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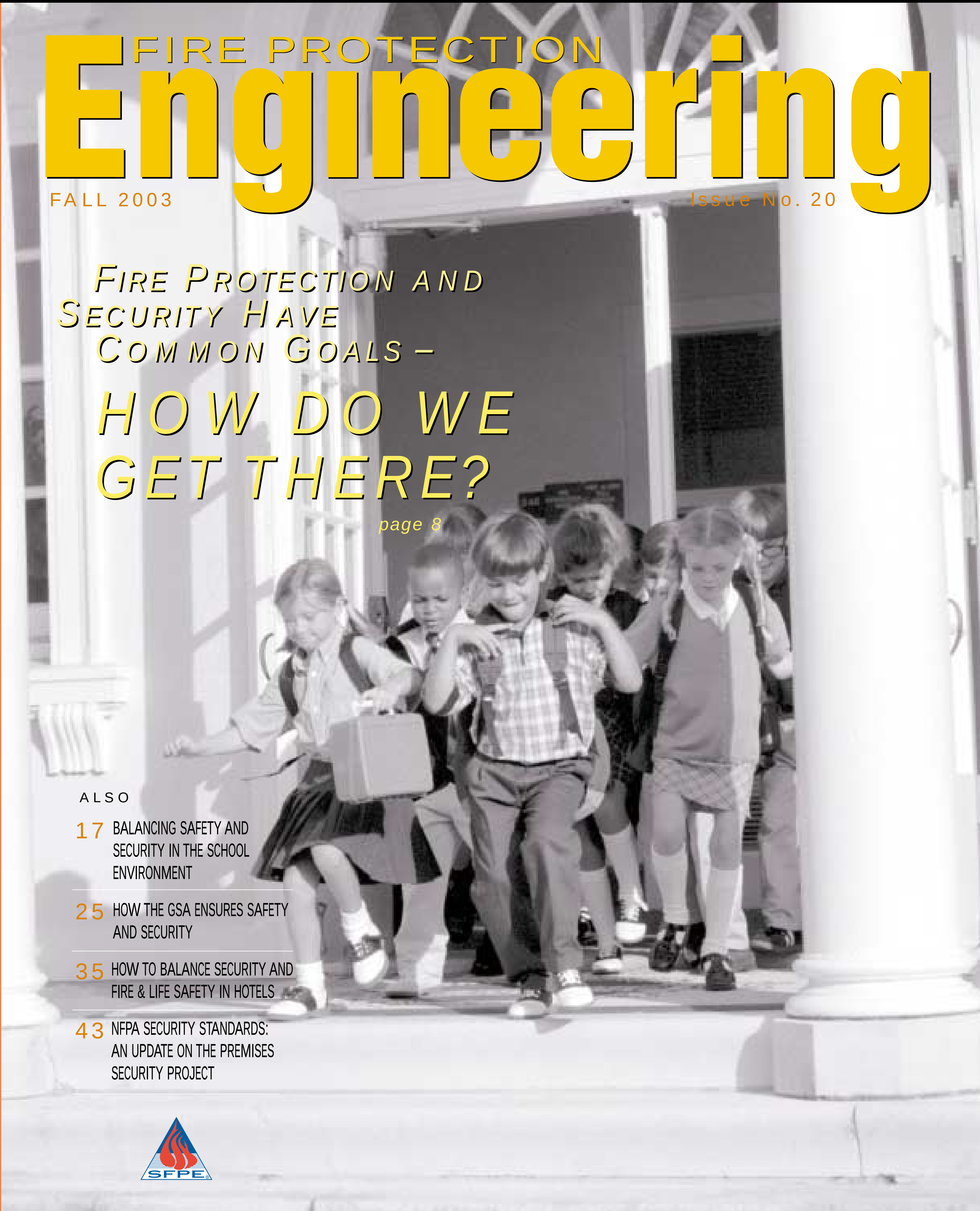

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Life Safety or Security... Must We Choose?

History has many examples of major fires with tragic results because the means of egress had been compromised in the name of security. The most tragic examples include the Triangle Shirtwaist Company where 146 persons died, Imperial Chicken Processing Plant in North Carolina where 25 were killed, Our Lady of Angels School in Chicago in which 93 students and staff perished, the Happy Land Social Club in New York where 97 died, and the Beverly Hills Supper Club where 165 died, to identify just a few. Countless other improperly secured exit doors have been found and corrected during routine inspections before devastating fires could occur.

Historically, fire protection engineers were taught not to allow the security needs of a project to supercede fire protection and life safety requirements. Only after all fire and *Life Safety Code®* requirements were met could consideration be given to the project's security needs, with no exceptions. Regardless of the property, the occupancy, or the risk, if the *Life Safety Code®* contained a requirement, there was no wavering in favor of security. Even if *NFPA 101M,* and now *NFPA 101A,* could be used to provide some relief, it may not be acceptable to the Authority Having Jurisdiction, especially if the relief from the prescriptive code requirement was strictly for security. After all, the local fire marshal is likely part of the fire department that has plan-review responsibility. There is never an opportunity for a security review in the plan-review process.

The 1989 movie *Lean on Me,* starring Morgan Freeman as Principal Joe Clark, was a vivid example of the conflict building owners must face when deciding in favor of security or life safety. Principal Clark was tasked with turning a failing inner city high school into a successful learning institution. He identified a major threat to his school and the success of his students as nonstudent drug dealers gaining access through unmonitored exits. To prevent this unauthorized access and the dangers that accompanied it, he ordered those exits to be chained and locked, making them unavailable for use by building occupants in an emergency. This obvious violation of the local fire and building codes was used by Clark's opponents to gain his ouster as principal. The local fire marshal found Principal Clark in violation of the local fire codes, arrested him, and led him away in handcuffs.

Was Principal Clark's decision to chain and lock the doors the best one? Obviously not. Were there legitimate reasons for him to take these actions? Absolutely. Clark determined the risks presented by the unauthorized access to his school by the criminal element were significantly greater than those of a rapidly intensifying fire. He took additional steps to minimize the fire risks by positioning his staff members near the locked doors with keys so the doors could be opened quickly in the event of an emergency.

Security professionals and fire protection engineers must partner when planning new construction or building renovations. Together, these individuals need to identify the minimum code requirements, the mandated and prudent fire protection measures, and the proper security protections. Additionally, they must determine the best way to include these in the project design. Disregarding the needs of either the fire protection engineer or the security professional to meet the requirements of the other is not an option. This is not to say compromise is not possible. On the contrary, compromises will be necessary. However, these compromises cannot make the facility any less safe for the occupants nor can they make the facility less secure.

What can be done to satisfy these seemingly conflicting goals? First, the fire protection engineer must understand the security requirements. A complete explanation of the desired security protection is needed, not an edict on what is to be done. Secondly, the security professional must realize it may not be possible to eliminate vulnerabilities introduced by required means of egress components shown on the plan. The relative risks of implementing measures specified by one discipline must be evaluated against protective measures required by the other. For example, a door on the back of a building in an area that is only occasionally occupied may solve a travel distance problem for the fire protection engineer but creates an obvious vulnerability to the security professional. Working together, the two professionals can specify a solution that solves each problem. Maybe the door can be relocated to a constantly attended area where monitoring is possible. Exterior hardware could be omitted making the door more secure. Changes to the installed fire protection may increase the permitted travel distances. Or a horizontal exit may be possible, eliminating the need for the exterior door altogether.

Other aspects of fire protection that initially do not appear to be related to the security of a facility need to be considered by both the fire protection engineer and security professional. For example, when considering the overall fire safety of a facility, a less flammable interior finish material in conjunction with enhanced fixed fire protection may allow increased travel distances, lessening the need for doors which can create security vulnerabilities. Increased interior compartmentation may allow horizontal exits in lieu of exits directly outside. Interlocking of building fire alarm systems with access control devices may provide both enhanced security and life safety.

The security professional must identify those potential security flaws that could be exploited by the fire protection and life safety systems. For example, Andrew Golden and Mitchell Johnson, responsible for the school shooting in Jonesboro, Arkansas, in 1998, used the fire alarm system to evacuate the building, placing the evacuees in a vulnerable position where the two boys could shoot them. A fire alarm system with a presignal feature could have eliminated this.

The type of occupancy being protected must also be a considered. In today's information age, large "server farm" buildings are becoming common. Using the traditional approach to fire protection and life safety, the buildings would be classified as business occupancies. The actual occupant load of these facilities is quite small, generally only a few dozen people in a building that could hold thousands. The fire protection engineer and the Authority Having Jurisdiction must recognize and acknowledge this reduced occupant load, and adjust the means of egress requirements accordingly. Further justification for reduced means of egress is the enhanced fire protection features found in these type facilities. The fire protection systems are designed to detect the fire early and suppress it quickly. It is also critical that these facilities be provided the highest possible level of security.

A secure facility does not have to be unsafe. Likewise, a safe facility does not have to be unsecured. Through collaboration between the project team members, including the architect, fire protection engineer, and security professional, a building that is both safe and secure can be designed and delivered to the building owner.

David C. Martini is with the Department of Defense.

ASHRAE Document Helps Engineers Avoid Legal Pitfalls

A document published by the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) describes how engineers can avoid disputes and litigation by identifying common pitfalls that can lead to exposure.

The "ASHRAE Member's Survival Guide: Avoiding Pitfalls in Engineering Practice" also suggests sound business and professional practices to help avoid these pitfalls.

"Engineers have all the potential for disputes and legal exposure if they fail to take appropriate steps to protect themselves in business or exercise reasonable care in the performance of their duties," author Frederick Kohloss, P.E., says. "Since disputes and litigation are costly, time-consuming, burdensome, and extremely stressful, every effort should be made to avoid them."

The document addresses professional responsibility; pre-engagement discussions with clients and owners; contracts; investigation of factors that influence design, planning, and execution of designs; preparing plans and specifications; and reviewing requests for information, shop drawings, and other contractor submittals.

The cost is $16 for ASHRAE members and $19 for nonmembers. For more information, visit www.ashrae.org.

New Research and Education Collaboration

Worcester Polytechnic Institute (WPI) and commercial and industrial property insurer FM Global have announced a new memorandum of agreement (MOA), which will increase their collaboration on fire research and fire protection engineering graduate education.

As part of the agreement, FM Global will provide more than $570,000 in financial and equipment contributions to WPI. Funding will support a WPI fire protection engineering professor to be designated as the FM Global Scholar as well as the work of graduate students. FM Global also is donating two state-of-the-art fire propagation apparatus for use in WPI's Fire Science Laboratory.

"We are grateful for FM Global's generous support and the recognition of our unique fire protection engineering program," says John F. Carney III, WPI's provost and vice president for academic affairs.

WPI professors and graduate students have been working with FM Global scientists, researchers, and engineers, and taking advantage of their laboratory facilities for decades.

"We believe this agreement will further strengthen our relationship with WPI's premier program in fire protection engineering and will provide its students with added educational value," says Dr. Paul Croce, FM Global vice president and manager of research.

For more information, visit www.wpi.edu or www.fmglobal.com.

Fire Protection and Security Have Common Goals – How Do We Get There?

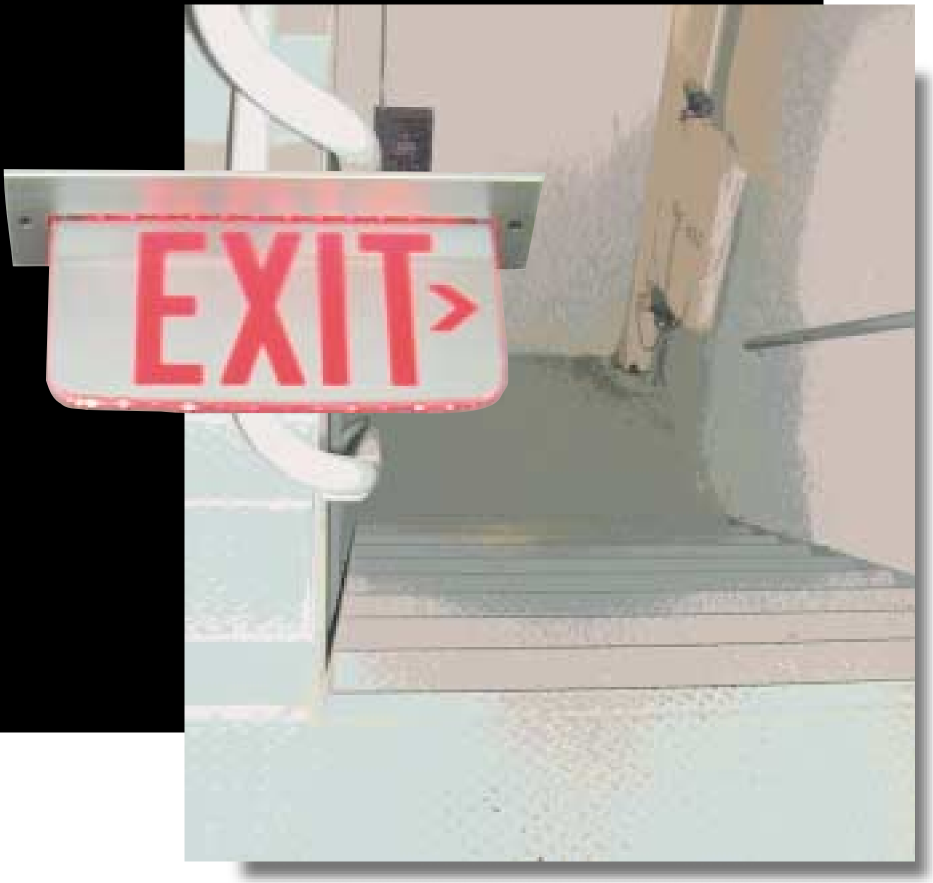
By Bert M. Cohn, P.E., CPP

The Triangle Shirtwaist fire in New York City on March 25, 1911, killed 146 workers. That factory was described as a "sweat-shop" in which fire exits had been locked, reportedly to prevent the theft of goods. About 500 workers – mostly young, immigrant women – were at work on that Saturday afternoon, making the popular high-necked blouses worn with long, dark skirts, the uniform of working women of the day. At 4:30, shortly after the quitting bell rang, there was a muffled explosion and smoke began pour out of the eighth-floor windows. Flames quickly spread out of control. Locked exits and a fire escape that buckled under the weight of fleeing workers resulted in many of the deaths.[1] Dozens jumped to their deaths from windows on the eighth, ninth and tenth floors.

At the turn of the 20th century, the conditions under which these immigrants worked were prevalent in many industries. As a result of that fire, the laws and building codes were changed so that such an incident would not occur again. The Triangle fire sparked widespread outrage about domestic labor conditions, and by the 1960s and '70s, sweatshop operations had ended.[2] Or so it seemed.

Within the last few years – eighty years later – factory fires resulting in multiple fatalities at least partially attributed to locked or blocked exits, or barred windows have been occurring with some regularity in the U.S. and elsewhere:

- A fire at the Imperial Food Products plant in Hamlet, North Carolina, on September 3, 1991, killed 25 workers.



in both cases, the fires were incendiary.

Many other examples of fires that caused fatalities due at least in part to locked exits or barred windows can be cited. A few that made headlines are as follows:

- Lanjisu Cyber Café, Beijing, June 18, 2002, 25 killed.
- Prison, Gongan, Iran, December 30, 2002, 27 inmates killed.
- Prison, Chile, May 18, 2001, 26 killed.
- Entertainment Complex, Luoyang City, China, December 25, 2000, 309 killed.
- Weierkang Club, Taichung, Taiwan, February 15, 1995, 64 killed.
- Club Cinq, St. Laurent du Pont, France, November 20, 1971, 143 killed.
- Cocoanut Grove Nightclub, Boston, November 28, 1942, 492 killed.
- Iroquois Theater, Chicago, December 30, 1903, 602 killed.

- The Kader Toy Factory fire in Bangkok, Thailand, less than two years later, on May 10, 1993, killed 189 workers.
- The same year, The Zhili Factory fire in Shenzhen, China, on November 19, 1993, killed 87 workers.
- The Gaofu Textile Factory fire in Fuzhou, China, in 1994 killed 64.
- The Sagar Chowdury Garment Factory fire in Bangladesh on November 25, 2000, killed 45 workers, including 10 children.

The problem of locked exits preventing escape of the occupants when a fire occurs is not limited to "sweatshops" and not to factories. Prisons, apartment buildings, single-family housing, department stores, restaurants, nightclubs, and coffee houses can be listed. Anywhere that people are prevented from easily escaping in case of an emergency – it doesn't have to be a fire – will at some time or other lead to fatalities.

There are a variety of reasons for having locked doors or installing barriers that hinder escape. Sometimes, as is typically the case in factories, it is to keep the merchandise from walking away. The same reason can be cited for department stores. In other cases, like prisons, it is to protect society from dangerous persons. Sometimes, it is to protect individuals in care centers who have to be kept from wandering off and hurting themselves, or children are locked in to keep them from getting hurt. At times it is a case of carelessness, of not keeping the paths to fire exits clear, or forgetting to remove chains on panic hardware when the premises are opened to the public. Sometimes, it is a case of not having the right hardware, not having locks that are easily opened in an emergency.

All too often, whole families perish in fires because they cannot unlock their doors or escape through barred windows. Between 1981 and 1985, of those killed in dwelling fires involving gates or locks, 19% were children age five and under.[3] In 1988, five children and young adults died in a single-family dwelling in Texas, where windows were covered with security bars because the oldest, a 19-year-old, had received death threats. In 1989 in Texas, four members of a family died in a home fire also because they feared for their lives and had bolted and nailed the door shut. Security bars prevented escape through the windows.[4] In both instances, the threats that made them lock themselves in were not imaginary. These people were not paranoid. In both cases, the threats were very real:

Those fire fatalities in the incidents cited above that were the result of blocked means of egress did not have to occur. Even a hundred years ago, every theater operator or nightclub operator was (or certainly should have been) aware that fire exits have to remain unlocked during performances. This has been in fire codes since the early 1900s. Why, then, do incidents occur every year where occupants could not escape a fire due to locked exits and barred windows?

Fire protection and security have the same primary goals of safeguarding of life and property, but the means of achieving these goals differ, and conflicts result. For the fire protection engineer, preservation of life is the primary goal, and property protection always has been a very important element of loss prevention. Additionally, business continuity, or assuring that the company can survive a catastrophic fire, is an important consideration.

Similarly, security's first goal is to safeguard human life, whether it is an attack against an individual during a hold-up or rape, or the attempt on the life of an important public figure or the collective safety of thousands attending a public event. The rest is often lumped under "assets protection," which is probably a better term than "property protection" because it includes not only the physical assets (building and contents) but also the intangibles that are needed to stay in business (the preplanning for disasters, including the safeguarding of customer lists and accounts receivable) – in other words, measures to assure business continuity.

If fire protection and security have the same goals, why is the treatment of the two subjects labeled as being "fire protection versus security"? That implies that the two disciplines are not compatible and that they must constantly fight and push each other out of way in order to succeed. That should not be the case, and it does not have to be. But for the two disciplines to be truly complementary, the fire protection engineer and the security engineer must be sensitive to the needs of the other.

Owners and operators of business establishments are constantly faced with threats against their ability to stay in business, from illegal ones, like shoplifting, employee thefts, hold-ups, burglaries, "crashing the gate" of entertainment venues, stealing babies from hospitals, bad debts, and manipulated books, to legal ones, like competition and economic conditions. On top of that, they are often faced with deteriorating neighborhoods that pose a threat to both employees and customers. These everyday, every-hour threats are much more real and immediate to everyone involved than the threat of fire. There are about 9,000,000 property crimes (not including motor vehicles) in the U.S. each year, while the number of structural fires is about 500,000.[5, 6] The fire protection engineering community has to acknowledge that there is as great a need for safeguards against crime as there is a need for safeguards against fires and explosions.

Those who write and enforce building and fire codes cannot blithely state that "every exit must be kept open" when that is impossible in light of the ever-present criminal and terrorist threats.

Generally, security professionals today are more cognizant of the need to incorporate fire code provisions into security systems than the fire protection professionals recognize the need for security measures as a normal part of fire safety. When building codes and fire codes are written, the everyday threats to life safety, property, and business continuity from criminal activities must be considered, and compromises must be made for the overall benefit of society. When fire protection engineers inspect an existing facility or review plans for new construction, they must consciously observe the need to achieve a reasonable level of security as much as to achieve a reasonable level of fire safety. The interface between fire safety and security needs to be seamless.

Integration of fire and security systems has been a buzzword that has been around for several years. However, as long ago as the 19th century, electric monitoring of alarm systems for fire protection and security were integrated. The old telegraph systems mixed sprinkler waterflow alarms, manual fire alarm stations, guard tour reporting stations, and other alarm and supervisory functions on the same multiplex circuits transmitting to proprietary or central station panels. Many of those systems were in good operating condition fifty years after they were installed. In the second half of the 20th century, the integration of HVAC, fire, and security functions into a single monitoring and alarm system was offered, but both their complexity and the method of operating the systems caused problems. Typically, the systems were under the control of the building or plant engineers, who often were accused of being more interested in keeping the HVAC systems running smoothly than monitoring activities from the fire and security alarm points. In addition, these integrated systems placed "all the eggs in one basket," at times resulting in total outages of all functions. Those in charge of fire protection and security felt that they had insufficient control and that the required high level of reliability was missing. As a result, fire departments demanded that the fire alarm portions function independently of the integrated system, and separate fire alarm systems typically were installed, with each alarm and supervisory point reporting separately to the integrated system when that feature was still desired.

Separate fire alarm systems carrying out only fire protection functions today are normal and typically required by the Authority Having Jurisdiction in all except small residential and commercial establishments. Parallel systems have to be installed for security functions, even when the same building staff is responsible for both fire protection and security. This causes unnecessary installation and operating costs since fire alarm and security monitoring systems for the most part use the same technology and the same circuitry. Significant improvements have been made in alarm system technology so that integration of functions no longer has the drawbacks encountered in the past. Components are more reliable, automatically charged backup batteries are normal, and telephone dialers provide an inexpensive means of communicating with a myriad of UL-listed central monitoring stations. Operating from inexpensive, generic personal computers, the high-end fire and security systems utilize distributive architecture and backup power supplies in field panels that allow the systems to continue to operate even when the computer shuts down or a power failure occurs.

The security monitoring system is that element of security technology that is closest to fire alarm systems and most easily integrated. Door contacts, glass-break sensors, motion detectors, and panic buttons have nonpowered, normally open or normally closed contacts that change position as an alarm occurs, identical to the operation of heat detectors, smoke detectors, manual fire alarm stations, and waterflow switches. Either with separate zoning or by using point-addressable devices, the control panel can distinguish between fire and security alarms.

An access control system operates somewhat differently, but its functions often are integrated into a security monitoring system, and as such, the fire alarm functions can also be integrated without loss of functionality or reliability. The access technology that is used is immaterial. Many manufacturers now offer control panels that can be used with a variety of access control technologies, including magnetic stripe cards, proximity cards, biometric readers, numeric keypads, or combinations thereof. Once the control panel has verified that the access credential is valid at that entry point and during that time period, it performs a number of actions, including unlocking a door or a turnstile, momentarily shunting out an alarm, and storing a record of the transaction. An entry that is made without the use of a valid access credential at a door that has been provided with alarm contacts results in an alarm being transmitted. The control panel allows individual doors or zones to be placed in an unsecured mode for varying time periods, allowing entry and exiting without sounding an alarm. In large systems, the access functions are placed in a number of intelligent controllers that are placed near the doors being controlled. Databases of cardholders are downloaded from a central computer, and each intelligent controller can operate independently of the central computer.

With an access control system in place, caution must be exercised that exiting in case of a fire or other emergency is not jeopardized. Normally locked doors unlocked with an access credential can be found not only around the periphery of the building but also to control who may enter certain interior spaces, including suites of offices, computer rooms, laboratories, and other portions of a building to which restricted access is desirable. In most cases, the access system controls entry but does not prevent exiting, but that does not mean that the path to fire exits is not blocked. The locked door may lead to a required exit that is within the controlled space, a situation that generally cannot be tolerated. Work-arounds, like an emergency release within a break-glass case, seldom are likely to meet the intent of the code. Providing an additional means of egress that does not require entering the restricted space may be the only solution.

Turnstiles can be used to control access, and they are found in office buildings, subway stations, and like places where entry of large volumes of people must be controlled. As with doors, they are released upon presentation of a valid access credential, usually a magnetic stripe card or a proximity card. Mechanical turnstiles, like revolving doors, present an obstruction to rapid egress, necessitating that they be supplemented by swinging doors, which are also needed for wheelchair ingress and egress. Optical turnstiles, on the other hand, do not have an impediment in the path of travel and easily accommodate both fire-exiting needs and wheelchair passage. They have infrared scanners across the entry lane that sound an alarm when a person passes through in one direction or either direction unless a valid credential has been presented. Optical turnstiles require a greater presence of security staff than access-controlled doors or mechanical turnstiles.

The traditional locking mechanism for access-controlled doors is the electric strike or the electric latch. In either case, the door prevents entry from one side, but as long as the hardware on the other side allows free egress towards fire exits, there is no fire safety conflict. If the door is alarmed, a request-to-exit device, which is a special-application motion detector, may be placed on the unlocked side to bypass the alarm while a person exits. In some instances, a pushbutton or a card reader may be used for the same purpose of momentarily shunting the alarm. Greater use is made today of electromagnetic locks in lieu of electric strikes and latches, and they pose a greater potential conflict with fire safety codes in that they prevent opening of the door from either side as long as the lock is energized. This problem must be resolved if the door leads to or is a fire exit.

The NFPA Life Safety Code[7] and most (if not all) building codes allow the use of electromagnetic locks or other types of locking mechanism on the egress side of doors required for exiting under prescribed conditions. Under the *Life Safety Code*, an "approved entrance and egress control system" can have the egress side of the door locked, provided:

1. A (request-to-exit) sensor detects a person approaching the door and unlocks it.
2. Loss of power to that part of the system that controls this door unlocks it.
3. A push-to-exit manual release, placed next to the door, interrupts the power to the lock, independent of the system's electronics, and keeps the door unlocked for 30 seconds.
4. Activation of the building fire alarm system unlocks the door and keeps it unlocked until that system is manually reset.
5. Activation of any sprinkler or fire detection system anywhere in the building unlocks the door and keeps it unlocked until that system is manually reset. Complete sprinkler or detection system coverage is required in mercantile occupancies.

The occupancy chapters contain additional restrictions. If in an assembly occupancy, lock control systems have to be deactivated whenever the space is occupied by more than 10 persons. They are not permitted in lodging or rooming houses.

When unnecessarily restrictive, these limitations tend to jeopardize the measures that need to be taken to keep a building secure from events other than fire. A magnetic lock de-energized for egress is also de-energized for ingress, thereby negating essential security measures for events that may be far removed from the secured door. Nonfire events that will unlock the door are much more likely to occur than an actual fire, including a malfunctioning smoke detector, a nonfire actuation of the sprinkler system, deliberate actuation of the fire alarm system, and casual actuation of the manual pushbutton release. Magnetic locks have no moving parts and invariably lose their holding force immediately upon power loss. All that should be needed for an emergency release of the lock is a push-to-exit manual release adjoining the door in noncritical situations or a panic bar for assembly or other critical locations, both interrupting power to the lock when pushed.

Interestingly, delayed egress locks have less severe restrictions.[7] These electromagnetic locking systems delay exiting for up to 15 seconds while a person pushes against the release device, usually a panic bar. A delay of up to 30 seconds is permitted provided the Authority Having Jurisdiction feels that reasonable life safety is assured. The locks are the same ones used in entrance and egress control systems, but the following provisions apply:

1. The entire building has to be protected by either an automatic fire detection system or an automatic sprinkler system.
2. The door unlocks upon actuation of any sprinkler, any heat detector, or any two smoke detectors.
3. The door unlocks upon loss of power to the lock or locking mechanism.
4. The delayed egress locks can be used for all occupancies at any time

as long as the contents of the space are low-or ordinary-hazard, except on the main entry doors of assembly spaces.

There provisions can be problematic from a security standpoint. Failure of the time-delay feature does not unlock the door, and there is no reliable, alternative method of unlocking the door except in the event of a significant fire. Loss of power as a means of releasing the door is unlikely if the lock is provided with battery backup power. The delay provides a deterrent to unauthorized egress only if audible and/or visual alarm signals are activated at the door during the delay period, and there is someone nearby to take preventive action. And if an alarm sounds only at a remote location and someone has to be dispatched to the scene, even a half-minute response to apprehend the offender is unrealistic in most instances.

More important, any event that causes occupants to rush for exits in a space where large numbers of people congregate is likely to have fatal consequences if there is a delay in opening exit doors. Relying on actuation of sprinklers or fire detectors for instantaneous release of exit doors is inappropriate. The triggering event can be the discharge of pepper spray, or it can be a fight in a crowded nightclub, or a gunshot or even the threat of shooting in any crowd environment. The delayed egress lock provisions of the *Life Safety Code* need to be revised to be more realistic for normal security needs, as well as to prevent bodies from piling up behind doors that do not open in high-density crowd situations.

For a recent security systems design project, the client had stipulated that delayed egress locks be provided on fire exit doors that now have regular hardware. The doors serve a basement food court with a normal lunchtime crowd in excess of 500 people. The normal exit path is one escalator and several elevators. There has been a problem with unauthorized use of the fire exits, which only have door monitoring contacts signaling at a remote location, but even though the applicable building code would permit them, an alternative solution to delayed egress locks were recommended in this situation. Panic hardware that releases the door and sounds a local alarm after a minimal, 1-second delay (to limit nuisance actuation) is being provided instead.

Like magnetic locks, electric strikes and latches configured to “fail-safe” upon loss of power will allow free entry to a normally locked door. This arrangement frequently is used on stairway doors that are locked from the stairway side for security reasons. Activation of the fire alarm system or other means cuts the power in an emergency and allows unrestricted access to firefighters and other emergency responders. Strikes or latches that “fail-secure” do not release upon power loss.

Local alarm signals in conjunction with panic hardware (exit devices) are commonly used to deter nonemergency use of doors provided solely to meet fire codes. The doors may also be monitored from a remote location. Signage indicates that the door is for emergency use only and that an alarm will sound when the door is opened. The arrangement is reasonably effective for deterring shoplifting and other thefts, inexpensive, and does not cause fire code problems since the doors are always available for emergency use. There may be some reluctance to use such alarmed exit doors even in a real emergency if they are not regularly used.[8] How to make occupants of a building use alternate exit paths in an emergency, rather than just the ones they used to come into the building, needs investigation.

Keeping occupants from walking out of buildings that have a high security requirement but that are required to keep fire exits open at all times while the building is occupied can be a real challenge. The 15-or 30-second time delay permitted by fire codes is insufficient for apprehension when the exits lead directly to a street or other public space. In most situations, the offender is likely to be long gone before security officers can respond to the scene. In some cases, the buildings can be designed with security in mind, arranging exit paths to limit direct access to public ways, but building and fire codes work against this solution. Penal institutions don’t have this problem because the entire facility is fenced – even if a building has to be evacuated, the inmates are not free to leave. The *Life Safety Code* makes an exception for Detention and Correctional Institutions, allowing exiting to an exterior area of refuge that does not have access to a public way.[7]

Even if a double row of barbed-wire-topped fencing is not suitable, placing a wall or fence around an exterior space on the premises provides a place of safe refuge while preventing a direct link to a street. The idea is to provide unrestricted exiting from the fire building but to keep the occupants confined within the “compound.” Because the people are not in immediate danger, they can be slowly screened before they are let go. Unfortunately, the *Life Safety Code* does not extend this option to healthcare facilities that need to keep some of the patients from wandering off nor to facilities that have a high national security requirement.

Life Safety Code requirements for horizontal exiting may need to be rethought in a context of building security. Horizontal exits used to move occupants from one fire area to another so as to place them in a safe environment on the premises also address security in that they allow security screening before the people leave the premises. However, the restriction on having only 50% of a building’s required exiting capacity in the form of horizontal exits[7] forces the other half of the exits to lead directly outside. If the 50% limitation has little fire safety justification, it may unnecessarily hinder achieving needed security levels. In establishments with low occupant density, a suitable area of refuge from which immediate evacuation would not be necessary might be a smokeproof stair tower, i.e., one that is reached by means of an open-air vestibule. However, the *Life Safety Code* does not presently permit such an arrangement.

By no means are all of the barriers to a seamless interface between fire safety and security on the side of the fire protection discipline. The security industry falls far short in automatically incorporating fire safety provisions into their products, rather than doing only the few things mandated by code. The practice of security engineering is almost nonexistent; there are no accredited curricula for the study of security engineering; the term is recognized mostly by a few U.S. government agencies; and there are few registered professional engineers practicing security engineering. There are essentially no laws, regulations, or building code provisions to establish a minimum acceptable level of security, as there are for fire safety.

ASTM Committee F12 has promulgated a number of security standards that do not appear to have much following in general commercial use. *Standard F571, Standard Practice for Installation of Exit Devices in Security Areas*, provides guidance for achieving the greatest security possible without violating the requirements and spirit of the *Life Safety Code*, although admitting that a high level of security may be not possible. Outside of that, there is little guidance for avoiding fire safety/security conflicts. Too many of the locks and locking systems sold for security may not open quickly and easily in an emergency. In 2001, only California had a law that requires a quick-release mechanism for window security bars in residential occupancies, and only two other states appeared to have some related requirements.[9] Window bars are still regularly sold without provisions for escape in case of fire. The NFPA Center for High-Risk Outreach has published a pamphlet warning about window bars that can trap children and adults in a deadly fire, but there is nothing similar from the leading organization for security professionals, ASIS International. In fact, none of the ASIS publications appear to address either security or fire safety for any residential occupancies, except hotels and motels.

Both disciplines should be giving more guidance to architects for incorporating features in building construction that will achieve the goals of a reasonable level of security and a reasonable level of fire safety. For example, enclosed stairways and elevators pose a threat of criminal attack, which can be lessened by leaving them open for observation from the outside. Elevators that have three glass-enclosed sides now are frequently encountered on the exterior of parking garages. Likewise, building codes usually allow the side of exit stairs facing streets or other open space at least 30 to 50 feet (9 to 15 meters) wide to be open or glass-enclosed, and that should be encouraged where security is an important issue, such as in low-income housing. Those codes that still mandate that stairs and elevators be totally enclosed in shafts of fire-resistive construction should be modified to omit fire ratings when not needed as a separation from the building's interior, in the interest of better security without loss of fire safety.

Because loss of life and damage to property as a result of crime are so much more prevalent than those from fire, the common emphasis on fire protection without considering security does not make sense. Fire protection engineers should make a conscious effort to remember that protection of life and property also extends to deterring criminal activities. Whenever possible, the cooperation of professionals in the security field should be enlisted to achieve a smoother interface with security and encourage security products manufacturers to provide for fire safety in their equipment and hardware. Fire protection engineers traditionally have worked closely with code- and standards-writing organizations to promulgate rules and regulations for the protection of life and property from fire. Fire protection engineers may have to involve themselves in the promulgation of security standards, guidelines, and codes that provide an adequate level of protection from both fire and crime. ▲

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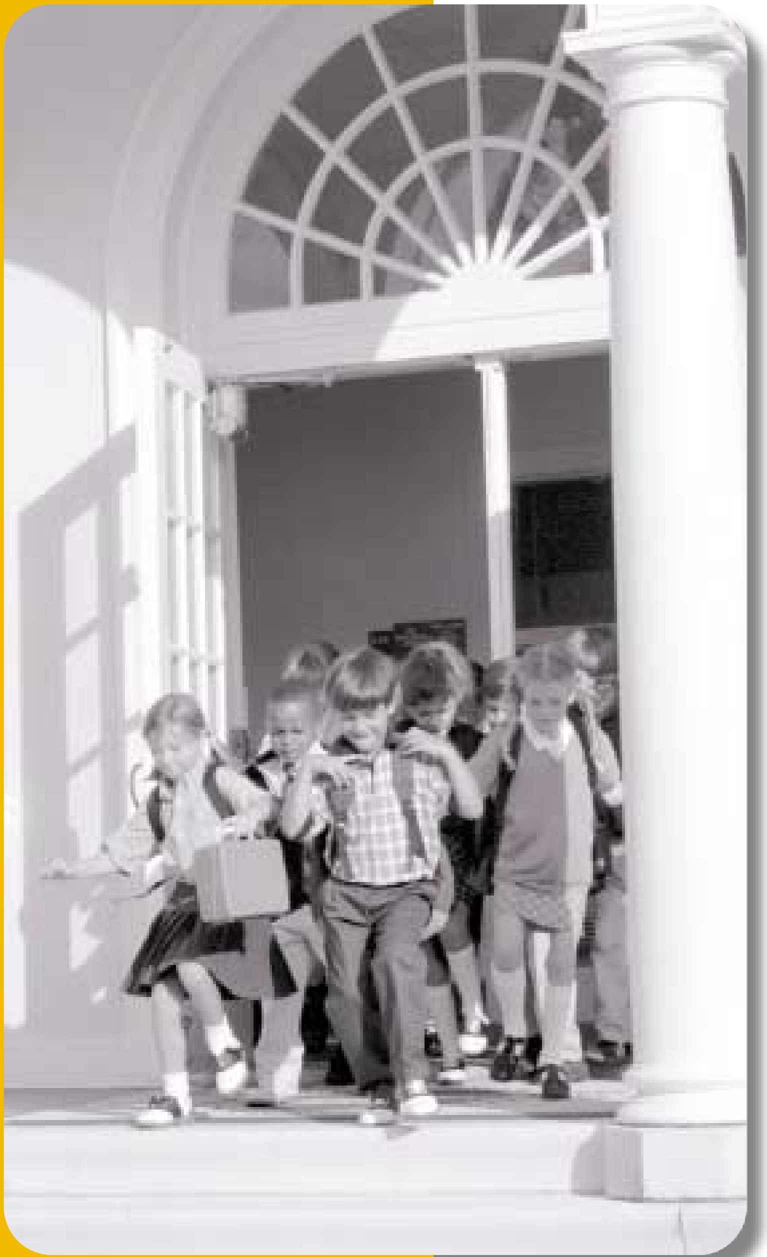

Balancing SAFETY *and* SECURITY in the School Environment

By Alex L. Szachnowicz, P.E.

Schools should be safe and secure places for students, staff, and visitors alike. Without a safe, orderly, and conducive learning environment, students cannot learn, teachers cannot teach, and the fundamental mission of the school system has essentially been thwarted. The responsibility of creating safe schools lies not only with school administrators, but on the entire community in which the school resides. Although the best time to address facility security concerns is in the design phase, renovations or targeted initiatives that improve the level of safety and security should always be considered.

In years past, safety in the classroom was not such a high priority for school administrators. Schools were thinking education, not safety, when schools were built years ago. Schools were designed to achieve an open and inviting campus-style setting with multiple entrances, expansive windows, and many opportunities for privacy. While there may have been the occasional fight or theft, issues like guns, snipers, bombs, terrorism, and other violent crimes were not at the forefront of most educational facilities planners. School administrators know too well that those days have passed. As everyone struggles to come to grips with the recent string of high-profile troubling events, school safety has gathered more attention.

FIRE-RELATED CHALLENGES IN SCHOOLS

Today, it is commonly believed that schools are among the safest occupancy classifications with respect to the nation's fire problem. While this is generally true, a few notable instances show that this was not always the case. The deadliest school-related incident in United States history occurred at the New London Junior-Senior High School in New London, Texas, where a natural gas explosion killed 294 people in 1937. The Lakeview Grammar School fire in Collinwood, Ohio, claimed 175 lives in 1908. Most notably, 92 children and 3 adults perished in the 1958 Our Lady of Angels Grade School fire in Chicago, Illinois, as a result of an intentionally set fire.[1]

The most recently published study indicates that approximately 7,600 structure fires occurred per year in educational properties in the U.S. between 1994 and1998.[2] On average, these structure fires caused 1 civilian death, 176 civilian injuries, and $82.6 million dollars in direct property damage annually. While the number of fires in educational properties has declined since 1982-1986,[3] and fires in educational properties account for an annualized average of just 1.3% of the nation's structure fires, 0.1% of the civilian fire deaths, 0.8% of the civilian fire injuries, and 1.1% of direct property damage from 1994 through 1998, they are still worthy of attention.

The Federal Bureau of Investigation's Crime in the United States Series statistics indicate that approximately half the people arrested for arson were considered juveniles. A look at the causes of structural fires in educational properties shows that 49.8% of these were classified as incendiary or suspicious in nature. This is significantly higher than the 27% figure attributed to incendiary or suspicious causes in nonresidential structure fires during the same 1994-1998 period. The leading areas of origin for structure fires in educational occupancies were the lavatory or locker rooms (23.8%), hallway or corridors (10.0%), and classrooms or small meeting rooms (8.2%). Notably, more fires occurred in high schools than in any other educational property.

SAFETY-AND SECURITY-RELATED CHALLENGES IN SCHOOLS

From July 1, 1998, through June 30, 1999, there were 47 school-associated violent deaths in the United States.[4] Thirty-eight of these were homicides, 6 were suicides, 2 were killed by law enforcement officers, and 1 was classified as unintentional. News stories like those regarding the senseless killing of 15 teens in Columbine, Colorado, or 5 killed and 10 wounded in Jonesboro, Arkansas, weigh heavily on everyone's consciousness. In the 1996-1997 school year, 10% of all public schools reported at least one serious crime, and another 47% reported at least one less serious violent or nonviolent crime. Over the five-year period from 1995 through 1999, teachers were victims of approximately 1.7 million nonfatal crimes at schools, including approximately 1 million thefts and 635,000 violent crimes.

The 2002 survey of School Resource Officers (SRO) found that approximately 95% of school-based police officers felt that their school was vulnerable to a terrorist attack, and 79% did not feel that schools within their district were adequately prepared to respond appropriately to a terrorism-related attack.[5] A majority of SROs surveyed reported that significant gaps exist in their schools' security, that their crisis plans are inadequate (55%), and that their schools' crisis plans are either untested or inadequately exercised (62%). The SROs described gaining access to the school grounds during school hours as being "very easy" (74%) or "somewhat easy" (22%). Similarly, the SROs described gaining access inside of the school during school hours as being "very easy" (37%) or "somewhat easy" (46%). Finally, 89% of SROs believed that crimes occurring on school campuses nationwide are underreported to law enforcement.

In the wake of recent high-profile school tragedies, concerns over school crime and violence have prompted many school districts to take various measures to reduce and prevent violence and breaches of security within schools. At least three states have approved laws establishing or governing the use of school security and safety plans (Alaska, Georgia, and Virginia). But school administrators are faced with the challenges posed by fiscal constraints, high staff turnover, and other competing priorities. One of the most important steps for any school district is the need to conduct a safety and security audit. One of the most valuable benefits of a comprehensive site survey is clearly identifying all of the possible security gaps. Without looking at the overall picture, administrators can get caught up in short-term fixes without doing much to increase the overall level of safety or security within the complex.

FUNDAMENTAL TOOLS TO COMBAT THE SAFETY AND SECURITY CHALLENGE

From the standpoint of maximizing the security aspects of a facility, the ideal school building would be located at the center of a large open field, be well-removed from any vehicular traffic, surrounded by an obtrusive fencing system, and awash in high-intensity lighting. Additionally, the school would be built with only one monitored entry door, no windows, well-compartmentalized interior areas, access-controlled doors on every interior space, and various other overt active and passive security-related features and systems. While this type of institutional arrangement might go a long way toward alleviating the security-related concerns at a school, it would certainly call into question the appropriateness of the facility with respect to fostering a conducive, nurturing, and inviting learning environment.

Unlike the host of well-known and widely utilized building, fire, and life safety codes, no such readily available codified recipe or source of information exists with respect to combating the safety and security challenges facing school facilities. The most widely reorganized host of tools has been compiled into a philosophy called Crime Prevention Through Environmental Design (CPTED).[6]

CPTED is based upon the theory that the proper design and effective use of the built environment can reduce the incidence of loss or potential for crime in any given occupancy. As such, it evaluates various school design and layout issues as they relate to proven crime prevention and security strategies. CPTED focuses in on the notion of security layering and defensible space planning practices. CPTED utilizes four key strategies to foster a safe and conducive learning environment: natural surveillance, territorial reinforcement, access control, and target hardening. Furthermore, designing a school security system relies upon a model that includes the following minimal elements: deterrence, detection, delay, response, recovery, and consequences. These strategies are applied to the following elements of a facility:

- Site design features such as landscaping, vehicular and pedestrian routes, parking areas, recreational areas, site lighting, site access, fencing, etc.

• Building design features such as building organization, exterior elements, points of entry, doors/hardware, windows/hardware, roofs, skylights, interior lighting, etc.

• Interior space features such as the configuration of lobby and reception areas, corridors, stairwells, toilet facilities, public assembly spaces, classrooms, lockers, administrative areas, mechanical/electrical areas, storage areas, etc.

• Building systems and equipment features such as security alarms and surveillance equipment, fire alarm detection and notification systems, fire suppression and control strategies, telephones, public address and data communication systems, elevators, mechanical, electrical, and plumbing systems, etc.

School administrators and designers cannot select the appropriate countermeasures unless a thorough and comprehensive threat assessment and security audit are undertaken. A focused team approach to addressing such safety and security concerns might involve security consultants, fire protection engineers, and other representatives from the design team in addition to representatives form the building staff, key community members, law enforcement, and the fire service. Threats to a school are further going to be categorized as either external (e.g., intruders, etc.) or internal (e.g., thefts, etc.).

BALANCING INGRESS AND EGRESS ISSUES

School administrators strive to increase the level of security within their facilities without sacrificing life safety and building function. Having a single, controlled point through which access is gained into and out of a school building would certainly go a long way toward increasing the intrusion and theft-related level of security at a facility. Similarly, limiting the number of interior doors and placing physical constraints upon their use would further enhance the goal of security maximization within a given facility. Those conditions would, however, fly in the face of a fundamental tenant of fire safety. Whereas most building, fire, and life safety-related codes stringently regulate the number, size, placement, and nature of various means of egress components, these same codes rarely regulate ingress into a facility.

The number and placement of exterior doors that a given facility has is usually decided upon during the schematic design phase. At this stage, the design team attempts to gain a thorough understanding of how the building will be used by its intended occupants and strives to facilitate these various functions. The goal of these initial design efforts revolve around accommodating the needs of the building's various occupants while providing due consideration for issues like convenience, aesthetics, inclement weather, safety, lost productivity due to excessive travel times, etc. These decisions are further refined and modified as code studies and program planning exercises are undertaken while the specifications and drawings progress through the design development stage and into the construction document phase. This is juxtaposed against the notion that the more points of entry that a building has, the more vulnerable the facility is to unwanted intruders. Therein lays the first major challenge to improving the overall safety and security level of a school facility.

INCREASINGLY COMMON EGRESS SYSTEM FEATURES

Recognizing the inherent security-related vulnerabilities associated with exterior doors, many school systems have asked their design professionals to investigate various means to protect this perceived weak spot. Quite a bit of thought and discussion has recently ensued with respect to how predisposed notions regarding a conventional school's egress system can be modified to accommodate the equally compelling need to provide for a secure facility. Fire safety experts have increasingly been called upon to work in conjunction with security consultants to come up with a basket of ideas that can be employed at school facilities. Some of the more common ideas have been listed below:

• The number of door openings in the building's perimeter should be limited to the minimum required to meet the prevailing fire and life safety codes. Careful consideration and investigation must be undertaken to verify that an adequate number of exits have been provided for from any given space or area.

• The use of recessed entryways or the placement of doors in areas where they cannot be readily observed or monitored should be avoided.

• All exterior doors should be self-closing, positively latching, and automatically revert back to a locked state.

• Where required, exterior doors should have as little exposed hardware as possible, be furnished with nonremovable pins or piano hinges, and provided with lock guards to prevent forced entry. Double doors should be furnished with mullions and centerposts to create a more stable interface at the latch surface.

• Doors should be made of heavy-guage steel or aluminum alloy and swing outward from a building, regardless of occupant load. School employees should check doors daily and have any damage repaired promptly.

• The special locking provisions available in the *Life Safety Code*[7] for educational occupancies should be considered. These include the use of approved and listed delayed-egress locks. It is important to note that such locking systems come with a host of additional code-mandated requirements, including that the building is protected throughout with a code-compliant, supervised automatic fire detection system or supervised automatic sprinkler system.

• Horizontal exiting strategies can be effectively utilized as alternative exit routes.

• Propped-open doors pose a serious security breach. Door contact switches should be used to provide notification locally or at a centralized location any time that a door remains open beyond a prescribed time interval. This would help notify the appropriate personnel if a door was left ajar, propped open, or otherwise unable to be closed. Also, doors can be outfitted with electronic alarm systems that sound when a door was opened without authorization.

• Exit doors should not be chained or padlocked, since an oversight, distraction, or absence can easily result in the egress door being rendered unusable.

• Electronic proximity card access control systems can be used to limit entry into buildings or select spaces. Proximity cards are generally preferable over magnetic swipe cards or conventional touchpad systems since they are less prone to weather-related damage and vandalism. Access-controlled egress doors and electromagnetic locking systems are permissible for use within educational facilities, subject to several additional requirements in *NFPA 101*. Proximity card systems can be programmed with specific areas or times of authorization and provide an audit trail or record each time the card is used. Since these cards can also include pictures of an individual and other vital employee information, they can dually serve as identification badges and make someone without a badge easily detectible, since they would seem out of place without one. Modern proximity cards can also be provided with magnetic strips, bar codes, or embedded microchips that allow them to function in the food services and library checkout areas as well.

- A key control policy should be implemented that is well thought out and communicated to all stakeholders. The use of high-security cylinder systems that utilize proprietary patented key blanks limit the potential for unwanted duplication and distribution of keys.
- Student lockers can be installed in classrooms or other areas where they are easier to monitor and do not create bottlenecks in the means of egress system.
- Doors and gates can be used to segregate public use or after-hours space away from other areas of the building not required to be opened. A detailed egress analysis must, however, be undertaken with such doors or gates in both the opened and closed position to verify that sufficient exiting capacity and travel paths are provided.
- While several recent studies have shown that academic achievement improves when students are exposed to natural light,[8] windows should only be used strategically. Unless required by code for emergency rescue or ventilation, clearstories, glass block, or secured skylights can be integrated into building designs in lieu of conventional ground-level windows. Also, sidelights should not be placed near exterior doors where they can be readily broken out to allow unrestricted access to the door's exit hardware.

FIRE AND SECURITY ALARM SYSTEM CONSIDERATIONS

Fire alarm systems have long been a mainstay in educational occupancies. The primary purpose of the detection and alarm system is to provide an early warning for building occupants to enact their emergency plans and safely evacuate. *NFPA 101* requires that educational occupancies be provided with a code-compliant fire alarm system. Traditionally, initiation of the fire alarm system is typically achieved by manual means. A review of data between 1982 and 1986 revealed that where automatic detection systems were added to complement manual pull stations, the average direct property loss was nearly cut in half.[3] Where acceptable to the Authority Having Jurisdiction, the fire alarm system may be permitted to be used for other emergency signaling or class change functions provided that the fire alarm provides a distinctive signal and overrides all other uses. It is important to reinforce these distinctive signals during emergency egress and relocation drills so that students and staff can readily discern between them. Also, the components and systems utilized to undertake such combined functions must be compatible and dually listed for their intended use within such integrated systems.

The use of security systems continues to increase within educational facilities. Security systems principally serve to act as a deterrent in that they make it more difficult to commit crimes and make the perpetrator feel less comfortable in their decisions. Most systems incorporate more traditional intrusion detection devices such as door contacts, motion detectors, and window-breakage sensors. Schools commonly include two-way communication capabilities within their public address systems, and some provide strategically placed duress alarm buttons for use by staff. The use of integrated closed-circuit television systems is also on the increase in education occupancies; however, legal counsel should be sought prior to implementing its use.

Advances in computer software and technology have increasingly allowed fire, security, and building-related systems to be integrated into common platforms. While the heating, ventilation, air-conditioning (HVAC), lighting, and energy management industries have taken the lead in utilizing these open protocol networked systems, the security, access control, elevator, and fire alarm industries have been slow to follow suit.[11] The advantage of such fire, security, and building system integration is that all of these vital functions can be monitored and controlled in an efficient manner from a single common point. It is important to understand that most codes mandate that where such system integrations occur, the equipment must be appropriately listed, and the fire safety-related functions must take precedence. Examples of this include taking control of the telecommunication system's digital dialer to ensure that emergency forces notification is achieved and shutting down the HVAC systems to limit the spread of smoke. It is also important to ensure that system compatibilities are addressed and that these disparate products are listed to function in the manner intended.

It must be recognized that technologies and equipment are not the answer to all fire and school security problems. The issue comes down to applying technologies that are effective, affordable, useable, maintainable, and politically acceptable. But these sometimes represent difficult trade-offs, and occasionally, compromises must be struck that result in less-than-ideal solutions. For most school districts, funding available for facilities is inadequate for even basic needs, and thus security is often one of the areas that must be curtailed. School cannot conceivably protect against the entire realm of potential safety and security threats. That is why it is important to identify the most likely and plausible threats and focus efforts there. In the end, this strategy will likely include some combination of technologies, personnel, policies, and procedures that do the best job of solving the school's credible fire and security challenges within its fiscal, logistical, and political constraints.

FALSE ALARMS, BOMB THREATS, CRISIS PLANS, AND SCHOOL EVACUATION DRILLS

Unfortunately, false alarms and inadvertent activations of fire alarm and security systems continue to plague many school districts. Good design, specification, installation, inspection, and maintenance practices can go a long way toward lessening the potential for such occurrences. Due to the disruptive and potentially dangerous nature of such repeated occurrences, some additional considerations may be warranted by the fire protection engineer and security consultant. Consideration should be given to placing devices out of the reach of students where possible. Listed or approved protective cages or guards should be placed over fire sprinklers, smoke and heat detectors, security alarm sensors, horns, strobes, and speakers. Pre-action alarm covers with built-in audible warning systems may be placed over fire alarm pull stations as an additional deterrent. The use of alarm verification logic and "smart" self-testing fire and security alarm systems may also lessen the incidence of such unwanted alarms.

Schools across the nation have also been plagued with bomb threats. While actual detonations of explosive devices on school properties are still rare events, the use of real or hoax explosive devices in school settings has increased in recent years. Additionally, real concerns exist with respect to secondary devices being placed with the intent to injure evacuees or public safety entities. One reason is the unprecedented access juveniles have to bomb-making instructions and other terrorist tactics via the Internet. There is also no shortage of propaganda from hate groups and activist organizations trying to persuade individuals to make a statement to society. In order to counteract these types of events, school officials should give consideration to eliciting the phone company's support to install caller identification systems on all phones, record phone calls, and eliminate pay phones.

Finally, the recent spate of highly publicized terrorist activities, school shootings, and sniper events have given school systems pause with respect to conducting emergency fire and evacuation drills. While it may seem understandable to carry such concerns, schools should not be dissuaded from conducting these vital drills. History is replete with examples where delayed egress led to tragic consequences. But in recognition of these newer concerns, some adjustments may be in order to previously crafted emergency evacuation and relocation drills. One such alteration may be to mandate the involvement of law enforcement agents to supplement the role traditionally played by the fire service. Additionally, administrators or other school-based personnel may be assigned to scan the school grounds and create a safety perimeter until the proper recall signal is sounded.

SOLUTIONS

Approximately 45 years ago, it took the deaths of 92 children and 3 adults in the Our Lady of Angels Grade School fire to raise the national consciousness with respect to the issue of fire safety in schools. More recent events have brought home a similar message with respect to providing security for youngsters from the threats of terrorism and violence.

Fire protection engineers and other fire safety professionals have developed a host of tools to help address the nation's fire problem. But these tools are not static; witness the move toward performance-based fire protection designs. The challenges faced by security experts today is not unlike that faced by fire safety professionals in the wake of the 1958 Our Lady of Angels Grade School fire.

As always, solutions often start with recognition. In this case, it is the recognition that both security- and fire-related emergencies can have a direct bearing upon the safety and security of students. It is not a matter that one is somehow more important than the other. What is needed is a careful and considerate balance that addresses those credible threats that children and staff face in educational occupancies. ▲

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Balancing Safety and Security –

FEDERAL AGENCY PERSPECTIVE

By David Frable and Kevin Biando

BACKGROUND

The physical protection of federal employees, the visiting public, and facilities is a priority for the U.S. General Services Administration (GSA). GSA works closely with the Federal Protective Service (FPS), which has the responsibility for law enforcement and security in federal buildings. FPS is a part of the U.S. Department of Homeland Security.

Fire, environmental, security, and other public safety concerns are an integral part of GSA's design, construction, and space procurement process. Since the bombing of the Alfred P. Murrah Federal Building in Oklahoma City on April 19, 1995, FPS, GSA, and other government agencies have followed building security guidelines developed by the Department of Justice in June 1995.

As a result of the terrorist attacks of September 11, 2001, the implementation of enhanced security measures has accelerated. Private building owners

Facilities Standards for the Public Buildings Service, PBS-P100

The first step anyone should take prior to embarking on a U.S. General Services Administration (GSA) project is to read the entire Facilities Standards for the Public Buildings Service, (PBS-P100), a document published by GSA's Public Buildings Service. This document is available online at http://hydra.gsa.gov/pbs/pc/facilitiesstandards/. This document will enable one to become familiar with the differences and nuances between GSA projects and other types with which you may be familiar.

The PBS-P100 establishes design standards and criteria for all new buildings, major and minor alterations, and work in historic structures of GSA. This document is intended to be GSA's building standard.

One of the initial steps of any project is to identify and become familiar with the applicable codes and standards – including the edition and any amendments – for which the project must be in compliance. PBS-P100 references all the applicable national codes and standards for all design and construction work performed in GSA buildings.

PBS-P100 also includes specific requirements for all aspects of construction including, but not limited to: site planning, architectural, mechanical, electrical, structural, fire protection and security. The chapter on security is based on the security design criteria issued by the Federal Interagency Security Committee (ISC), chaired by the Federal Protective Service (FPS), formerly through GSA, but currently through the Department of Homeland Security. In addition, the appendix to PBS-P100 includes detailed design submission requirements at the preliminary concept, final concept, design development and construction document stages of the design.

Any time there is a question for any given project regarding fire protection and/or life safety issues, the GSA regional fire protection engineer should be consulted. Similarly, issues related to security should be directed to the FPS security specialist.

and tenants in addition to the federal sector have become increasingly concerned with building fire safety and security, especially in highly visible public gathering places.

GSA is considered the landlord of the civilian federal government with a total inventory of over 330 million square feet (30 million square meters) that houses in excess of one million federal employees in 2,000 communities throughout the nation. This inventory consists of over 1,600 government-owned buildings, resulting in approximately 55 % of GSA's total inventory. The remaining 45 % is in privately owned, leased facilities.

Many government buildings are potential targets for terrorists due to their symbolism and functional importance. In addition, GSA tenants include law enforcement agencies, court-related agencies and functions, and other agencies or tenants that perform functions critical to government operations and the nation's well-being.

INTRODUCTION

While security technologies such as those governing alarms, CCTV, magnetometers, and similar equipment have evolved significantly in recent years, today's national building codes only address security issues related to basic locking arrangements that affect the building's means of egress system. Most of these requirements were developed many years ago and have not adequately changed to address today's advanced security and safety requirements.

The Federal Protective Service believes that each building's security measures, in terms of features and equipment, should be unique based on the application of the Interagency Security Committee (ISC) Security Design Criteria within the context of the tenant agency's visibility, potential threats, and criminal intelligence information. Some federal agencies have developed their own physical security design and construction criteria for federal buildings due to the lack of a national security code or standard that currently applies to all public-and private-sector buildings.

The ISC Security Design Criteria for new federal office buildings and major renovation projects were developed to ensure that security is consistent and becomes an integral part of the planning, design, and construction of new federal office buildings and major modernization projects. The ISC Security Design Criteria grew out of the Department of Justice's (DOJ) published document titled "Vulnerability Assessment of Federal Facilities" that was written following the 1995 Oklahoma City bombing. The ISC is currently developing security criteria to be utilized in the acquisition of federal leased space.

The events of September 11, 2001, reemphasized the need for enhanced integration of security systems and fire protection and life safety systems. The collapse of the World Trade Center towers demonstrated the country's vulnerability to a wider range of threats that was never anticipated. Consequently, GSA and many other federal agencies are now integrating appropriate – yet cost-effective – means to protect vital building systems. Combining these protective measures in concert with other design objectives early in the design process will ensure a quality building that will reduce vulnerability of people and property, and speed the process of recovery after an event.

DESIGN CONSIDERATIONS

Addressing both safety and security issues on a GSA project is a major challenge for the design team. The design team must satisfy the unique interests, distinct needs, and sometimes conflicting desires related to safety and security of GSA itself, as well as from the building tenants such as U.S. Marshals, Federal Judges, U.S. Attorneys, Treasury, Commerce, and other tenants. Generally, each tenant has its own perception of the security and safety risks to be mitigated. These concerns are often heightened based on media coverage that may not reflect accurate information or the complexity of fire safety and security issues. Therefore, it is essential that the fire protection engineer and the FPS security specialist be involved early in the design phases of a building project. In addition, GSA is continuingly improving its project development processes to ensure this is accomplished.

Understanding the perceived needs and the rationale of the security and safety issues is the first step towards a successful project. Throughout the design process, the design team must utilize engineering judgment rather than relying strictly on the requirements of the national codes and standards.

Both the fire protection engineer and the security specialist can serve as ambassadors to all parties involved in the project to ensure the common goal of balancing safety and security, and that appropriate openness to the public is achieved. Based on past experience, it is extremely costly and very difficult to change an implemented security measure that is inadequate or, worse, not included when construction is underway or completed.

Conflicts between security and safety often occur in the design phases of projects, ranging from perimeter security to exit stair locks. Several examples illustrate how well-intentioned design features can be conflicting, but more importantly they show how cooperation between the fire protection engineer and the security specialist can solve almost any problem.

Exterior perimeter security is the first line of defense in providing physical security for a building. The basic principle is to create a protective barrier either using natural or structural barriers around the perimeter of the building to restrict unlawful access to the site or to reduce vulnerability to vehicular traffic. This is normally accomplished by installing barriers (e.g., bollards, planters, fences, etc.) to withstand assaults by moving vehicles and to minimize blast effects from potential vehicle bombs. However, unless designed properly, placement of these types of security barriers could adversely impact the ability of emergency vehicles to access the site, impede firefighter operations, or even interfere with movement/flow of occupants evacuating from the exit points of the building.

One such conflict involved the installation of a perimeter fence that impacted how the fire department accessed the building and key areas within the building. The fire department required multiple access points into the building; however, due to the installation of the fence, no access was available to allow the fire department to set up operations either at the main entrance or rear of the building. This conflict was resolved by issu-

ing the fire department with the necessary "smart" access card (inside a Knox box) at multiple access points around the site, enabling them to expedite access to and within the building.

Another aspect of exterior perimeter protection with regard to federal buildings involves the installation of protective window glazing materials and assemblies to counter the effects of flying glass in the event of an explosion or forced entry. Serious injuries to building occupants, the public, as well as emergency responders can occur due to airborne glass fragments. Protective glazing materials include materials such as anti-shatter film, laminated glass, and blast curtains. The rigidity and flexibility of the protective glazing are usually dependent on the "stand-off" distance between the building and the vehicular traffic. While essential from a security perspective, little information is known regarding the potential consequences such glazing materials/assemblies can present to firefighters needing to enter through access panels and/or windows or to vent a fire via these openings.

To address this concern, GSA and the Department of Homeland Security contracted to perform forcible-entry testing of certain selected air-blast-resistant windows and window retrofit systems commonly found in GSA buildings nationwide.
Forcible-entry demonstration tests were conducted to determine if firefighters utilizing standard forcible-entry techniques and tools (i.e., axes, hooligan tools, and pike poles) would be able to penetrate the sample of protective window glazing materials/assemblies tested. It was anticipated that these demonstration tests would provide some insight as to whether firefighter emergency operations would need to be significantly altered due to the use of protective window glazing materials/assemblies or if the use of such materials would classify the building a windowless structure that would impose additional building and fire code requirements (e.g., engineered smoke control system, etc.). The results of the demonstration tests concluded that the firefighters were able to enter all of the window mockups of air-blast-resistant windows and window retrofit systems commonly found in GSA buildings nationwide utilizing conventional firefighter tools. A copy of the final report titled "Forcible Entry Demonstrations Report" is posted in the reference section at http://www.oca.gsa.gov. However, it is still imperative that emergency rescue personnel know the implications to emergency operations as a result of the installation of protective window glazing materials/assemblies. In the future, it is anticipated that GSA will conduct additional testing of other window types, particularly laminated windows with structurally glazed bites, to provide additional information for firefighters, building owners, and designers.

Most of the concerns that occur between security and safety involve the second line of building defense, namely, the interior security controls within a building or the access control systems throughout the building. Building codes typically require access-control doors to be equipped with either occupant-detecting sensors or panic hardware that unlock these doors. Unfortunately, these safety precautions defeat the security objective, and security personnel typically object to these types of access-controlled egress doors.

Locks are still the most widely used security devices to control access within a building. Type and location of locking devices can greatly impact the overall safety of the occupants.

Exit stair doors and their locking arrangements frequently illustrate how security measures can inadvertently impact life safety concerns when not coordinated with the fire protection engineer's goals and objectives for a project.

Security personnel prefer all stair doors to be locked from the stair side in sensitive operations during normal building operation as well as during emergencies. The security objective is to mitigate unauthorized persons from gaining access into the stairs and subsequently into the interior areas during normal conditions or by activating the fire alarm system. However, stair re-entry provisions provided in the codes require a multitude of safeguards that may include the stairs be unlocked in a fire emergency, a stairway communication system be installed, or re-entry be provided without traversing more than several stories. The fire safety objective is to ensure occupants in exit stair enclosures can seek refuge onto another floor should a fire render the lower part of a stair unusable during evacuation.

This type of conflict may be easily overcome with the installation of electric mortise locksets on each exit stair door. These types of locks provide controlled access, remote-control capability, and positive latching even when unlocked, maintaining the integrity of the exit stair. In addition, in cases where projects incorporate selective evacuation procedures for occupants during fire emergencies, modifications of floors designated as re-entry floors must be coordinated with the fire alarm system voice evacuation system messages.

Code-compliant delayed egress locks do not normally function with access control doors. In specific cases, it is extremely important that the fire protection engineer and the security specialist analyze the risks associated with the actual locations of each of the proposed access control doors. Following the risk analysis, it may be jointly agreed that it would be reasonable to allow a specific access-controlled door to be installed without occupant-detector sensors or panic hardware. However, all aspects of fire protection and security, both active and passive, must be considered prior to making this decision.

Another example of an access control issue involves the installation of turnstiles or electronic access systems within the main lobby of a building. These installations are typically not fail-safe to open upon receipt of any fire alarm signal or upon loss of the primary power to the fire alarm system. Incorporating optical portals designed to be fail-safe to open upon receipt of any fire alarm signal or upon the loss of primary power to the fire alarm system is a viable solution to be incorporated into the initial design. The design team and installer should make note that these electronic access systems should not be connected to the secondary power supply nor should they be connected directly to the primary power circuit for the fire alarm system. Otherwise, emergency exiting may be impeded and unnecessary delays may result. However, no matter what type of access control system is utilized, it is imperative that the fire protection engineer be cognizant of the possible impacts the system may have on the evacuation procedures and training that is developed for the occupants and visitors of the building.

An example of security technologies actually facilitating life safety concerns is when an access control system utilizes an antipass-back system (e.g., card in/card out readers) that require the use of access control card readers to leave or enter all points of egress or ingress for a specific area or building. This type of technology can be incorporated into the building's occupant emergency plan such that emergency personnel can use the system to determine which individuals have not carded out and potentially may still be in the building. Once this information is obtained, emergency rescue personnel will have a better idea of how many persons are potentially still in the building and which floors they may be located on to search for missing individuals. This latter example exemplifies how, if properly designed, the technologies of both the security profession and the fire protection engineering community can and should be mutually supportive.

CONSTRUCTION CONSIDERATIONS

Once design is complete, the security issues continue throughout the construction phase of the project. Administration and commissioning issues are extremely important for security components that affect the overall success of any project.

Project Documentation and Security Restrictions

Following the attack of September 11, 2001, security concerns have not just been limited to the physical protection of a building. Equally important is the safeguarding of all security-related design information. Since fire protection, life safety, and security are so integrated, GSA restricts access to this information.

GSA has specific requirements for labeling and handling all documentation, using electronic transfer of files, and releasing documentation to contractors engaged in the design and construction of its buildings. In that regard, security clearances of any GSA construction contract employee is mandatory. Depending on the federal agency for whom the project is being constructed, multiple clearances may be required. Lack of timely notice of required paperwork for clearance has resulted in project delays.

Commissioning

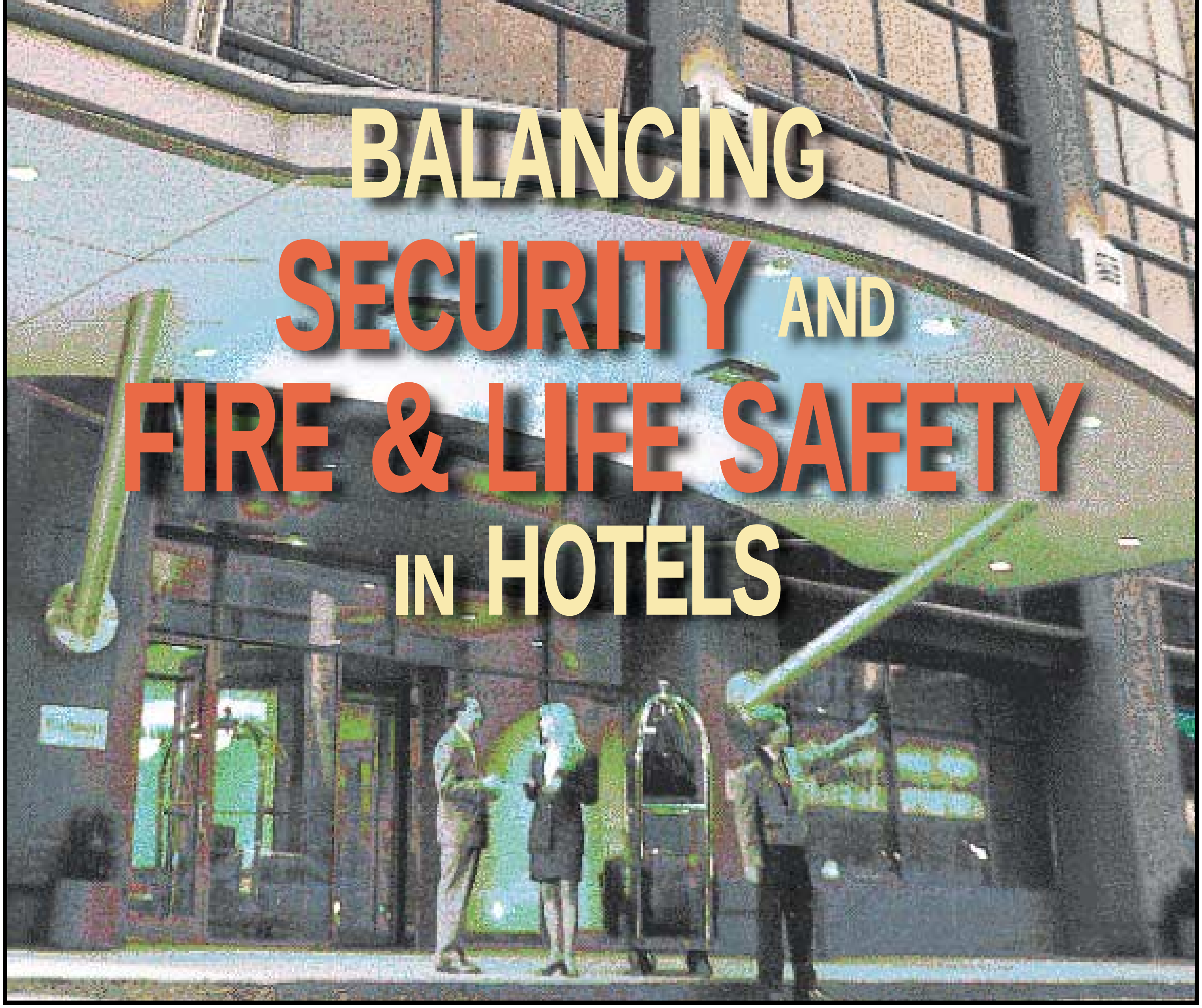
Considerable coordination in both the planning and execution stages is required for any new construction or major renovation project. There are three critical elements that should be incorporated into the building specifications and followed through to commissioning to ensure successful coordination and interaction between the security system and the fire protection and life safety systems. The three critical elements are: (1) system operation sequence, (2) commissioning protocols, and (3) system training requirements.

System operation sequence. One of the many stumbling blocks encountered during a project involves how the different components of the security system should function and interact with the fire protection and life safety systems. In order to test the security system, a complete system operation sequence for the security system should be developed. This sequence of operations matrix should detail all inputs and outputs of the security system to identify the system interaction.

Commissioning protocols. All building systems – including the fire protection and life safety and security systems – must be tested to ensure proper operation, including all system interfaces. For all major projects, GSA requires total building commissioning practices be applied to assure performance requirements are met. GSA also requires that each and every device within a fire protection and life safety system, as well as those systems that interact with them, be tested to ensure it operates as intended. A representative of the security team should be present during the testing of the fire protection and life safety systems to confirm proper security interface. Similarly, the fire protection engineer should be present during the testing of security system.

System training requirements. Any system installed in a building is only as good as the person operating or maintaining it. It is imperative the persons responsible for the security and the fire alarm systems be trained on how the systems are interfaced. Knowledge of how the systems were designed will minimize any future changes or actions that could reduce the reliability of these systems. ▲

David Frable and Kevin Biando are with the U.S. General Services Administration.



BALANCING SECURITY AND FIRE & LIFE SAFETY IN HOTELS

By April Berkol

"Hotels always must find the delicate balance between making guests feel both secure and comfortable in their environment."[1] Prior to the events of September 11, 2001, the traveling public expected hotels to have adequate levels of security and fire and life safety; however, they were not concerned with how this was achieved. Given the heightened concerns for personal safety in this period of daily news on terror attacks around the world and fears that similar events may take place at home, hotel companies have had to review, and in some instances bolster, their safety and security procedures. Acts of terror can happen anywhere, and the lodging industry has recognized that it must take measures to respond to the associated risks. "In the current climate of insecurity, it is essential that safety and security procedures are communicated adequately and appropriately."[1]

Fire and life safety and security all have as their ultimate goals the protection of life and property. This is the same for hotels and lodging establishments everywhere. The way in which hotels achieve their fire, life safety, and security objectives don't usually conflict. There is one area, however, where security concerns and fire and life safety concerns can conflict. For example, facilities which charge entrance fees want to make sure that patrons don't use a back door to allow in nonpaying patrons. Likewise, once inside a bar or nightclub, management wants to make sure that patrons don't leave without paying their bills, so barring exits and limiting the numbers of exits to those they can readily control often occurs.

Most hotels are places open to the

public 24 hours a day, 7 days a week, 52 weeks a year. Hotels have garages, nightclubs or bars (or both), large and small function rooms and meeting rooms, restaurants, shops, underground access to mass transit systems, and, of course, lobbies – all open to the public. To supply all of the various activities going on at lodging establishments, deliveries of goods and services are made every day: fresh linens for the rooms, fresh food and beverages, display materials for exhibits, floral arrangements, ware washing, housekeeping and laundry chemicals and supplies, mail and package deliveries, etc. Every day, hundreds, sometimes thousands, of different people go through the front doors of a hotel; buses, vans, and assorted vehicles stop and discharge guests; and many others go to the delivery entrance.

The logistics of controlling the goings and comings of all of these people is a tremendous undertaking. Lodging establishments use live closed-circuit TV (CCTV) to monitor active entrances and exits, security guards to patrol lobbies and other public spaces, and a combination of both in some situations. Hotels in suburban locations are less likely to use live CCTV: the system might be set to record, and the tapes would only be reviewed if an incident occurs. It would be impractical, and not very appealing, to place metal detectors and x-ray machines at hotel entrances. (It should be noted, though, that during especially contentious meetings/events, hotels have been known to screen visitors using metal detectors and even x-ray machines at specific entrances.)

In the current climate, lodging establishments use trained security guards to check the trunks of cars and backs of vans/trucks and to inspect the undercarriage of vehicles entering hotel garages/underground parking facilities.

Vehicles can be used as terrorist weapons. During the reign of terror brought about by the Shining Path in Peru, the Sheraton Lima hotel was the target of a large car bomb placed in its underground parking garage. Most recently, several French engineers were killed in front of the Karachi Sheraton, again by a car bomb. In the current climate, lodging establishments use trained security guards to check the trunks of cars and backs of vans/trucks and to inspect the undercarriage of vehicles entering hotel garages/underground parking facilities.

One simple way in which security measures can thwart fire safety objectives is on the outside of a building. To prevent unauthorized vehicles from approaching too closely, hotels in urban settings may install permanent, reinforced concrete bollards or barriers around the immediate perimeter of the building. This prevents unauthorized vehicles from gaining access to the building, but it also impedes fire department equipment from having easy access. In such cases, designing some barriers as retractable (in predesignated locations in consultation with the fire department and emergency response services) is a way in which this can be resolved, by allowing access control to the perimeter of a building and fire department access. In suburban locations, access control may be achieved via fences, walls, and built-up berms or ditches with designated access points.

Though access control poses the greatest area of conflict, it is also an area which has received much study and thought. Fortunately, *NFPA 101*, the *Life Safety Code*,[2] and model building codes provide for ways to control remote access without compromising fire and life safety objectives. To prevent unauthorized access from exit stairs to all floors of a building, stair doors are permitted to have limited re-entry or no re-entry, depending on whether certain conditions have been met. Special locking devices are permitted on exit doors when it is desired to keep occupants from leaving a facility. Exits may be alarmed and provided with delayed locking devices or cameras to survey individuals who want to use the exit or entrance so that unauthorized exiting or entering can be prevented. The codes and standards provide for overrides of such access control devices in the event of a loss of power or activation of an evacuation signal.

While fire and life safety requirements are prescribed in codes and standards, currently there are no occupancy-specific security standards; hence, the level of security a building owner provides is dependent on the owner's tolerance for risk and ability to pay for the desired security systems.

For the fire protection engineer's design to work, the integrity of the installed systems must be maintained. To accomplish this, backup systems such as emergency generators or Uninterruptible Power Supplies (UPS), can be built into the design. Protection of the fire detection and fire suppression systems is key to providing a safe environment for all occupants of any facility.

If it is determined that the threat of a terrorist act is very high, hotels in some large cities and foreign countries may have to be built with hardened (specially reinforced) walls, foundations, and floor/ceiling assemblies so that they might survive a specific type of terrorist attack. Windows and doors likewise may have to be hardened to prevent shattering from bombs, thrown objects, and, in some instances, sniper bullets. Already, in places like Washington, DC, Seattle, and New York City, where large demonstrations are common, hotel buildings have suffered broken windows, trampled landscaping, fire bombs, and similar damage. Sometime in the future, there may even be a need for hotels to consider installing a crowd control system consisting of a chemical agent. For such applications, to prevent the agent from being dispersed into other areas of the building, the space in question may need to have a dedicated heating, ventilating, and air conditioning system. All of these types of security measures require careful planning in conjunction with the fire protection systems designer so as to ensure that the security objectives and systems do not inadvertently compromise the fire and life safety of the occupants.

Means must be provided for fire department access to the building and the fire area. Normal venting operations in a hardened building may require specialized equipment to override. The potential for exposure to crowd control chemicals would also have to be overcome by the firefighters – this is less of a problem with self-contained breathing apparatus, but tear gas can cause irritation without being inhaled. It is possible that one day some hotels may have to be planned and designed to such drastic standards.

As with everything else, cost will play an important role in deciding what level of security a hotel owner/operator wants to design into his/her property.[3] While fire and life safety requirements are prescribed in codes and standards, currently there are no occupancy-specific security standards; hence, the level of security a building owner provides is dependent on the owner's tolerance for risk and ability to pay for the desired security systems. The existing building codes and fire and life safety codes and standards provide adequate alternatives to ensure that neither the security objectives nor the fire and life safety objectives of an owner/operator are compromised. ▲

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REFERENCES

1 “Balancing Security and Comfort” IH&RA Report, *HOTELS*, April 2003. p. 52.

2 *NFPA 101, Life Safety Code*, National Fire Protection Association, Quincy, MA, 2003.

3 “Building for a Secure Future.” *Engineering News-Record*, March 10, 2003, pp. 19-54.

NFPA SECURITY STANDARDS

An Update on the Premises Security Project

By Charles E. Hahl, P.E.

The National Fire Protection Association is currently developing two security standards – *NFPA 730 – Premises Security* and *NFPA 731 – Security System Installation*. Both standards complement the safety requirements of NFPA's Building Code (NFPA 5000).

WHEN DID NFPA GET INTERESTED IN SECURITY STANDARDS?

This project began in July 1994, when the NFPA Standards Council first approved a Burglar/Security Alarm System project.

However, after soliciting public input and direction from the NFPA Board of Directors, the Standards Council suspended the project due to lack of widespread interest in the project by both the public and industry at large.

In June 1999, the insurance industry again asked NFPA to reconsider the premises security project. Later, in November 1999, the NFPA Board of Directors endorsed a full set of codes be developed by NFPA for the built environment. By July 2000, the Standards Council had approved the initial scope of the Premises Security project. The committee scope was refined in January 2001 to read: "The Committee shall have the primary responsibility for documents on the overall security program for the protection of premises, people, property, and information specific to a particular occupancy. The Technical Committee shall have responsibility for the installation of premises security systems."

NFPA created a separate and independent technical committee to address this project, although some suggested that this project belonged under the purview of the committee responsible for the *National Fire Alarm Code.* Other than coordination through the *National Fire Alarm Code* Technical Correlating Committee, this project is proceeding as an independent, standalone project.

WHO IS REPRESENTED ON THE COMMITTEE?

The premises security committee is currently comprised of representatives from the following industry groups:

- insurance industry
- Underwriters Laboratory

NFPA 730 – GUIDE FOR PREMISES SECURITY

TABLE OF CONTENTS
(Proposed)

Chapter 1	Administration
Chapter 2	Referenced Publications
Chapter 3	Definitions
Chapter 4	General - Fundamental Requirements - Occupancy Definition
Chapter 5	Security Vulnerability Assessment
Chapter 6	Exterior Security Devices and Systems
Chapter 7	Physical Security Devices
Chapter 8	Interior Security Devices and Systems
Chapter 9	Security Personnel
Chapter 10	Security Planning
Chapter 11	Education Facilities
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Chapter 13	One-and Two-Family Dwellings
Chapter 14	Lodging Facilities
Chapter 15	Apartment Buildings
Chapter 16	Restaurants
Chapter 17	Shopping Centers
Chapter 18	Retail Facilities
Chapter 19	Business Facilities
Chapter 20	Industrial Facilities (Tentative)
Chapter 21	Parking Facilities

NFPA 731 — SECURITY SYSTEMS INSTALLATION STANDARD (Proposed)

1. Administration
2. Referenced Publications
3. Definitions
4. Fundamentals
5. Intrusion Detection Systems
6. Access Control Systems
7. Closed-Circuit Television
8. Holdup, Duress, and Ambush Systems
9. Testing and Inspections

- American Hotel Motel Association (AHMA)
- International Council of Shopping Centers (ICSC)
- American Society for Industrial Security (ASIS)
- local police and fire service officials
- special experts and consultants
- Builders Hardware Manufacturers Association (BHMA)
- Security Industry Association (SIA)
- various security equipment manufacturers
- American Institute of Architects (AIA)

NFPA 730 – PREMISES SECURITY

The premises security Technical Committee has decided to issue the first edition of the premises security document as a "guide." As defined by the NFPA *Manual of Style*, guides are advisory or informative in nature and contain only nonmandatory provisions. The document as a whole will not be suitable for adoption into law.

> ***NFPA 730*** **will recommend performing a risk assessment to identify the assets to be protected and the threats to those assets.**

The Technical Committee spent considerable time deciding this first course of action. This action was decided because of the large amount of new material being introduced. It was felt that a full public comment period would be beneficial before elevating the document to a "recommended practice" or "standard" as defined by NFPA.

The Premises Security Guide is envisioned to be a performance- and occupancy-based document. The Committee recognizes that it would be impossible to define specific security requirements that could cover any or all situations, occupancies, locations, and building construction and operations.

Rather, *NFPA 730* will recommend performing a risk assessment to identify the assets to be protected and the threats to those assets. A multistep process will be recommended.

The first step will be a risk assessment that will recommend examining the following elements: identification of assets, identification of threats, vulnerability of the threats, strategies, cost benefit analysis, and plan of action. This guide will focus on protecting assets, including premises, people, and property.

The threats covered by *NFPA 730* will include crimes against property, crimes against people, vandalism, terrorism, and special events.

Following the identification of risks and threats, a vulnerability analysis will be recommended. The vulnerability analysis should consider the probability, frequency, and impact of the threats. The user will then be encouraged to develop a mitigation plan, which should include evaluating the existing:

1. Design, installation, and maintenance of the physical security devices.
2. Administrative procedures including access controls, pre-employment screening, and documentation and follow-up of security-related complaints.
3. Response planning including the security assignments and responsibilities of personnel and the response plan with public responders.

The guide will also recommend that the mitigation plan also include a cost benefit analysis that prioritizes threats by assessing their probability and potential impact. Based on the results of

The actual level of security required for any particular facility would be decided utilizing a performance-based risk assessment methodology such as that recommended under the sister document, *NFPA 730,* or another similar referenced document.

the vulnerability analysis, the level of premises security provided can be selected and the mitigation plan implemented. As the final step, *NFPA 730* will recommend documenting the results of the risk assessment revisiting them on a periodic basis.

The first ten chapters will detail various security devices, systems, physical security devices, electronic security systems, and planning. These would be the basic elements or building blocks to design a security program based upon the risk assessment. Please refer to the side-bar for the proposed *NFPA 730* Table of Contents.

The remaining chapters of *NFPA 730* will be occupancy chapters. These chapters will provide recommendations suited specifically to an occupancy such as business, retail, parking, or healthcare facilities. The first edition of *NFPA 730* will contain many of these occupancy chapters. Future editions are expected to contain occupancy chapters for industrial and other facilities not addressed in the first edition.

NFPA 731 – PREMISES SECURITY INSTALLATION STANDARD

The *NFPA 731 – Premises Security Installation Standard* will cover the application, location, installation, performance, testing, and maintenance of physical security systems and their components.

The premises security Technical Committee decided to issue the first edition of *NFPA 731* as a standard as described in the NFPA *Manual of Style*. Wording will be mandatory and suitable for adoption into law.

As stated in the standard, the purpose of the standard will be to define the means of signal initiation, transmission, notification, and annunciation; the levels of performance; and the reliability of electronic security systems.

NFPA731 will establish minimum required levels of performance, extent of redundancy, and installation quality, although it will not establish the only methods by which these requirements are to be achieved. Nothing in the document is meant to prevent the use of other systems, methods, or devices equivalent or superior to that prescribed by *NFPA 731*.

The standard will apply to new installation of premises security systems including intrusion detection, access control, closed-circuit television, asset protection, and holdup and duress.

NFPA 731 will focus on local premises alarm annunciation. The standard assumes there is on-site response. Off-site or central-station-type monitoring requirements are not envisioned to be covered under this standard.

It is also important to note that *NFPA 731* will not address levels of protection. These will be developed in *NFPA730 – Guide to Premises Security*. The actual level of security required for any particular facility would be decided utilizing a performance-based risk assessment methodology such as that recommended under the sister document, *NFPA 730*, or another similar referenced document.

WHEN WILL THE PREMISES SECURITY BE ISSUED?

Publication of the *Guide to Premises Security* and the *Security System Installation Standard* will be an important step forward by assimilating what has been a diverse set of existing security standards and practice into a comprehensive document.

Both premises security documents are currently in the May 2005 NFPA revision cycle schedule. Following a favorable vote of the membership, the *NFPA 730* and *NFPA 731* Premises Security Standards could be issued July 22, 2005. ▲

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Fire Alarm Testing Strategies Can Improve Occupant Response and Reduce the

“CRY WOLF” SYNDROME

The title of this article could just as easily be “Fire Alarm Testing Strategies Can DETERIORATE Occupant Response and INCREASE the Cry Wolf Syndrome.” Whether the glass is half full or half empty may be less dependent on a positive or negative attitude, than it is on whether the glass is being filled or emptied. Thus, the fire protection industry thinks of fire alarm testing as a positive thing, designed to uncover faults and increase reliability. However, a large segment of the public thinks of fire alarm testing negatively, as a nuisance and an interruption of their lives and work. Often, their perception of testing is no different than that of false or nuisance alarms.

If long, drawn out testing of alarm systems several times each year ensures an operable system, but causes occupants to delay egress or even stay when the desired action is for them to leave, has safety really been increased?

In the last article of this series, Messaging and Communication Strategies for Fire Alarm Systems, the very real problem of delayed occupant response was discussed.[1] This article looks at the reasons why testing may contribute to delayed occupant response and unwanted behavior. Strategies to use fire alarm testing for positive occupant behavior modification are then outlined.

CRY WOLF

The “Cry Wolf” syndrome occurs when someone is subjected to a high ratio of false-to-real alerts.[2] In this context, the word false is used to describe any non-fire or non-threat activation of the occupant notification part of a fire detection and alarm system. When a real (fire or other threat) activation of the alarm system occurs, occupant response and behavior depends on their confidence in the system. The “Cry Wolf” syndrome causes occupants to question the validity of the alarm. Any strategy to reduce the ratio of false-to-real alerts is likely to increase occupant confidence in the system or at least reduce the loss of credibility.

Certainly false activations and nuisance alarms contribute to slowed occupant response.[3] The fire alarm, fire service and engineering communities have gone a long way to reduce nuisance problems. Systems that are properly designed, installed and maintained tend to be very stable and free of false and nuisance alarms. However, it is possible for false alarm experiences at home and in other places to affect the credibility of any fire warning system.

THE PROBLEM

In general, testing of audible and visible alarms is likely to be the reason for the highest number of activations and the greatest amount of time that a fire alarm system is actively signaling. This is true even for systems that experience several false or nuisance alarms per year. For example, consider an existing apartment building being upgraded with a new fire detection and alarm system. There are 63 apartments on three floors with three wings per floor. Table 1 is a list of equipment for the system.

NFPA 72, the National Fire Alarm Code, requires a 100% test at the time of acceptance.[4] After acceptance, the code requires annual testing of all audible and visible appliances. The test method is the same for both acceptance and periodic testing. Specifically, for audible appliances:

> “Sound pressure level shall be measured with sound level meter meeting ANSI S1.4a, Specifications for Sound Level Meters, Type 2 requirements. Levels throughout protected area shall be measured and recorded. The sound level meter shall be set in accordance with ANSI S3.41, American National Standard Audi-

Table 1 – Equipment List

Equipment Estimates

Project#: 1167b **Project:** Apartment City **Location:** Hometown, AZ **Title:** Building 12

		Manual Fire Alarm Box	Smoke Detectors	Heat Detectors (R/F)	Horn/Strobes (15 cd eff.)	Horn/Strobes (30 cd eff.)	Horn/Strobes (110 cd eff.)	Horns (only) in Apts	Strobes (only, 15 cd eff.)	Strobes (only, 30 cd eff.)	FACU	Control Modules
Zone/Ref.	**Description**	**A**	**B**	**C**	**G**	**H**	**I**	**K**	**L**	**N**	**O**	**P**
1	Basement	2	11	30	2		1		1			3
2	Lobby-1	2	5	2		1			1		1	1
3	Lobby-2	1	4	2					1	1		1
4	Lobby-3	1	5	2		1			1			1
5	F1, W1	1	4	7	1			7	1			
6	F2, W1	1	3	7	1			7	1			
7	F3, W1	1	4	7	1			7	1			
8	F1, W2	1	4	7	1			7	1			
9	F2, W2	1	3	7	1			7	1			
10	F3, W2	1	4	6	1			8	1			
11	F1, W3	1	3	7	1			7	1			
12	F2, W3	1	3	7	1			7	1			
13	F3, W3	1	4	7	1			8	1			
	Total	**15**	**57**	**98**	**11**	**2**	**1**	**65**	**13**	**1**	**1**	**6**

ble Evacuation Signal, using the time-weighted characteristic F (FAST). Record the maximum output when the audible emergency evacuation signal is on."

For public mode signaling, such as in apartment buildings, the Notification Appliances chapter of the code sets a specific performance requirement for the audible signaling system as a whole:

..." 15 dB above the average ambient sound level or 5 dB above the maximum sound level having a duration of at least 60 seconds or a sound level of at least 75 dB, whichever is greater, measured at the pillow level in the occupiable area, using the A-weighted scale (dBA)".

Therefore, measurements must be made "throughout protected area" to ensure audibility in the "occupiable area." Combined, these two requirements necessitate measurements in every room of a building. Large rooms or spaces may require multiple measurements. In addition, it is necessary to ensure that the system, with all appliances operating, does not exceed 120 dBA anywhere in the occupiable area. In some cases, a lower maximum is used where occupants are expected to be exposed for long periods during their egress from the space.[5]

Assume each apartment has five rooms where measurements will be made (bedrooms, bathroom, kitchen, living room) – in some cases there may be more. Each hallway, stair, laundry room, trash room, mailroom and storage space will require at least one measurement. For this three-story apartment building with a full basement, there might be about 350 different measurement locations.

All new audible evacuation signals are required to use a three-pulse temporal pattern. In order to measure the peak SPL (sound pressure level) in a particular location with a meter set for fast response, the signal will have to cycle several times. Then, the technician must move to the next space where the next measurement is required. Moving through an apartment, opening and closing doors and getting stable, repeatable measurements in each location takes at least one minute plus the time for the technician to move to the next space. Since this is an occupied apartment building, it is necessary to knock and have access keys ready as the tester moves from apartment to apartment. If the technicians are pre-dosed with highly caffeinated beverages, provided with ear plugs and roller blades and denied any breaks, it may be possible to get five measurements per minute – the actual speed may vary and the average will almost certainly be less.

How many ANSI S1.4a, Type 2 meters are available to conduct parallel testing? Most contractors show up with one – and it's usually not a certified ANSI Type 2 meter. The AHJ might have one. If an engineer is involved, they may supply one. Assuming there will be two certified meters and five measurements per minute, a 100% test of the above system will require about 35 minutes. To do this, each person taking measurements will require a scribe to follow them and record the results.

Unlike audible appliances, performance tests are not done for visible appliances. Instead, it must be "confirmed that each appliance flashes." The intensity (cd eff.) is verified by inspection of the nameplate or other indicator. So, as the audibility test is being done, the technicians must also observe each strobe. Checking of the nameplate for the correct intensity rating can be done without the system activated.

Realistically, for this example, testing would probably be done by turning the system on and off as the technician(s) and AHJ move around from space to space. The time required would be on the order of two hours, if all goes well. For two hours, the occupants are subjected to signal on, signal off, signal on, signal off. Chances are that the occupants have seen the technicians installing the system for several weeks. During the installation, the system has probably been activated several times to check the wiring and installation. The contractor may even have conducted a 100% pre-test before bringing in the owner, engineer and AHJ for the final, official acceptance test. In addition, if any faults or deficiencies are found during testing, changes may be made and the system may then be retested. How often are the occupants told when testing has been completed and that the system is now operational?

Following the acceptance test and any necessary retests, the system requires annual (periodic) testing. Because other parts of the fire detection and alarm system require more frequent testing, it is common to test one-sixth or one-quarter of the system every two or three months. Many technicians will include a percentage of the occupant notification appliances or circuits in this more frequent test cycle. The net result is a period of about one month before and several weeks after the "official" acceptance test where the occupants are desensitized to the alarm system. Then, every two or three months the occupants are again subjected to alarm testing, often with little or no notice or notice that only some occupants receive and remember. The occupants are desensitized before the acceptance test by the installation and set-up process. They are desensitized for some time after the test if they have not been told (and convinced) that testing has been completed and when they should expect the next test. They are also desensitized if they have been "trained" that testing can occur without their being informed in advance.

Most people's only experience or interaction with a fire alarm system is the result of the system being tested. They have been trained to ignore the system. They have probably not had any drills or real fires to train them for the correct response – evacuation or relocation. The next time the system goes off, they are annoyed and wonder why it's going off.

In order to reduce the Cry Wolf syndrome associated with fire alarm systems, it is necessary to decrease the ratio of false-to-real alerts. Assuming it is not desirable to increase the number of real alerts, it becomes necessary to decrease the number of false alerts. A second way to minimize the Cry Wolf syndrome is to reduce the impact of false alerts so that they are not perceived as being bad. ▲

Next issue – strategies for reducing the "cry wolf" syndrome.

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1 "Messaging and Communication Strategies for Fire Alarm Systems," NEMA Supplement in Fire Protection Engineering, Society of Fire Protection Engineers, Bethesda, MD 20814, Summer 2003.

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3 Proulx, G., "Why Building Occupants Ignore Fire Alarms," National Research Council of Canada, Ottawa, Ontario, Construction Technology Update, No. 42, 1-4, December 2000.

4 NFPA 72, National Fire Alarm Code, National Fire Protection Association, Quincy, MA, 2002.

5 Richardson, L.F., and Moore, W.D., editors, National Fire Alarm Code Handbook, National Fire Protection Association, Quincy, MA, 2002.

Editor's Note – About This Article

This is a continuing series of articles that is supported by the National Electrical Manufacturer's Association (NEMA), Signaling Protection and Communications Section, and is intended to provide fire alarm industry-related information to members of the fire protection engineering profession.

Products/Literature

New Paddles for Waterflow Detectors

The Accuflow™ series of solid-state waterflow detectors is now available with a new 2-in. paddle that complements and enhances the usability of the manufacturer's Sprinkler Systems Monitoring product line. The new paddle is designed for use with malleable and cast iron tees, specifically for the WFDT, WFDTH, WFDTNR models from System Sensor.

www.systemsensor.com
—System Sensor

New Emergency Signaling Options

Edwards Systems Technology has added multi-candela-strobes, horn-strobes, and chime-strobes to its Genesis line of fire alarm signals. The new models expand on the line's flexibility, offering four field-selectable strobe output settings, public or private mode flash rate, high or low dB sound levels, and temporal or steady horn output. Together, the options provide no less than 32 different operating modes from a single device.

www.est.net
—Edwards Systems Technology

Low-Flow Adjustable Fire Sprinkler

The new V3804 quick-response, low-flow concealed fire sprinkler for residential applications permits up to .25-in. or eight-millimeter adjustments to accommodate residential installation needs. It incorporates a new two-piece mounting cup and cover-plate design, and socket wrench for rapid fitting. The new V38-4 socket wrench engages the slots in the cup rather than the sprinkler frame wrench boss, which helps to eliminate wrench-slipping during installation.

www.victaulic.com
—Victaulic

Cable Pathway Requires No Firestopping

The EZ-Path™ cable pathway is a simple solution for cables and wires penetrating fire-rated walls. It installs in minutes, and there is nothing else to buy. Cabling may be increased, decreased, or repositioned easily without removing and reinstalling firestopping. It offers zero to 100% visual cable fill, and the self-enclosed firestopping automatically adjusts to the cable load. Whether empty or full, EZ-Path remains firestopped 100% of the time.

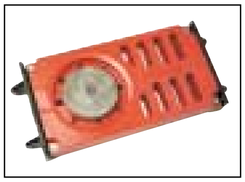
www.stifirestop.com
—Specified Technologies, Inc.

Commercial Concealed Sprinklers

Viking has added new commercial concealed sprinkler choices to its product line. The new adjustable sprinklers, with domed covers, offer competitively priced alternatives to flat-plate concealed sprinklers. The line includes standard and quick-response sprinklers for standard and extended coverage applications available in 5.5K, 8.0K, and 11.2K models. Available in white, black, ivory, and custom colors.

www.vikingcorp.com
—Viking Corp.

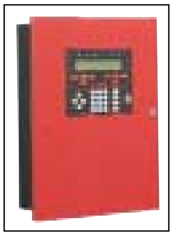
Grate Nozzle® Receives FM Approval



Viking announces FM approval on the Grate Nozzle® as a fixed-discharge nozzle for fire protection. Developed with the U.S. Dept. of Defense, the Grate Nozzle delivers a foam/water solution for underwing protection in aircraft hangars and may also be used for applications including helipads and flammable liquid loading facilities. Installed on piping in trench drains that run the length of the hangar, they discharge solution in a 360-deg. pattern at between 12 and 18 in. above the floor.

www.vikingcorp.com
—Viking Corp.

Analog-Addressable Fire Alarm Control Panel



The IdentiFlex™ (IF) 602 analog-addressable fire alarm control panel is the latest in the 600 Series of control panels. It is ideally suited for small-to medium-sized installations of commercial, institutional, and industrial life safety applications. The IF602 uses SmartLink™ peer-to-peer protocol to connect up to 250 network nodes for added flexibility to meet challenging design applications. It also features advanced self-programming and a fully digital communications protocol.

www.gamewell.com
—Gamewell Co.

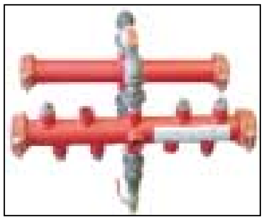
Weather-Resistant Recessed Escutcheons

Victaulic introduces weather-resistant recessed escutcheons for use on most V27, V34, and V36 pendents or sidewalls. They are made of either stainless steel or brass and are offered in finishes including chrome, stainless steel, and white. Ideal for use where corrosion-resistant sprinklers are required, such as near salt water or swimming pools. The brass option is suitable for nonmagnetic applications such as MRI rooms.

www.victaulic.com
—Victaulic

Products/Literature

Corrosion Monitoring Station



Potter introduces the PCMS-Potter Corrosion Monitoring Station. Its coupon rack duplicates the conditions of the cross-main and provides easy access to test coupons for evaluation. The PCMS has nine outlets for removable test coupons and sprinkler heads. It is easily isolated from the sprinkler system for coupon removal and internal inspection. Grooved couplings allow for easy internal inspection.

www.pottersignal.com
—Potter Electric Signal Co.

Modular Design Fire Controller

The IFC-3030, the newest member of the Metasys® IFC family of intelligent fire controllers, offers benefits including a highly configurable design, easy installation, flexible programming, and improved fire detection and reporting speeds. It may be configured without a display or with a 640-character multiline LCD. It supports a full line of remote annunciators, programming tools, modular configuration options, and intelligent detector technology, and is highly scalable.

www.johnsoncontrols.com
—Johnson Controls

New CAD Software

FARO Technologies, Inc., is now shipping a free evaluation copy of Rhino 3.0 software along with every purchase of Platinum and Titanium FaroArm. The software, which supports polygon meshes and point clouds, enables Platinum, Titanium, Gold, Silver, and Bronze FaroArm users to create, edit, analyze, and translate NURBS curves, surfaces, and solids in Windows®. It also provides free-form 3-D modeling tools.

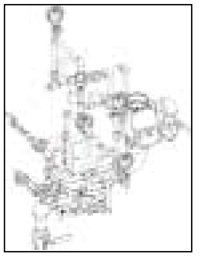
www.faro.com
—Faro Technologies, Inc.

Fire Suppression Releasing Control Panel

New Simplex 4004R Suppression Releasing Control Panel is specifically designed for suppressing fires in computer rooms, petrochemical facilities, power plants, and other high-risk environments. It controls the release of extinguishing systems such as Inergen, FM-200, preaction, water spray deluge, and carbon dioxide in areas where the risk of fast-spreading fire is high, where interruption to operations would be catastrophic, or where the cost of replacing lost equipment would be extraordinary.

www.simplexgrinnell.com
—SimplexGrinnell

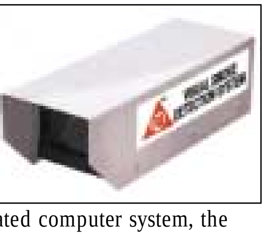
Fire Sprinkler System Backup Operation



Viking's SureFire™ Single or Double Interlock Preaction System offers fail-safe protection that remains functional in the event of both primary and secondary power loss. It adds protection that allows the electrically operated preaction system to operate as a dry system when primary power and battery backup are lost. Available in sizes from 1.5 through 8 in., using angle pattern or straight through pattern valves.

www.vikingcorp.com
—Viking Corp.

Visual Smoke Detection



The VSD-8 Visual Smoke Detection system was recently awarded FM approval. The system is designed to protect high-value assets where traditional detection systems are not effective. Based on CCTV cameras and a dedicated computer system, the VSD-8 delivers early warning of fire at the incipient stage.

www.firesentry.com
—Fire Sentry Corp.

CLASSIFIED

FIRE PROTECTION ENGINEER

Clark County, Nevada, is currently recruiting for Fire Protection Engineer.

Requires Bachelor's Degree in an applicable engineering discipline and three (3) years of design, plan check, and inspection work in the fire and life safety specialty discipline. Must possess valid registration as a professional Fire Protection Engineer from a state recognized by the NCEES, must be registered in Nevada within one year of employment. Salary is $53,410.24 - $82,786.08. Clark County application, résumé, and a copy of current and valid Professional Fire Protection Engineer certification are required. See our Web site at **www.accessclarkcounty.com** to get the job posting and application, or call **702/455-4565**. EOE M/F/D

Resources

NEW Fall Additions to the SFPE 2003 Publications Catalog

SFPE's Engineering Guide to Human Behavior in Fire

SFPE's newest engineering guide summarizes the state-of-the-art knowledge in the area of human behavior in fire. Any life safety design, whether prepared to meet prescriptive or performance-based codes, should consider human behavior. The anticipation of human behavior and prediction of human response are two of the most complex areas of fire protection engineering. This guide identifies both quantitative and qualitative information and resources in the literature. This information should be considered prior to developing safety factors or exercising engineering judgement in the practical design of buildings, the development of evacuation scenarios for performance-based designs, and the estimation of evacuation response. This information may also be useful and applicable to postevent analysis. 48 pgs., $36.00 SFPE member/$50.00 nonmember

Fire Alarm Signaling Systems, Richard W. Bukowski, P.E., Wayne D. Moore, P.E.

This new edition of *Fire Alarm Signaling Systems* brings you up-to-date with the latest technical applications and code requirements impacting your work. This book offers critical guidance on every aspect of fire alarm systems, from components to signal initiation to system testing. *Fire Alarm Signaling Systems* provides testing schedules, data on system malfunctions, cost analysis methods, and more. A history of fire alarms provides added perspective on recent advances in technology. End-of-chapter questions boost comprehension. ISBN#; 450 pgs. $75.00 SFPE member/$95.00 nonmember

The Ignition Handbook, Vytenis Babrauskas, Ph.D.

The Ignition Handbook, developed in part with support from the SFPE Educational and Scientific Foundation, has now been published! It treats in detail not just ignition of fires but also initiation of explosives and pyrotechnics, and explosions of unstable substances. Ignition is defined as the "initiation of combustion," but many unstable substances react in ways where heat is produced by a noncombustion reaction, e.g., decomposition or polymerization. The scope of the handbook includes the initiation of exothermic reactions in such substances. The sections that deal with hazardous materials will be of special interest to workers in this field, because the handbook endeavors to present ignition aspects in a more thorough way than can be found in existing monographs.

The handbook is a massive resource, consisting of 1,116 pages, tightly set in a 2-column, 8.5" x 11" (215 x 280 mm) format. The book includes 627 black-and-white figures, 447 tables, and 140 color plates. The handbook is divided into two main sections: Chapters 1 through 13 include presentations of the fundamental principles of ignition sources and of the response of ignitable materials to heat or energy in various forms. Chapters 14 and 15 constitute an "encyclopedia of ignition," containing extensive information on individual materials, devices, and products. ISBN: 0-9728111-3-3, 1,116 pgs., $178.00 SFPE member/$198.00 nonmember

UPCOMING EVENTS

March 2004
International Fire Safety Engineering Conference
Sydney, Australia
Info: www.sfs.au.com

March 2-4, 2004
Use of Elevators in Fires and Other Emergencies
Atlanta, Georgia
Info: www.asme.org/cns/elevators/cfp.shtml

March 17-19, 2004
Fire & Safety at Sea
Melbourne, Australia
Info: conference@rocarm.com

March 17-20, 2004
6th Asia-Oceania Symposium on Fire Science and Technology
Paegu, Korea
Info: 203.232.135.200/english/index.hem

May 2-7, 2004
CIB World Building Congress 2004
Toronto, Ontario, Canada
Info: www.cibworld.nl

May 9-14, 2004
5th International Scientific Conference – Wood & Fire Safety
Slovak Republic
The High Tatras
Info: www.wfs.tuzvo.sk

July 5-7, 2004
Interflam, 2004
Edinburgh, UK
Info: www.intercomm.dial.pipex.com

October 6-8, 2004
5th International Conference on Performance-Based Codes and Fire Safety Design Methods
Info: www.sfpe.org

BRAINTEASER

A car is driven 20,000 km per year. The car averages 12 km per liter of fuel. Assuming perfect combustion (i.e., no carbon monoxide or unburned hydrocarbons are created) and that the chemical formula for gasoline is C_8H_{18}, how much carbon dioxide is emitted by the car annually?

Solution to last issue's brainteaser

How much carbon dioxide would be created by burning 10 kg of gasoline? Assume perfect combustion (i.e., no carbon monoxide or unburned hydrocarbons are created) and that the chemical formula for gasoline is C_8H_{18}.

The reaction for burning C_8H_{18} is

$$C_8H_{18} + {}^{25}\!/_{2}\, O_2 \rightarrow 8CO_2 + 9H_2O$$

Since the molecular weights of hydrogen, carbon, and oxygen are 1, 12, and 16, respectively, for each 114 grams of gasoline that are burned, 352 grams of carbon dioxide are produced. Therefore, burning 10 kg of gasoline would create 30 kg of carbon dioxide.

Fire Protection Engineering

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NCEES Task Force Develops Proposed Changes to U.S. Licensure System

Morgan J. Hurley, P.E.
Technical Director
Society of Fire Protection Engineers

In 2001, the National Council of Examiners for Engineering and Surveying formed a task force to "assess the current licensure system and develop recommendations for enhancement or change."[1] The National Council of Examiners for Engineering and Surveying is an organization composed of engineering and land-surveying licensing boards from all U.S. states and territories.

Presently, licensure as a professional engineer requires successful completion of several tasks: graduation from an accredited engineering school, passing the fundamentals of engineering (or "EIT") exam, a minimum of four years of engineering experience, and passing the principles and practice of engineering (or "PE") exam. The fundamentals of engineering exam can be taken any time during or after an engineering student's last semester of undergraduate studies, and the principles and practices examination can be taken at any time following a minimum amount (typically four years) of engineering experience.

The National Council of Examiners for Engineering and Surveying task force identified several concerns with the current licensing system.

- The requirements for licensure vary between states, which can make it difficult for licensed engineers to seek comity from one state to another.
- Many engineers in new disciplines do not find licensure practical.
- Undergraduate engineering education may not adequately prepare students for practice in the future. Many academic institutions have decreased the number of credits required for graduation, while increasing the number of required nontechnical courses. The result is that additional education beyond a baccalaureate degree will be required to practice at a professional level. Also, the reduced number of "core" engineering subjects required for all engineers makes generic licenses less supportable.
- A relatively low proportion of engineering educators are licensed, which results in students not appreciating the value of licensure.
- In some disciplines, the breadth of the principles and practices of engineering examination may require engineers to refresh their knowledge in some areas prior to attempting the exam.
- The principles and practice of engineering examination does not cover aspects associated with the practice of engineering, such as legal practices, contract law, ethics, regulatory requirements, and contract administration.
- The engineering profession may not command the same level of respect as other professions, such as medicine, law, or architecture, which have greater education requirements. The lack of engineering specialty certifications may contribute to this perception.
- Only engineers that directly offer their services to the public are required to obtain a professional engineer license. Licensure is not required or encouraged for many engineers that work in industry or government. As a result, only approximately 20% of engineers are licensed.
- The current licensure model does not recognize specialization.

Based on these concerns, the task force has developed a new licensure model. Graduation from an accredited engineering school would be required, after which an engineer would earn the title "graduate engineer." Following successful completion of the fundamentals of engineering examination, an engineer would earn the title "associate engineer." The fundamentals of engineering examination would be waived for engineers who have both an undergraduate degree from an accredited engineering school and a doctoral degree in engineering.

Following the completion of four years of engineering experience, an engineer would become a "registered engineer" and would be entitled to practice engineering that does not involve offering services directly to the public. The experience requirement would be reduced to three years for engineers with a master's degree and to two years for engineers with a doctorate in engineering. An engineer that has passed the principles and practice of engineering exam and has the experience required for a registered engineer would be licensed as a "professional engineer."

Unlike the current model, the proposed model would allow an engineer to take the principles and practice of engineering exam at any time following graduation from an accredited engineering school. Additional coursework beyond a baccalaureate degree may become required in the future prior to award of a professional engineering license.

The proposed licensure model is intended to integrate with specialty certification, which would be formulated and managed by professional societies. The proposed model intends that specialty certification serve as an enhancement, not as a substitute, for professional licensing.

If enacted, the proposed licensure model would likely have little immediate impact on fire protection engineering. It is not likely that it would significantly increase the number of fire protection engineers who hold a professional engineer's license, since the 65% of fire protection engineers that are presently licensed far exceeds the fraction for the entire engineering profession. By allowing the principles and practice of engineering examination to be taken at any time after graduation, the new model would make it somewhat easier for fire protection engineers to become licensed.

The proposed new licensure model is just a recommendation of a task force and may be modified, or rejected altogether, by the National Council of Examiners for Engineering and Surveying. However, given that this task force was created by the organization that is composed of the licensing boards in the U.S., it has the potential to be implemented in some form.

1 "Report of the Engineering Licensure Qualifications Task Force," National Council of Examiners for Engineering and Surveying, Clemson, SC, March 2003.