel engine shut down because of a lack of combustion air (due to an attempt to conserve energy) and another classic domino effect was sparked.

Because the layout and storage arrangements for many facilities are often revised, team effort between risk management and loss control is critical. If management has advance notice that protection will be affected because of a potential change, they can consider the added adjustment costs in their evaluations and budgets. If the problem is identified after the change is made, it is likely that the needed protection upgrade will be delayed. During this period, a major loss could strike, such as the landmark roll paper fire in 1969 that occurred when upgraded sprinkler protection was being planned.

Finally, consider alarm systems, guard service and combinations of the two. Quality alarm systems are invaluable in alerting facility personnel to an emergency and transmitting the signal to an offsite center.

Exposure

Exposure is normally out of the risk manager's control except during initial site selection and construction. Exposures arising from neighboring properties, aircraft landing strips, railways and flood zones, which can develop after a site has been selected and developed, provide tricky circumstances for risk managers. For such unavoidable exposures, some mitigation can

help to maintain HPR status.

For example, it is possible to build on a site not originally considered a flood zone, but due to continual construction, paving and grading, storm drains and waterways may not be able to handle extended, heavy rainfall. Address this issue by developing emergency action plans for flooding.

Or, if your organization decides to build in an earthquake zone, consult with local earthquake design specialists in addition to your loss control consultants. Proper design can make a drastic difference in the event of a serious earthquake. Pay attention to items such as sway bracing for sprinkler systems and earthquake actuated shutoff valves for natural gas lines.

Plus

The closer you can come to meeting the preferred COPE features, the safer your facility will be, and the more likely it will rate the status of HPR. But in order to gain the full benefit from your investments, more is required.

There are programs related to the human aspect of property loss control, including procedures for maintaining and testing protection equipment, handling unusual occurrences and emergencies and dealing with the hazards that humans sometimes create. Critical Plus programs include:

Facility Protection System Inspection and Testing Procedures—An effective program will insure to the greatest extent possible that protection systems remain in service.

Handling Impaired Protection—Many landmark fires in HPR facilities happen when protection is out of service.

Permit System for Cutting and Welding—Hot work precautions listed on the permit should be followed every time such work is done outside of designated maintenance areas. This applies to both facility personnel and outside contractors.

Plant Emergency Organization (EO or PEO)—The effective use of a fire extinguisher can douse a fire in its initial stage before the operation of a single sprinkler head, but employees should be well trained and backed up by coworkers. During a major incident, someone would notify the fire department, appropriate evacuation would take place, hazardous processes would be shut down, and others would respond in accordance with their assignment and training (sprinkler valve attendant, fire pump attendant, etc.).

In conclusion, no, HPR status cannot ensure success; property losses will always occur. But the odds of successful prevention and mitigation can be improved with engineered protection by considering all the COPE building blocks, supplemented by effective Plus elements. RM