Best Practices

Handling Impairments to Fire Protection Systems

By Walter S. Beattie

Fire protection systems must be maintained in operational order. When they are not functioning properly, they should be quickly repaired and returned to service.

Some of the largest industrial fires in history have occurred when systems were out of service or impaired. One example is the fire at MacFrugal's Bargains-O-Closeouts Inc. in New Orleans, LA, a rack storage warehouse with storage to a height of approximately 65 ft. After an initial fire was controlled and extinguished, the sprinkler systems were shut down. Improper handling of these impaired fire protection systems is reportedly a main contributing factor that led to a second fire, which totally destroyed a 1.2-million-sq-ft warehouse.

Fire Protection Is the Norm

Fire protection and detection systems are installed in businesses throughout the U.S. Many municipalities now require all new construction of businesses, assembly occupancies and even single-family residences to be provided with both detection systems and automatic fire protection systems. People are now accustomed to seeing sprinkler heads in manufacturing facilities, offices, high rises, hospitals, hotels and even some homes. Computer rooms and areas that house sensitive electronic equipment are protected with gaseous suppression systems. Explosion suppression systems are installed in flammable vapor and dust-laden atmospheres. Chemical occupancies and aircraft hangers are protected with deluge and foam systems.

Fire pumps are needed to supply adequate pressure and volume for many of these systems. Insurance underwriters, fire departments, plant safety managers and risk managers all recognize the importance of these systems. Each depends on the systems being installed properly, maintained in proper working condition, and ready to operate in the event of a fire or other unusual conditions. Thousands of dollars are spent to install the systems so that facilities are adequately protected against fire. It is critical that they be maintained in operational order—and when they are not, they should be quickly repaired and returned to service.

Proper Care of Fire Protection Systems

Once physical fire protection systems are installed in a facility, they must be properly managed and maintained. NFPA has codes and standards covering these issues, including NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems. Standards also exist for gaseous, dry chemical, kitchen range,

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Sprinklers

Viking has expanded its Mirage line of commercial concealed sprinklers to include two new quick-response, extended coverage products. The VK632 and VK634 sprinklers are listed for 135 °F, 155 °F, 175 °F and 200 °F temperature ratings. Flat-plate sprinklers include a push on, thread off cover plate for easy installation without use of a ladder. Cover plate options are available in nine standard finishes and 900 custom colors.
Request 25 at www.psads.info.

Employee Training

The BullsEye fire extinguisher training system from **BullEx** is designed to simulate the discharge of a dry chemical extinguisher for a completely clean, safe, effective training experience. System's digital panel responds to the laser extinguisher as the trainee aims and sweeps. Product uses a conical laser to replicate extinguisher discharge, making it ideal for training in an actual work environment where an extinguisher might be used. System features an onboard rechargeable battery and a speaker that simulates the sound of a discharging chemical extinguisher.
Request 26 at www.psads.info.

alarms, fire doors and other facility protection systems.

In addition, a facility should have a human element program in place. One component of that program should be a mechanism to ensure that installed fire protection systems are in proper operational condition. If equipment is not properly tested and appropriately maintained, facility occupants may be lulled into a false sense of security.

Proper operation of fire protection systems has far-reaching ramifications. Failure of these systems to operate can lead to significant losses that would not otherwise occur. The insurance premiums a company pays may be reduced because it has installed fire protection systems and safeguarded its operations.

In addition, the fire department will rely on alarms and fire protection systems being in service. The fire department's preplanning anticipates that the facility's sprinklers will operate and control a fire until firefighters arrive. A company's risk manager has developed business contingency plans based on limited fire damage because of the installed fire protection systems and may not anticipate a total loss of an entire facility.

Fire pumps supply adequate pressure and volume for many fire supression systems. In this impairment, the pump's main discharge value is shut off.

Impairments Must Be Considered

A facility's human element program should also include a comprehensive written fire protection impairment handling program. The impairment program outlines measures to be taken before, during and after any impairment to ensure that increased risks are minimized and that the duration of the impairment is limited. An impairment coordinator should be assigned to oversee this program. This person should designate individuals to oversee program implementation during his/her absence.

An impairment occurs when an alarm, fire or explosion suppression system is shut off or otherwise removed from service, completely or in part. While impairments are necessary during maintenance, renovation, new construction or because of failure, all involved must understand that a facility is at greater risk of major loss during this downtime. Whether an impairment is planned or accidental, precautions must be taken to provide temporary protection, reduce hazards and ensure prompt restoration.

Types of Impairment

Impairments can be categorized as emergency, planned and hidden. An emergency impairment occurs when an unforeseen incident or accident partially or totally impairs the system's operation or effectiveness. Examples include a system shutdown to repair a sudden break in the piping or to replace a sprinkler head damaged by forklift impact. In the case of MacFrugal's, the emergency impairment occurred after a fire, when sprinkler heads needed to be replaced.

A planned impairment occurs when a detection,

Best Practices continued on page 62

While impairments are necessary in various situations, all involved must understand that a facility is at greater risk of major loss during this downtime.

Industry Resource

The 20th edition of **NFPA's** *Fire Protection Handbook* is now available on CD, allowing users to search the two-volume, 211-chapter handbook by word or phrase. Handbook features 25 new chapters on topics such as premises security, protecting against extreme events, flammability of materials and evacuation strategies. More than 250 leading experts contributed to the book.
Request 27 at www.psads.info.

Alarm System

Notifier's NFS2-640 intelligent fire alarm control panel is designed for medium-size applications. Panel comes with one expandable signaling line circuit, which supports up to 636 intelligent devices. Device has four notification appliance circuits with built-in synchronization protocol for System Sensor, Wheelock and Gentex horns, strobes and horn/strobes. Product can be expanded via the NOTI•FIRE•NET intelligent fire alarm network to accommodate future facility growth and expansion. Built-in QWERTY keypad enables users to easily perform basic programming and maintenance functions.
Request 28 at www.psads.info.

Flame Detection

Model FL3111HT from **General Monitors** is a high-temperature (125 °C) ultraviolet (UV) optical flame detector designed to detect fires while maintaining false alarm immunity. Device detects only in the UV spectral range for optimized speed of response. Its electronics are integral within its stainless steel explosion-proof housing, allowing information to be processed at the point of detection.
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Best Practices

continued from page 61

fire or explosion protection system must be shut down for maintenance or modification (e.g., shutting down a sprinkler system to add or to relocate sprinklers). While this may seem a simple task, many losses can occur during this downtime.

A hidden impairment is one that is not known to exist—and it is the most serious. A system may have been shut down for repairs and inadvertently left out of service once work was completed. A system might have been shut down without proper notification, in error or as a result of a malicious act. Such impairment may exist for days or even weeks if an adequate self-inspection program is not in place. A good inspection program can reveal a hidden impairment, allowing prompt restoration of vital protection equipment.

Impairment Program Guidelines

As noted, a site should have an assigned impairment coordinator. The building owner is responsible for managing impairments. In the owner's absence, a designated person should be appointed. Where there is a lease, written use agreement or management contract that specifically grants the authority for inspection, testing and maintenance of the fire protection system(s) to the tenant or management firm, that person or entity must assign a person as impairment coordinator. This is part of the NFPA standards and several U.S. cities also require impairment handling by law.

The coordinator's responsibilities include the following:

- Follow the written impairment handling program.
- Inform supervisors and facility occupants that fire protection systems will be shut off.
- Ensure that areas affected by impairments have a fire watch. A fire watch should consist of trained personnel who continuously patrol the affected area. The ability to promptly notify the fire department is an important item to consider. During patrol, personnel should look for fire and should also make sure the building's other fire protection features, such as fire extinguishers, egress routes and alarm systems, are available and functioning properly.
- Curtail all hazardous operations until protection is restored.
- Relocate combustible materials from the impaired sprinkler area to an area protected with sprinklers, if possible.
- Enforce strict no-smoking regulations throughout the affected area.
- Prohibit welding, cutting or any other hot work in the affected area.
- Provide additional manual protection in the impaired area with ready access to portable extinguishers and/or a charged fire hose.
- Have tools, parts and qualified people available and ready before shutting off protection.
- Work continuously until repairs are completed and protection is restored.
- Physically check the valves after restoring the systems to operation. A main drain test should be conducted

An impairment tag identifies equipment that is closed or otherwise shut down. Alarm panels such as that shown above should also be tagged.

after the valve or valves are reopened. Other functional tests should also be conducted to verify that the system is placed back into service appropriately.

In addition, an impairment tag should be used to identify equipment that is closed or otherwise shut down. This tag should be posted at each fire department connection and system control valve, indicating which system has been removed from service. Alarm or actuating panels, such as a panel controlling gaseous agent suppression systems, should also be tagged.

The tag at the fire department connection alerts responding firefighters of an abnormal condition. It should identify which area of the system is out of service and indicate which portion of the building or equipment is controlled by the shut valve or panel. Space should be provided for an authorizing name, signature and date, as well as for the name, date and time when the system is restored. If the impaired protection is a sprinkler system, space should be provided to record the static and flowing pressures of the main drain test.

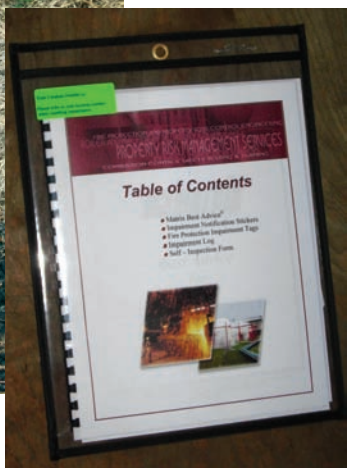
Also, a reminder tag should be placed in a conspicuous location to remind facility management that the system is impaired. A tag placed only on the system riser could go unnoticed for an extended period. The tag should be brightly colored so it is noticed immediately. Many insurance carriers provide tags printed on fluorescent green or orange cardstock. Other carriers provide electronic versions printed on brightly colored cardstock. A company can also create custom tags.

Steps for Handling an Impairment

Several key steps should be taken to ensure that a system impairment is properly handled.

- Coordinate planned impairments with area supervisors. Plan only one impairment at a time. Work continuously and prohibit workers from leaving an impaired system for breaks or meals. If work is stopped and continued the next day or if work breaks are to be taken, the system should be returned to service for the time that work is not performed.
- Shut down only the portion of the fire protection system on which work will be performed. Sectional control valves may be used to help isolate the impaired areas of underground repairs.

For example, one may unscrew pipe from a fitting immediately upstream of the repair area, cap or plug the end and return the remainder of the system to service while repairs and alterations are made to a small portion of the sprinkler system. In every case, portable or manual firefighting means should be available and additional equipment provided as appropriate.



(Left): This post indicator valve is shut off and has been tagged as impaired.

(Below): A written fire protection impairment handling program outlines measures to be taken before, during and after an impairment to ensure that increased risks are minimized and that the duration of the impairment is limited.

- Verify whether the company's insurance carrier has notification requirements and comply where applicable. Include the agent's and insurer's requirements in the plant's emergency procedure manual.
- Notify the company that monitors the site's alarm system. Improper notification may lead to fire department or emergency service response—and some municipalities charge for false alarms.
- Call the local fire department or fire dispatch center. Depending on the facility, the fire department's protocol may change its response assignment to include additional equipment or manpower. This will help ensure that the department has the equipment and manpower to safely attack a fire in the unprotected portion of a facility. Some fire departments will have an engine company respond to review the impairment or to stand by during the downtime if the risk is great.
- Notify department heads and the members of the plant emergency response group.
- Properly tag affected equipment. Remember that more than one tag may be needed for a single impairment. A reminder tag or sign should be displayed to serve as a constant reminder that a system is impaired.
- The coordinator should follow the procedures in the impairment program regarding hot work, no-smoking policies and providing a fire watch.
- Work continuously to make the needed repairs quickly. When performing large alterations, such as when building a new addition, the sprinkler systems and alarms must be returned to service each evening. The 30 minutes needed to put a system back into service at the end of the day are well worth it.
- After repairs are completed, the impairment coordinator should verify that all sprinkler valves are opened and locked. A main drain (2-in. drain) test should be conducted on affected sprinkler systems. Alarm service should be restored to fully active status.

All parties notified before the impairment should be notified that all equipment has been returned to service. Tags and documentation should be filed for review by the authority having jurisdiction and for critique by company management and the safety committee.

Emergency impairments do not lend themselves to the luxury of having advance planning and notification. These types of impairments include:

- sprinkler system leakage due to physical damage;
- interruption of water supply, possibly due to an underground water main break in the neighborhood;
- frozen or ruptured piping;
- equipment failure;
- shutdown of a system to replace sprinkler heads after a fire event.

When emergency impairments occur, emergency action should be taken to minimize potential injury and damage.

Following impairment procedures is an important facet of a comprehensive management program. An effective impairment program will reduce the potential for a major fire loss at any facility.

Walter S. Beattie *joined the volunteer fire service in 1969 and remains involved in fire suppression and protection. He has worked in the highly protected risk insurance field since 1979 in various capacities, including senior loss control specialist, HPR technical manager, underwriting special agent and account engineer. Beattie is currently senior consulting engineer, insurance service, with Matrix Risk Consultants Inc., Miamisburg, OH. He was named 2007-08 Safety Professional of the Year by ASSE's Fire Protection Branch. The branch recently became ASSE's newest practice specialty, and Beattie serves as its Assistant Administrator.*

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