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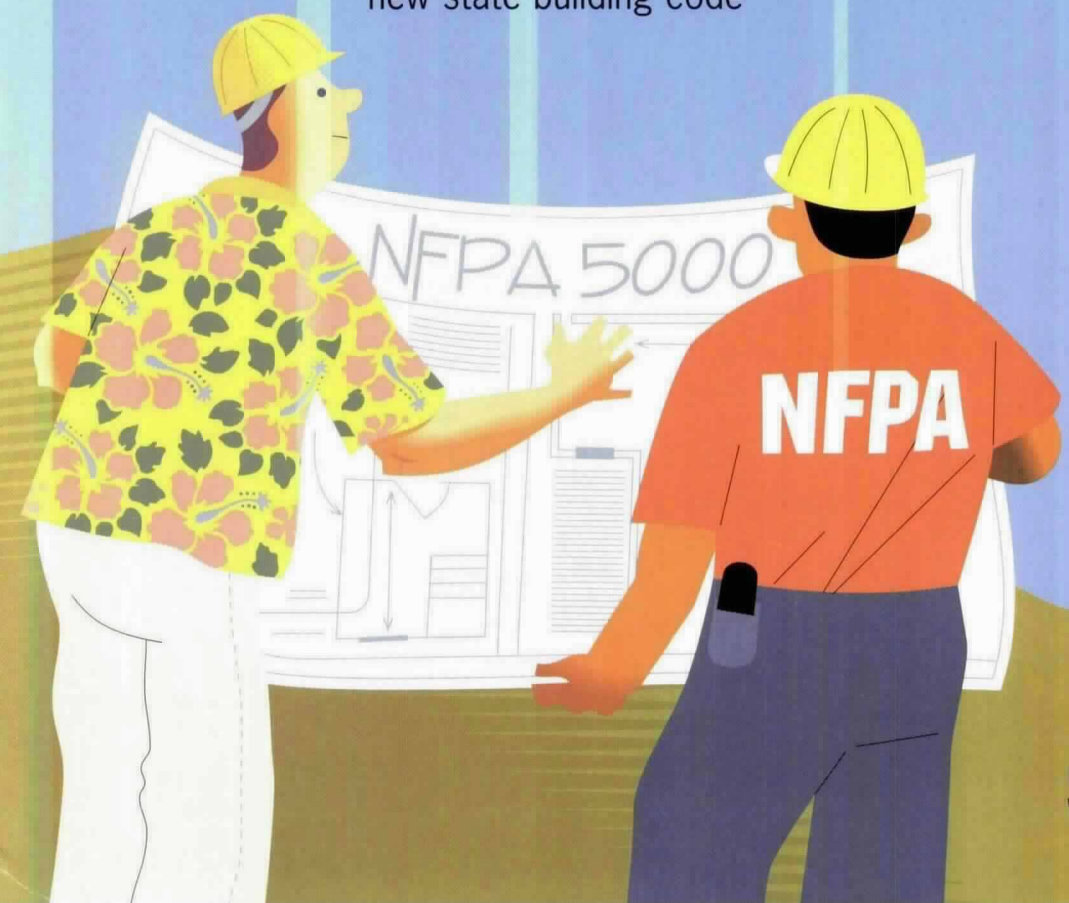
How we're gearing up to make sure California has the technical support it needs to implement *NFPA 5000*™, the new state building code



The Mississippi Project

NFPA SPEARHEADS AN INNOVATIVE SMOKE ALARM INSTALLATION PROJECT

Large-Loss Fires of 2002

MORE THAN 1.5 MILLION FIRES IN THE U.S. LAST YEAR DID OVER $10 BILLION IN DAMAGE

No Way Out?

A LOOK AT UNCONVENTIONAL HIGH-RISE EVACUATION METHODS

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CALCULATING THE REMOTE AREA IS A CRITICAL STEP IN SPRINKLER SYSTEM DESIGN THAT'S OFTEN MISUNDERSTOOD

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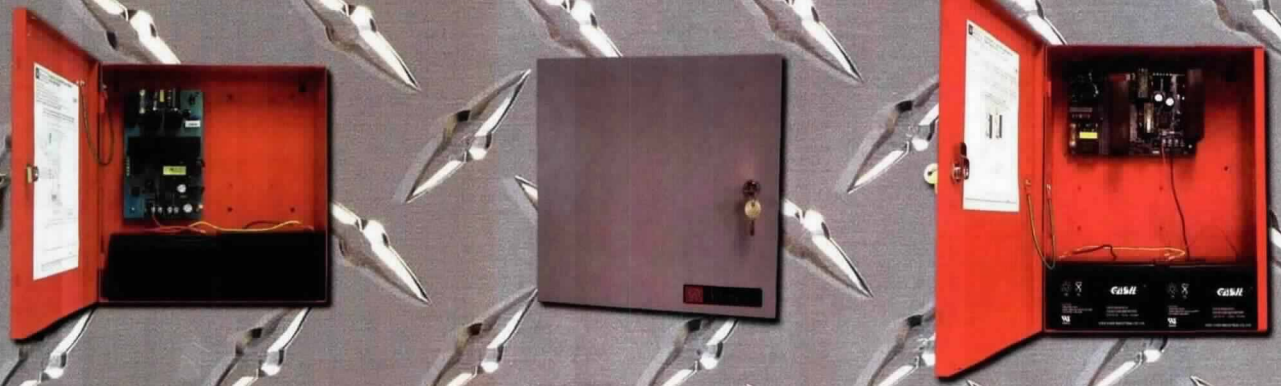

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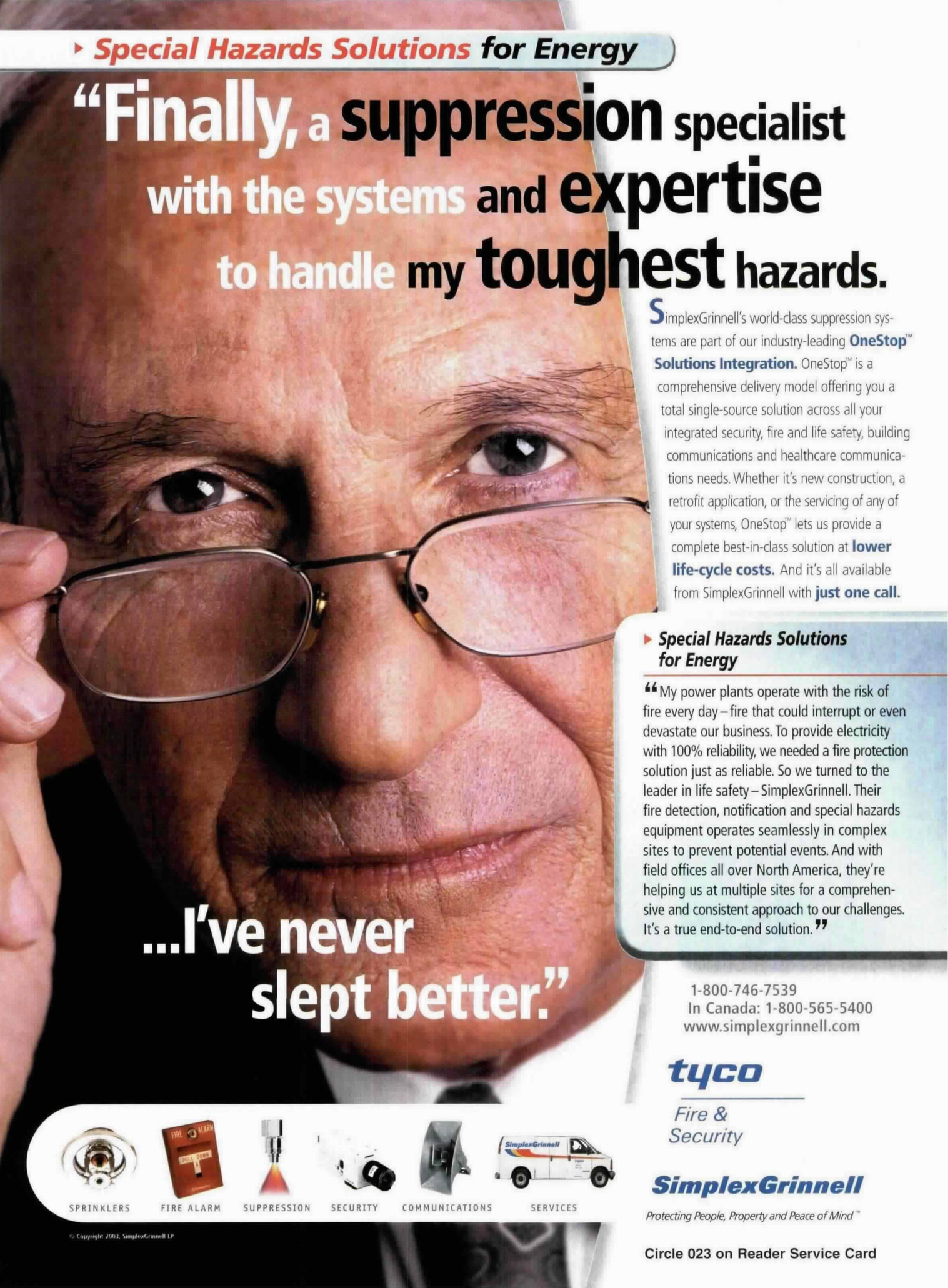
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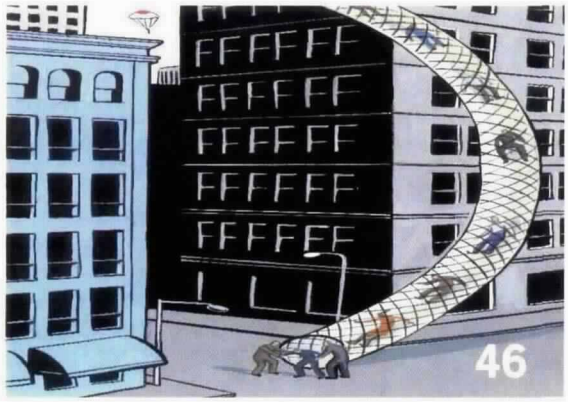

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FEATURES

COLUMNS

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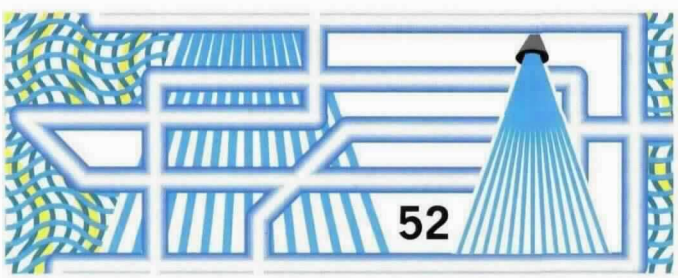

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THIS ISSUE OF NFPA Journal features an article (page 42) by NFPA's Public Affairs Director Margie Coloian about our involvement in an exciting new project in the Mississippi Delta.

For years, Holmes County, Mississippi, has had one of the highest fire death rates in the United States. After a fire in Tchula killed six children last year, however, the county's citizens

decided things were going to change. Funded through a grant from the U.S. Fire Administration and a contribution from NFPA, a task force of area leaders got together and developed a plan to install working smoke alarms in every Holmes County residence that needs them. A well-organized band of community volunteers, led by the fire service, will commit their time and labor to the project, which will be completed over the next nine months.

It's a great advance for fire safety in Holmes County, and NFPA is proud to be part of it. But a broader message emerges from this experience. The Mississippi effort came together because people in the community decided to take control of their own futures and make it happen. The task force was born from the community's grief at the unacceptable loss of innocent lives and its belief that people in the county could join with one another to do something about it.

One of the most frustrating aspects of our attempts to protect lives and property is the fact that most tragedies can be prevented if individuals take very simple steps to educate themselves and follow through on what they've learned. That's why NFPA's public education programs are so central to our efforts. Basic actions, such as replacing smoke alarm batteries and practicing an escape plan with your kids, are a statement of personal responsibility for your own safety. A system of safety codes, along with effective enforcement and a well-trained and well-equipped fire department, is important, but nothing can be as effective as the efforts of individuals and communities to address safety issues themselves.

In Holmes County, simple steps were taken to prevent future tragedies

The Holmes County project is a model of what people can do to protect lives and property through their own initiative, and the example has not been lost on others. Several more communities have already spoken to us about developing their own plans with NFPA's help. Different approaches will work in different places, but the lesson is simple: None of us can afford to sit on the sidelines when it comes to hazards like fire. Nothing can offer the protection that personal responsibility provides.

Fire Prevention Week is our annual opportunity to reinforce this message, but we emphasize it every day at NFPA. We believe in codes and standards. They've proven their importance in saving lives.

We support our fire service and feel that more resources must be provided to ensure that our firefighting and enforcement communities have the necessary tools to do their jobs. But everyone should realize that the first line of defense in making the world safer is our own families and our own homes. This is a lesson Mississippi can teach all of us.

James M. Shannon
President and Chief Executive Officer
NFPA

PHOTOGRAPH: KATHY TARANTOLA

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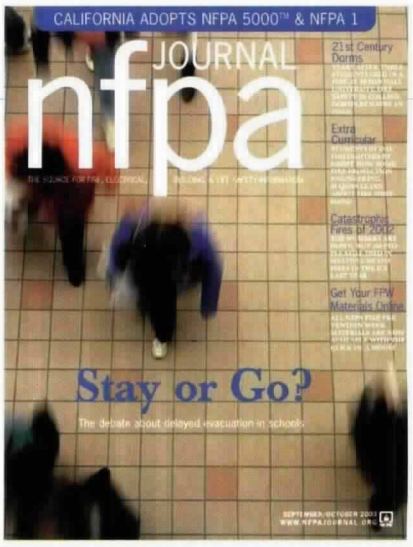


Additional information

Recently, I read the September/October 2003 edition of the NFPA Journal. Typically, this publication provides a wealth of information. However, this time I am mildly disappointed with one article…by Shelly Reese…titled, "21st Century Dormitory."

The article…states, "In the past three years, states have introduced more than two dozen pieces of legislation relating to the issue, and only about four of them have gone anywhere." What disturbs me is that Delaware's proactive legislation isn't even mentioned. And yet Delaware's law is more comprehensive than any of the four states mentioned, namely New Jersey, Wisconsin, Pennsylvania, and Kentucky.

In Delaware, regardless of occupancy, our State Fire Regulation has required sprinklers in all buildings over 10,000 square feet (929 square meters), including dormitories, for over 10 years. This requirement has limited the number of unsprinklered dormitories.

In July 2002, our governor signed into law House Bill 291, which requires all student housing, public or private, new or existing, to install sprinklers.

HB 291 applies to housing of all students, not just college [students]. It includes boarding, elementary, and secondary schools.

To assist in its success, HB 291 provides state funding for a 0% loan program.

…Bill Preston, the state fire marshal, is, as were his immediate predecessors, an energetic promoter of sprinkler protection. He is convinced that this is a matter of public safety and that sprinklers save lives. Besides the installation requirements in the regulation, which are more stringent than the national codes, Delaware also mandates the NFPA 25 requirements and has so mandated for over 10 years.

R. T. Leicht, SFPE
Chief Fire Protection Specialist
Office of the State Fire Marshal
Dover, DE 19904

NFPA RESPONDS

Dear Mr. Leicht:

Thank you for bringing this legislation to my attention.

As the publisher of Campus Firewatch, I make an effort to track all of the national legislation relating to campus fire safety; this one clearly slipped by me.

Delaware is to be commended for taking such a proactive and aggressive approach to campus fire safety.

Ed Comeau
Publisher
Campus Firewatch

Picking and choosing

I read with interest the "Building to Code" column by Jerry Wooldridge in the September/October 2003 edition of *NFPA Journal*. It describes a very unique situation that definitely requires creativity when applying code requirements.

However, I'm not sure I understand Mr. Wooldridge's logic regarding how the code was applied. I agree with him that section 1.5 of *NFPA 5000™* allows use of equivalency concepts, but the question is what constitutes "equivalency"? Unless I don't have all of the facts, it appears that he allowed use of a provision of the code intended for Detention/Correctional occupancies (chapter 21) in a Hotel occupancy (chapter 24), without any additional provisions being provided?

In 19 years of building/fire code enforcement, I have had many designers attempt similar things by "picking and choosing" a section from another, completely unrelated, occupancy chapter simply because it appeared to fit their design, and then argue the equivalency to me.

With all due respect to Mr. Wooldridge, the fact is that a detention occupancy is not the same as a hotel occupancy. If it were, the provisions for an exterior area of refuge that Mr. Wooldridge described would be written into the hotel occupancy provisions as well. In my opinion, to allow the use of such a provision without any additional measures of fire/life safety being offered is not the intent of the code.

I have a saying that I've used way too many times over the years in response to architects/engineers/designers: You need to design the building to comply with the code, not design the code to comply with the building!

Daniel F. Dykstra
Michigan Department of Consumer and Industry Services
Bureau of Construction Codes and Fire Safety

ERRATA

There were several errors in tables of "Catastrophic Multiple-Death Fires 2002" in the September/October issue that the editors would like to rectify by reproducing the corrected tables below. In addition, the caption on page 72 implied that six people died in a row house fire in Baltimore. In fact, seven died. For the full text and all tables of the report, visit www.nfpa.org. We apologize for any inconvenience these errors may have caused.

RESIDENTIAL/Abbreviated Table One

Deaths	State	Occupancy	Month	Cause
8	LA	Two-family dwelling	January	Combustibles too close to heat
7	OH	Single-family dwelling	January	Undetermined
7	MO	Manufactured single-family	January	Misuse of heat of ignition
7	NY	Apartment house	June	Cooking
7	MD	Single-family row house	October	Suspicious
6	NC	Single-family dwelling	June	Overloaded electrical
6	LA	Single-family dwelling	August	Overloaded electrical
6	NJ	Dwelling	July	Not reported
6	MS	Manufactured single-family	October	Not reported
5	GA	Manufactured single-family	January	Undetermined
5	MS	Single-family dwelling	January	Not reported
5	PA	Single-family dwelling	February	Electrical short circuit
5	MI	Single-family dwelling	September	Propane explosion
5	MI	Rooming house	October	Combustibles too close to heat
5	PA	Single-family dwelling	December	Not reported
5	AR	Two-family dwelling	December	Undetermined

NONRESIDENTIAL/Abbreviated Table Two

8	NC	Correctional facility	May	Not reported
5	MS	Manufacturing plant	May	Dust explosion
3	AL	Hunting lodge	November	Not reported
3	OR	Store	November	Heat from incinerator
3	MO	Storage	December	Overloaded electrical

NONSTRUCTURAL/Abbreviated Table Three

6	NH	Aircraft / wooded area	September	Crash and fire shortly after takeoff
5	SC	Multiple vehicle crash	March	Collision on Interstate
5	CO	Vehicle rollover	June	Driver lost control
5	FL	Multiple vehicle crash	November	Collision on Interstate
4	WA	Multiple vehicle crash	August	Collision on Interstate
3	NM	Multiple vehicle crash	March	Collision on Interstate
3	MN	Automobile fire	June	Automobile fire on roadway
3	CA	Firefighting aircraft	June	Airplane breakup and crash
3	CO	Firefighting aircraft	July	Airplane crash
3	CA	Fire apparatus roll over	July	Fire apparatus rolled off road.
3	AR	Multiple vehicle crash	July	Collision on Interstate

Nursing Home Fires

SADLY, NURSING HOME fires continue to grab headlines. In September 2003, a fire broke out at a four-story nursing home in Nashville, Tennessee, killing 11 residents and injuring at least 28. In March 2003, a fire tore through the Greenwood Health Center nursing home in Hartford, Connecticut, killing 16 people.

The problem isn't new but it is on the decline when looked at over time.

According to NFPA's Fire Analysis and Research Division, in 1999, 2,500 nursing home and 700 residential board and care facility fires caused a total of 3 civilian deaths, 150 civilian injuries, and $10.7 million in direct property damage.

From 1994 through 1998, an estimated average of 3,000 reported structure fires in facilities that care for the aged caused 12 civilian deaths, 241 civilian injuries, and $6.8 million in direct property damage per year.

Fire detection and prevention measures are making a difference. Ninety-three percent of facilities that care for the aged have smoke alarms. Almost three-quarters of the facilities with reported fires were protected by automatic suppression systems. The death rate without an automatic suppression system present was almost six times as high as the rate in a facility with this protection. Direct property damage was twice as high.

The 3,200 structure fires in nursing homes and residential board and care facilities in 1999 accounted for 0.6 percent of the 523,600 structure fires, 0.1 percent of the 3,041 civilian structure fire deaths, 0.8 percent of the 18,519 civilian structure fire injuries, and 0.1 percent of the $8.5 billion in direct property damage.

When taken as a whole, structure fires in facilities that care for the aged fell 27 percent from 4,400 in 1980 to 3,200 in 1999. From 1998 to 1999, these fires increased 16 percent from 2,800. Despite the increase (and the inclusion of fires from children's homes or orphanages that were converted into board and care), the 1999 figure is lower than the 3,300 in 1997.

For more information, visit www.nfpa.org/Research/FireInvestigation/CTFire/CTFire.asp.

ILLUSTRATION: ANNE BISSETT

Structure Fires in Facilities that Care for the Aged

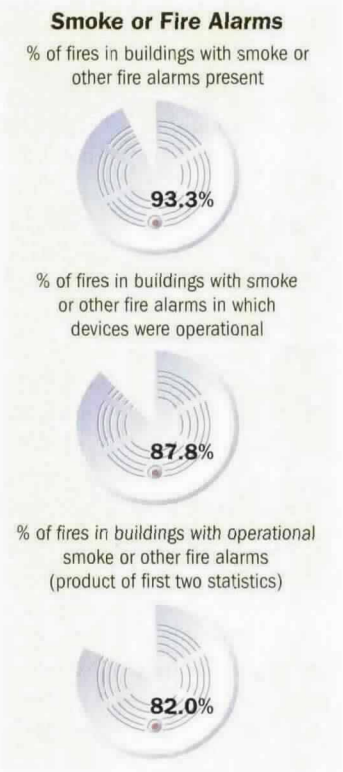
1994–1998 Annual Averages

Note: These are fires reported to U.S. municipal fire departments and so exclude fires reported only to Federal or state agencies or industrial fire brigades. Fires are rounded to the nearest hundred, deaths and injuries to the nearest one, and direct property damage to the nearest hundred thousand dollars. Sums may not equal totals due to rounding errors. Damage has not been adjusted for inflation.

SOURCE: National estimates based on NFIRS and NFPA survey.

Fire Protection Features in Reported Structure Fires in Facilities that Care for the Aged

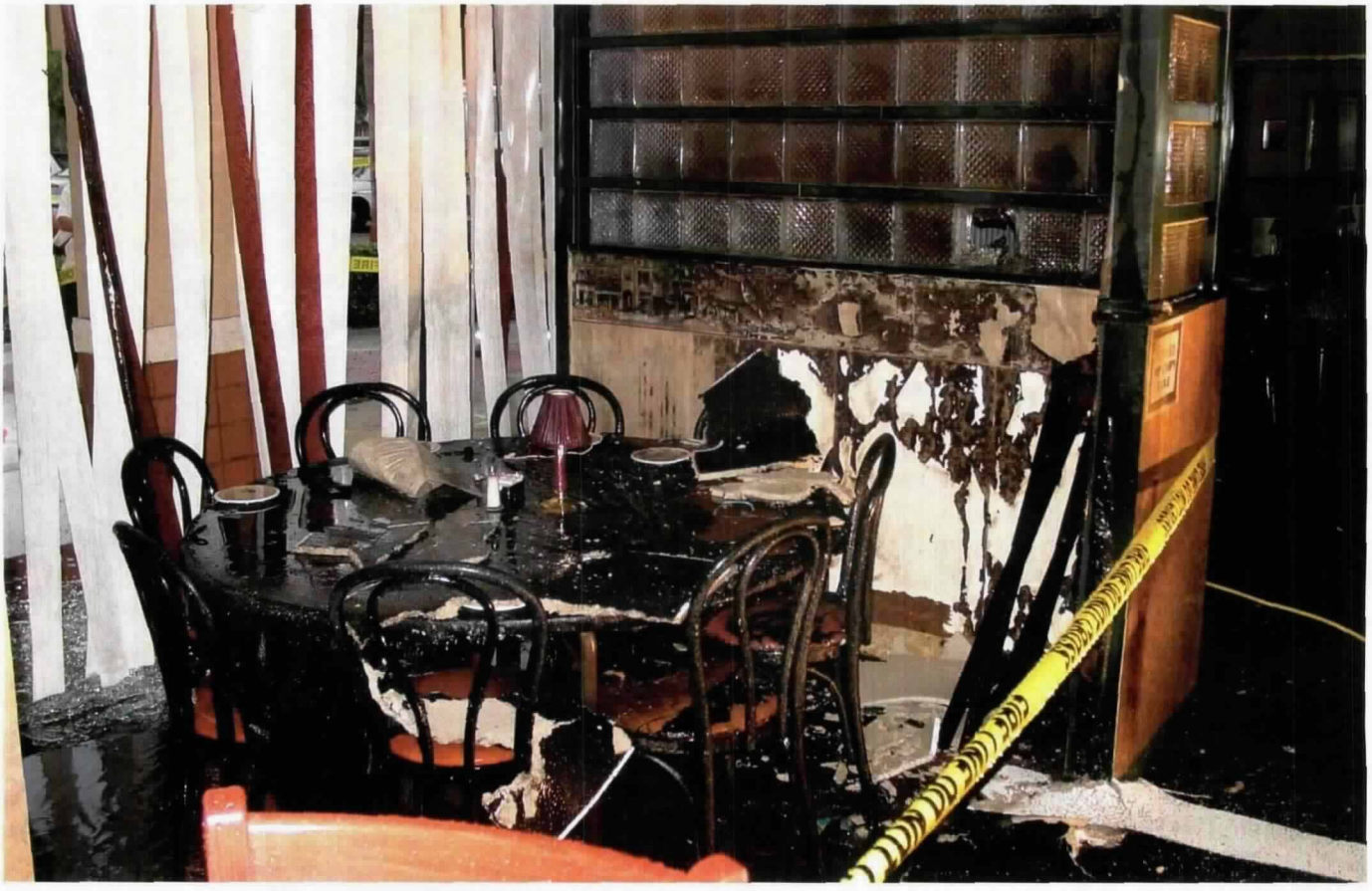
1994–1998 Annual Averages



Automatic Supression Systems

% of fires in buildings with automatic supression system	73.6%
Deaths per 1,000 fires with automatic supression system	1.9
Deaths per 1,000 fires without automatic supression system	10.8
Reduction in deaths per 1,000 fires when automatic supression systems were present	82.0%
Average loss per fire when automatic supression system was present	$1,780
Average loss per fire with no automatic supression system	$3,973
Reduction in loss per fire when automatic supression systems were present	55.2%

SOURCE: National estimates based on NFIRS and NFPA survey.



Three Molotov cocktails were thrown into a restaurant through the front window, but a single fire sprinkler quickly extinguished the fire.

PHOTOGRAPH: DELRAY BEACH FIRE-RESCUE DEPARTMENT

ASSEMBLY

FLORIDA

Fire sprinkler extinguishes arson fire

Several incendiary devices thrown through a restaurant window around 5:30 a.m. ignited the building's contents, but a single fire sprinkler quickly extinguished the fire. Fire department notification was delayed when an improperly connected water-flow alarm failed to operate.

The single-story restaurant, which was 76 feet (23 meters) long and 48 feet (15 meters) wide, had metal and steel walls covered with drywall and a metal-deck roof. It was protected by a full-coverage wet-pipe fire sprinkler system.

The owner of a neighboring dry cleaners heard water running when he arrived at work around 5:30 a.m. and called 911 at 6:02 a.m., after he saw broken glass and the operating sprinkler. Responding firefighters found the fire completely extinguished and shut down the water supply.

Investigators determined that the fire started when someone threw three Molotov cocktails into the restaurant through the front window. The burning liquid ignited seating, the walls, and the ceiling before the fire sprinkler activated.

Damage to the building was estimated at $5,000, and damage to its contents at $1,500.

RESIDENTIAL

FLORIDA

Cigarette ignites mattress in assisted-living facility

Fire sprinklers extinguished a fire in a bedroom in an assisted-living facility, limiting fire damage to the room's mattress, bedding, and wall coverings. However, water damage to the building's lower floors and electrical system made the facility uninhabitable until repairs were made.

One hundred seventy people lived in the facility, although not all were present at the time of the fire. The four-story building, which was 100 feet (30 meters) long and 100 feet (30 meters) wide, had a two-story basement, hollow tile walls, and a wooden roof with a built-up roof covering. A wet-pipe fire sprinkler system provided full coverage, and a fire alarm system had been installed. A central station alarm company monitored both systems.

Firefighters responding to an automatic flow alarm at 9:24 p.m. found the occupants, who told them sprinklers were operating on the fourth floor, being evacuated independently and with the help of the staff. Fire crews discovered

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that two fire sprinklers had already extinguished the blaze in the unit of origin, which was occupied by a mentally impaired 80-year-old woman.

Once they confirmed that the fire was out, firefighters shut down the water to the fire sprinklers, but not before water, draining from the fourth floor, damaged the entire building's electrical distribution system and lighting. The Red Cross and Salvation Army helped transfer the occupants to other facilities or to relatives' homes until repairs could be made.

Investigators determined that the blaze began when a discarded cigarette ignited the woman's bedding. Fire damage was estimated at less than $1,000. No one was injured.

ALABAMA

Security bars trap six

Security bars on the back door prevented six members of a family from escaping from their burning home when fire blocked the front exit. Firefighters and a neighbor managed to breach the door and free three children, but two adults and a 5-year-old boy died trying to find another exit.

The fire occurred in a one-story, single-family home of wood-frame construction with an asphalt roof. The house had no smoke alarms or fire sprinklers.

An electric space heater placed too close to a bed ignited the bedding, mattress, and the room's carpeting before the fast-moving fire spread into the attic and other areas of the house, eventually causing the roof to collapse. By the time the occupants awoke, flames had already limited their escape routes and the security bars blocked their alternative exits.

A 13-year-old girl, an 8-year-old boy, and a 2-year-old boy survived with smoke inhalation injuries. The house, valued at $46,000, and its contents, valued at $16,000, were destroyed.

CALIFORNIA

Heat from fireplace ignites Christmas gifts in fatal fire

Three of the five people in a two-family house died of smoke inhalation when embers or flames from the fireplace in one apartment ignited the contents of the living room. Investigators believe a hard-wired smoke detector in the apartment was removed from its mounting prior to the fire, contributing to the deaths.

The two-story, wood-framed structure, which covered 900 square feet (83.6 square meters), was unsprinklered; the smoke detectors, installed in the hallways leading to the bedrooms, had no battery backup.

On the night of the fire, four children, ages 11, 9, 5, and 3, were at home with their 60-year-old grandmother. During the evening, the 9-year-old boy started a fire in the living room fireplace without supervision. He and the others then went to bed, only to awaken around 2:30 a.m. to find the apartment filled with fire and smoke.

Investigators determined that embers or flames from the fireplace ignited nearby combustibles, which included holiday gifts and a Christmas tree. The tree, only a foot or two (30 to 60 centimeters) from the fireplace, was a significant source of fuel for the fire, which spread to other combustibles in the room.

The 9-year-old and his 11-year-old sibling escaped the blaze, but neither called 911 to report the fire. Their grandmother, 5-year-old sister, and 3-year-old brother died in the blaze.

Damage to the house, valued at $500,000, was estimated at $200,000. Damage to its contents, valued at $50,000, was estimated at $10,000.

OHIO

Halogen light ignites fraternity house curtains

Operating smoke alarms alerted the sleeping occupants of an off-campus fraternity house to a fire that began when heat from a halogen light bulb ignited the drapery in a common room. About 30 people were in the house at the time, and all managed to escape from the unsprinklered building before firefighters arrived.

The two-story structure was 150 feet (46 meters) long and 60 feet (18 meters) wide. Details about the type of smoke alarms weren't provided.

The fire department received a call reporting the fire at 6:59 a.m. Because it came in during a shift change, the fire department responded with six firefighters, twice the number normally sent. When they arrived three minutes later, firefighters saw heavy fire from the left side of the front of the house spreading from the first floor to the second floor and roof.

Using a 1 1/2-inch hose line, crews from the first engine knocked down the exterior fire and advanced into the first-floor hallway towards the room of origin. A second engine tied into a hydrant and laid a 5-inch water supply line to the first pump, then pulled a second 1 1/2-inch hose line for backup. Firefighters managed to control the fire, which had spread to a second-floor bedroom, in 10 minutes.

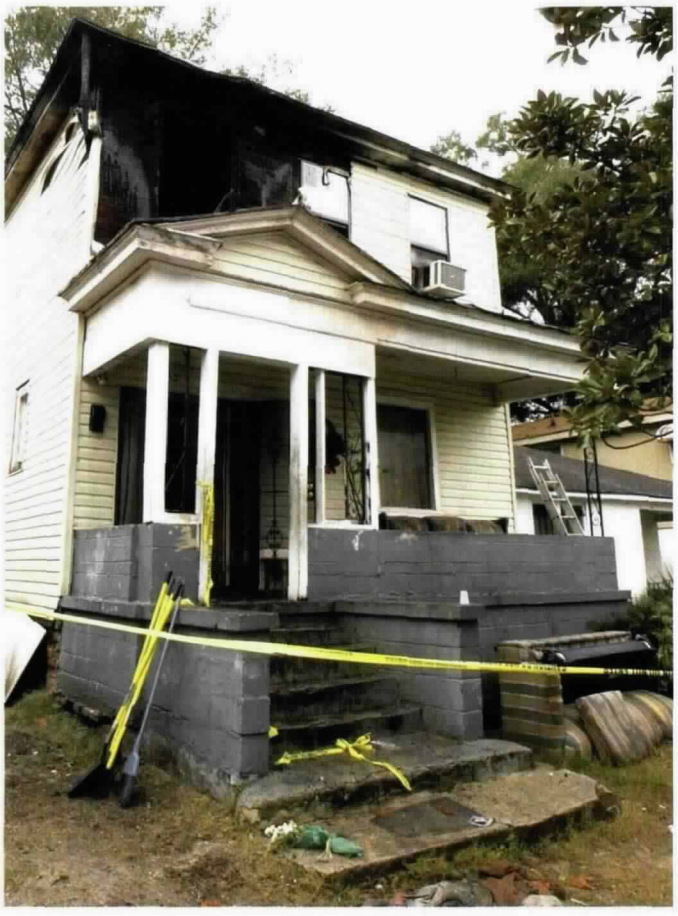
One occupant suffered shoulder and arm injuries while escaping from a second-floor window. She was taken to the hospital. The $1 million building had damage estimated at $250,000, and its contents, valued at $150,000, had damage estimated at $100,000. None of the firefighters was injured.

GEORGIA

Candle ignites fatal fire

Four members of a household of 10 died in a house fire started by a candle they'd been using for light because the utility company shut off their electricity for non-payment.

The single-family, wood-frame house was 45 feet (14 meters) long and 20 feet (6 meters) wide. The first floor of the unsprinklered, two-story structure consisted of a living room, kitchen, dining room, bedroom, and bathroom; there were five bedrooms and a bathroom on the second floor. After



Four members of a household of 10 died in a house fire started by a candle.

the fire, investigators found a smoke alarm on the floor under debris, but they don't know whether it operated.

The fire was reported at 12:35 a.m. Firefighters arrived to find fire and heavy smoke coming from the house and discovered neighbors using a ladder to help six of the occupants escape from the second floor. All six suffered smoke inhalation injuries and were taken to area hospitals. The injured included a 9-day-old boy, a 4-year-old boy, a 6-year-old girl, a 9-year-old boy, and two adults ages 25 and 21.

Firefighters found one of the victims, an adult, in the second-floor hallway, another adult and a child in a second-floor bedroom, and a second child in another bedroom. The 7-year-old girl, 4-year-old boy, 50-year-old woman, and 72-year-old woman had died of smoke inhalation.

Investigators determined that the 50-year-old woman, who was mentally impaired, occupied the bedroom in which the fire began after a candle she was using ignited combustibles.

Fire damage was limited to part of the second-floor hallway and the woman's bedroom, although the rest of the house incurred heavy smoke and water damage. The home, valued at $39,000, suffered $10,000 in damage. Its contents, valued at $20,000, suffered $5,000 in damage. There were no firefighter injuries.

MANUFACTURING

MASSACHUSETTS

Oil mist ignites during manufacturing process

A single fire sprinkler above an automatic grinding machine in a million-dollar manufacturing plant activated when sparks from improperly aligned steel components ignited the machine's cooling oil mist, starting a fire that spread to the machine's oil and flexible tubing. A carbon dioxide system protecting an oil filtration system's ductwork also activated, and the two suppression systems controlled the fire, substantially limiting property damage.

The blaze occurred on the first floor of a two-story, heavy-timber building 200 feet (61 meters) long by 200 feet (61 meters) wide. The wet-pipe fire sprinkler system and the carbon dioxide system were connected to a fire detection system that was tied into a municipal fire alarm system.

During the normal grinding process, steel taps are placed in the machine and bathed in oil. On the day of the fire, the operator said that the steel moved deeper into the machine than usual, causing excessive sparking that ignited the oil mist.

The fire spread to the oil in the machine and the flexible hose that handled the oil mist, building rapidly until the sprinkler above the machine operated. The CO_2 system in the oil filtration ductwork operated, as well. Workers also used one CO_2 extinguisher on the blaze.

The fire department received the alarm at 12:50 p.m. Firefighters turned off power to the affected area and checked for fire extension, but found none.

The building and its contents, estimated to be worth $1 million, suffered only $10,000 in damage. There were no injuries.

STORAGE

CALIFORNIA

Fire sprinklers extinguish warehouse fire

Two fire sprinklers extinguished a fire in a large electronic equipment warehouse on Christmas Day, limiting damage to $5,000.

The warehouse, covering an area of 200,000 square feet (18,580 square meters), had concrete tilt-up walls, a concrete slab floor, and a steel-truss roof 35 feet (10 meters) high. The full-coverage wet-pipe fire sprinkler system was monitored by a central station alarm company, as were smoke alarms in the HVAC ductwork.

Firefighters responded to the building when the alarm activated at 9:22 a.m. On arrival, they didn't see any smoke or flames coming from the building, although one company reported seeing water coming from the fire sprinkler pump room.

When firefighters entered the building, however, they found smoke in the fire control room, and the incident commander ordered them to advance a pre-connected hose line into the warehouse to investigate. The ladder company placed its aerial ladder to the roof

PHOTOGRAPH: BOB MORRIS/SAVANNAH MORNING NEWS

to size it up, as well.

Firefighters inside the warehouse reported the smoldering remains of a fire in a group of cubicle workstations and ordered the fire sprinkler systems shut down to limit damage.

The blaze began when an electrical short circuit ignited the material on the walls of the cubicles and spread across the partition walls before the two fire sprinklers activated. There were no injuries.

WASHINGTON

Material stored too close to furnace ignites

Automatic fire suppression and ventilation systems controlled a fire in a large warehouse that started when cardboard boxes stored within inches of a ceiling-mounted, gas-fired heater ignited. Employees in the building first thought the smell of smoke was from a coffee-roasting operation in another part of the building.

The single-story warehouse, which was 1,000 feet (305 meters) long and 400 feet (122 meters) wide, had concrete, tilt-up wall panels and wooden roof trusses. The roof was covered with single-ply rubber roofing material. A wet-pipe fire sprinkler system provided coverage, and a separate in-rack fire sprinkler system was installed throughout the rack storage, which contained cardboard boxes on wooden pallets. Skylights with fusible links were designed to open automatically to limit the horizontal spread of heat and smoke. The warehouse also had a fire detection system, but details of its coverage weren't reported. A central station alarm company monitored all systems.

When firefighters responded to the automatic fire alarm at 9:51 a.m., a warehouse employee directed them to a section of the rack storage system, where they found fire sprinklers controlling a fire near the ceiling. The building hadn't been evacuated.

The incident commander ordered additional resources and sent crews into the rack storage area with a 1 3/4-inch hose line to extinguish the remaining fire that the ceiling-mounted and the in-rack fire sprinklers couldn't reach. Two skylights opened automatically to release built-up smoke and heat, and prevent further loss.

Investigators determined that the heating unit ignited the boxes. The sprinklers limited fire damage to the area around the top rack. The value of the building and contents wasn't reported, but property damage was estimated at $250,000. No one was injured.

MERCANTILE

CALIFORNIA

Incendiary fire damages office complex

Someone used an open flame device to ignite combustibles in an unlocked stairwell of a large office building. A malfunctioning heat detector in the area of origin prevented the alarm from sounding at the fire department, which was eventually notified by passersby.

The unsprinklered three-story building, constructed of heavy timber with a brick exterior and a wooden built-up roof, was 180 feet (55 meters) long and 65 feet (20 meters) wide. Smoke and heat detectors were installed throughout the building, which contained 26 offices. Several passersby called 911 around 1:41 a.m. to report the fire, and a police officer reported that the building was fully involved. Based on that information, the battalion chief ordered a second alarm while still at the station. After he arrived at the scene and saw fire on all three floors of the building, he called for a third alarm. Engines and ladders answering the call set up for a defensive attack using ladder pipes and large-diameter hoses to douse the fire through the open windows. They also protected several nearby exposures, including an elderly housing complex.

Investigators determined that the fire, which was declared under control at 2:30 a.m., began in a stairwell on the first floor and spread up the wooden stairs and through openings and voids in the walls to all three floors. The door to the stairwell was found unlocked, and a stack of booklets provided fuel. The building had been vandalized earlier, and this fire was intentionally set.

The value of the building and its contents wasn't reported, but damage was estimated at $4.5 million.

HEALTH CARE

IOWA

Fire in hospital mechanical room contained

A fire in the basement mechanical room of a hospital was confined to the room of origin, although patients and staff on the second and third floors were evacuated as a precaution. Fire investigators determined that the fire started when an electrical extension cord arced as a result of damage caused by heavy wooden spools of electrical wiring that had been stored on top of it.

The hospital had eight stories above ground and two floors underground, and the mechanical room, which had no fire detection or suppression equipment, was located on the lowest level. Details about the building's construction or other fire protection provisions weren't reported.

Firefighters dispatched to the fire at 2:25 a.m. arrived four minutes later to find smoke coming from one entrance. An engine company located the fire in the mechanical room, which an electrical contractor was using to store electrical supplies, and quickly extinguished it.

Investigators determined that two or three spools of wire weighing 124 to 186 pounds (273 to 409 kilograms) each had damaged an electrical cord lying on the floor beneath them, causing it to arc and ignite the spools and some cardboard boxes.

Damage to the $200 million property was estimated at only $2,000. There were no injuries.

Cost-effective E-learning for professionals

NFPA'S ONLINE LEARNING center, which provides the training you require in a convenient, cost-effective manner, has expanded its offerings to include four eight-course certificate programs: automatic sprinkler systems, fire alarm fundamentals, electrical installations in hazardous locations, and fire and life safety in health care occupancies. If you're an entry–mid-level designer, installer, enforcer, inspector, safety supervisor, or educator, you'll benefit from these programs.

The new automatic sprinkler systems course covers such topics as planned sprinkler system impairments, special sprinkler systems, and an introduction to automatic sprinklers.

The basic fire alarm program covers system functions, power supplies, basic circuit design, and an introduction to initiating devices, while the advanced program covers specialized fire detectors and supervisory initiating devices.

In the flammable liquids courses, topics will include handling flammable liquids, flammable liquids and portable containers, and flammable liquids in storage rooms. Other certificate courses offered online include advanced topics in fire alarms and handling flammable liquids.

Recognized experts prepared each self-paced, 30-minute course as a series of interactive lessons that will keep you involved and facilitate learning. Case studies and quizzes measure your progress and proficiency.

Select individual courses at just $35 per course or choose an entire certificate program for $196. When you complete all of the courses in a program, you'll earn 0.4 CEUs and a certificate. To try a demo course or to register, log on to www.nfpalearn.org.

ILLUSTRATION: VEER

Certification programs

NFPA has added new certifications to its professional development offerings. In January, we launched the Certified Building Inspector and Certified Building Plans Examiner Programs. In June, we followed with the Certified Fire Inspector II Program. And in August, we launched the Certified Residential and Certified Master Electrical Inspector Programs. We've also begun preliminary needs-assessment work on a Certified Building Official Program.

To review all of NFPA's certification programs now offered, visit www.nfpa.org/certification.

Safety Conference and Exposition

The 2004 *NFPA World Safety Conference and Exposition®* (WSCE) is scheduled to take place at the Salt Palace Convention Center in Salt Lake City, Utah, from May 23 to 26. The theme for the conference is "Building a Safer World."

Conference tracks will include sessions devoted to business continuity, detection and suppression, the *National Electrical Code®* (*NEC®*), firefighting and emergency response, life safety, leadership, research, and safety and security.

In addition, we've planned two new pavilions. The *NEC* Pavilion will feature products and services for design, installation, and maintenance of electrical systems and equipment, while the Security Pavilion will feature the latest in security products and systems to help protect people, premises, and property.

NEC users

The necforum: the *NEC* Users Symposium & Exposition will offer dynamic *NEC*-related educational sessions with the added bonus of the new *NEC* Pavilion. This year it will be held in conjunction with the WSCE, giving symposium attendees the added benefit of full access to the exposition, including the keynote speeches and the opening general sessions.

The *NEC* Users Symposium emphasizes the electrical code, electrical safety, emerging issues, and design and maintenance.

Educational sessions will address the requirements of NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*; improving electrical safety programs; industry trends; best practices; new equipment; electrical design choices; and electrical issues related to life safety.

EXTRA!

Game over for 'zippotricks'

NFPA HAS SNUFFED out a controversial and dangerous Web site that promoted using cigarette lighters to perform tricks.

After receiving strong protests from NFPA and other fire safety advocates for several weeks, the Zippo Manufacturing Company shut down its Web site in August. The site presented more than 500 "tricks" involving lit Zippo lighters and promoted a planned nightclub tour of fire trick demonstrations to a dozen cities.

Margie Coloian, director of Public Affairs for NFPA, says that over the course of four weeks NFPA called this site to the public's attention and, through persistence and outside support, convinced Zippo management that safety is more important than a flawed corporate campaign.

"This shows advocacy in action and is something NFPA can be very proud of," Coloian says.

The site was brought to NFPA's attention last June by one of our *Risk Watch*® Champions, who help communities deal proactively with public safety issues that affect children and families. NFPA President Jim Shannon quickly reacted, calling for an end to the "zippotricks" and the nightclub tour.

Luring visitors

Zippo invited individuals to submit the tricks, then posted them on zippotricks.com, which Zippo hoped would lure visitors to the site. Streaming video provided demonstrations of the tricks. Hogan's Leg Drop, for example, showed a lighter tossed on someone's leg and ignited, while Twilight Sky depicted a large flame created by two lit lighters in motion.

In a letter to Zippo President Greg Booth, Shannon wrote that "the 'Zippo Tricks' campaign could be deadly at any age but [is] particularly dangerous for younger children with access to the Internet..."

According to NFPA statistics, each year more than 100 people die and more than 750 are injured in residential fires started by children playing with lighters.

"The lighter industry has been very constructive in supporting efforts to make lighters more child-resistant," Shannon wrote. "We have spent years, in fact decades, teaching children and adults about the dangers of matches and lighters. Playing with fire at any age is wrong."

There was no reply to the letter, so Shannon called Zippo directly. A representative from Zippo's Marketing Division returned the call and suggested that Zippo was rethinking the campaign.

In July, when nothing had come of the call, NFPA sent out a press release explaining the actions NFPA had taken and Shannon's opposition to the site and tour.

There was still no response from Zippo, but NFPA began to receive telephone calls and letters of support from other fire safety advocates and doctors who work with burn victims. NFPA's *Risk Watch Champions* also began writing letters to the company calling for an end to the site.

Soon after publishing the press release, NFPA's Public Affairs Division began working with *The Boston Globe* and *The Washington Post* on news stories related to the Web site and NFPA's concerns.

Six days after the press release appeared, *The Washington Post* published its first story on the controversy, and soon afterward the Globe's Adrian Walker wrote a column on the issue. The Quincy, Massachusetts, *Patriot Ledger* ran a page-one, banner headline story, and Firehouse.com published an article on its site. The issue even gained international exposure when *Fire International Magazine* ran the story.

Monitoring forum

NFPA began to monitor zippotricks.com's member forum and found message board postings suggesting that children as young as 13 were experimenting with the tricks. Some admitted they had been burned. NFPA also discovered that the growing opposition to the site shocked a few diehard fans.

In a telephone interview with *The Washington Post*, Booth said that the company had received letters from about 25 fire-safety professionals expressing concern about the promotion of tricks that encouraged young adults, ages 18 to 24, to light up with Zippos.

PHOTOGRAPH: PUNCHSTOCK

"We didn't think it would do any harm, but there was enough controversy to cause me to step back and say, 'Here's a 70-year-old respected company with an American icon as a brand,' " he said. " 'Do we really want to be in this controversy and risk our good name?' "

As the complaints mounted, Zippo tried to raise barriers that would prevent younger users from visiting the site, but was unable to come up with a system that was entirely leak-proof.

Booth and Zippo's general counsel, Jeff Duke, defended the site and the tour in a July 17 *Washington Post* article, saying Zippo lighters were safer than other lighters or matches.

"There is no statistical support that the Zippo lighter is a dangerous tool," Duke told the paper. Closing down zippotricks.com, the company said, would simply drive a long-established community underground.

Countering the argument that Zippo was taking a responsible attitude to playing with fire, NFPA pointed out that "curious [trick] titles like Dante's Halo, Uh Oh, Dragon Mouth, and Devil's Kiss" were an obvious attempt to titillate an impressionable public.

Faced with unrelenting public pressure and the strength of NFPA's statistics, Zippo, in a statement issued in August, said the company had shut down the site. Zippo "took this proactive action as a result of ongoing internal discussions and the expressed concerns of some in the fire safety industry.

"Despite our best efforts, some still find the site controversial," the statement continued. "Based on this controversy, continued internal concerns, and the inability to adequately restrict site access by individuals under the age of 16, the company has decided that Zippo should no longer be associated with this or any site that promotes tricking."

The statement also said that the planned nightclub tour of lighter trick demonstrations would instead become a "musical tour with details to be announced...."

Booth said the company would use legal action if any other site infringed on the company's trademark and promoted tricks with Zippo lighters.

"We are pleased that Zippo has taken the responsible course of action in this matter," said Shannon.

Call for David Ball Award nominations

Nominations are invited for the third annual David Ball Award for Fire and the Environment, sponsored by Kidde, plc, in association with the U.S. EPA and NFPA. It honors the late David Ball, former research manager of the Kidde group, who was an enthusiastic contributor to the debate on fire and the environment, especially the Montréal Protocol that started the process of phasing out the use of halon. For a nomination form, visit www.kidde.com.

HEADSUP

Five years later

THE FIVE YEARS since the U.S. Consumer Product Safety Commission announced a major fire sprinkler recall have been an unprecedented time of change in the fire sprinkler industry. Cooperation between fire sprinkler manufacturers and product-testing laboratories has ensured that sprinklers continue to meet historical standards of exceptional performance.

Among the immediate changes to Underwriters Laboratories' (UL) fire sprinkler standards is the addition of a test for compatibility with potential residual hydrocarbons and antifreeze solutions in October 1998. Other changes to the product standard followed, including a revised residential fire test, and as a result, all residential fire sprinklers were relisted in July 2002.

Several changes decided over the past few years have just been implemented. In January 2003, UL banned the use of dynamic O-rings and added an internal deposit-loading test for dry-pipe sprinklers and a dezincification test for copper alloy parts with more than 15 percent zinc content that are exposed to system water.

In July 2003, UL instituted a waterway clearance test for dry-pipe fire sprinklers, as well as a sealed atmosphere test to prevent internal ice build-up in dry-pipe sprinklers.

Some changes are still forthcoming. In March of 2004, UL will add a side-impact test for glass-bulb fire sprinklers that will create the need for protective covers.

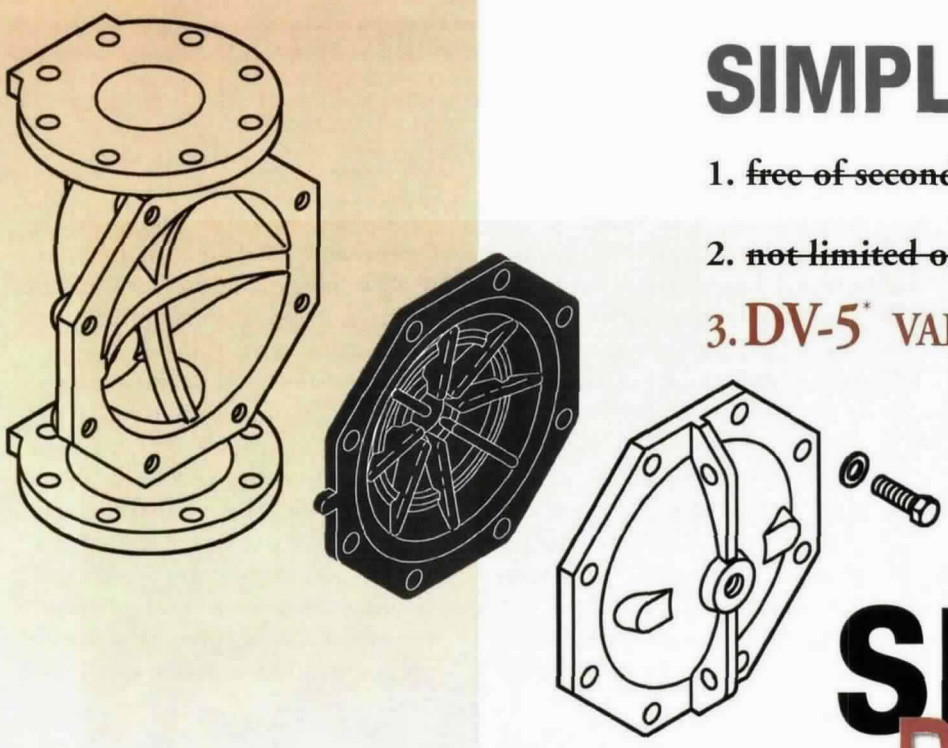
And in September 2004, UL will begin to require a glass bulb integrity test for 100 percent of bulb fire sprinkler production.

In response to changes in the 1999 edition of *NFPA 13, Installation of Sprinkler Systems,* the laboratories implemented the Sprinkler Identification Number system on January 1, 2001. Now, all fire sprinkler models are identified by a one- or two-character code indicating the manufacturer, followed by three or four numbers identifying each change in orifice size or shape, thermal sensitivity, maximum pressure rating, and deflector spray distribution characteristics. This helps to ensure that the fire sprinklers the designer designates are actually those installed in the system and will help responders identify the location of a particular fire sprinkler in the future.

Other changes to NFPA 13 and NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* are also aimed at improving fire sprinkler system performance and reliability. These changes include an Owner's Certificate in the 2002 edition of NFPA 13 that will help guarantee that the system can handle the occupancy's hazard and random testing of internal piping to help guard against obstructions that could interfere with proper fire sprinkler discharge. This is found in the 2002 edition of NFPA 25.

All in all, it has been a productive five years, in which the increased scrutiny of fire sprinklers has led to changes aimed at ensuring continued quality and performance.

ILLUSTRATION: JACK DESROCHER



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1. ~~free of secondary complications~~
2. ~~not limited or restricted~~
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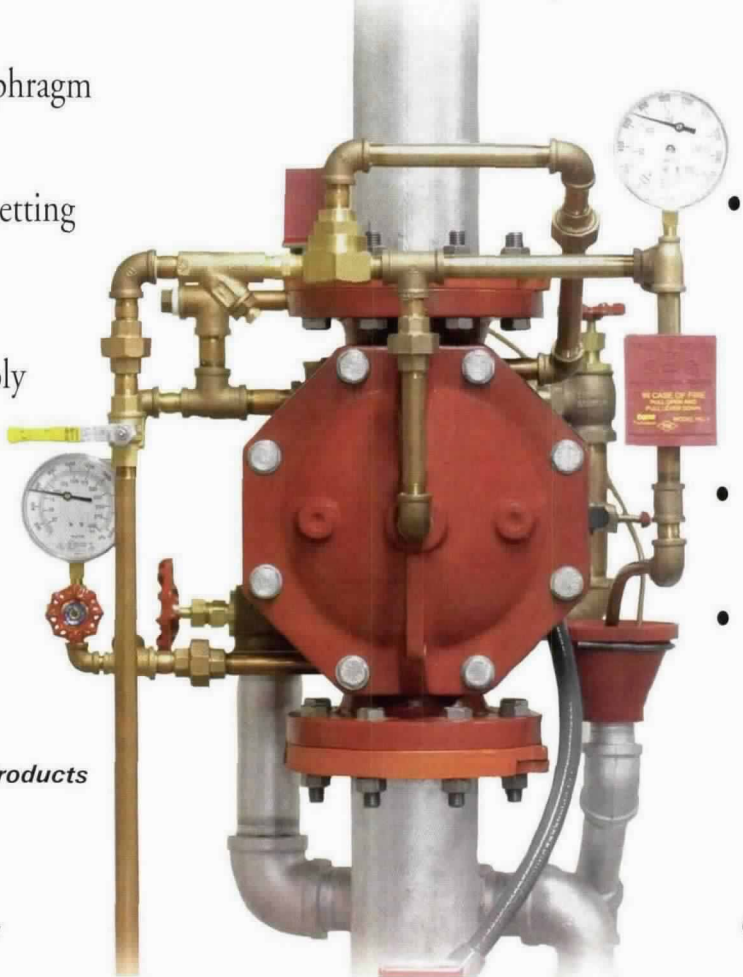

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The ultimate life-safety challenge

ALTHOUGH FIRES IN unoccupied places of assembly present a minimal life-safety problem, they may result in considerable property damage, progressing considerably before they're detected and reported, especially when the building isn't protected by automatic alarm or suppression systems. Often, such fires are only discovered when the building re-opens or the fire vents through windows or the roof. In these instances, the arriving firefighters typically have a defensive fire attack as the only option.

It's a different story in occupied assembly occupancies, in which any fire represents a possible multi-fatality incident. For this reason, the incident commander's first consideration when determining firefighting strategy and tactics in such occupancies is always life safety.

History shows that the most effective life-safety tactic is extinguishment, and the most effective means of extinguishment is the automatic sprinkler system. Catastrophic fires simply don't occur in fully sprinklered buildings.

If a fire in an unsprinklered assembly occupancy can be quickly extinguished, the threat to life is immediately reduced. However, a study of such fires shows that delayed alarms and other factors often result in the fire department arriving after the fire has gained headway, making it impossible for a quick knock-down. This presents fire crews with the serious problem of the building's occupants.

When confronted with many people trying to escape, firefighters should consider placing hose streams so as to protect egress paths and employing tactics that keep occupants moving outside and away from danger.

Reports, photographs, and videos of fires involving large-scale evacuations reveal that people often reach the exit, then congregate outside the exit door. This behavior slows the evacuation and places evacuees at risk of injury or death from falling glass or other debris. It also hampers firefighters' efforts to mount an attack on the fire. For these reasons, it's essential to direct evacuees well away from the exit discharge. The importance of moving evacuees to designated safe locations should be stressed during training and evacuation drills.

When staffing is limited, it may be possible to assign this task to police officers, employees, or other reliable people, depending on the incident commander's size-up. However, freeing occupants jammed in an exit door is a job for firefighters. They can protect evacuating occupants with hose streams if the exit area is threatened by fire, and they may be able to increase the size or number of exits in some buildings. Fire departments have a variety of forcible entry tools that can be used to enlarge the exit discharge or alternative exit paths, such as windows.

Aerial view of the Beverly Hills Supper Club fire site

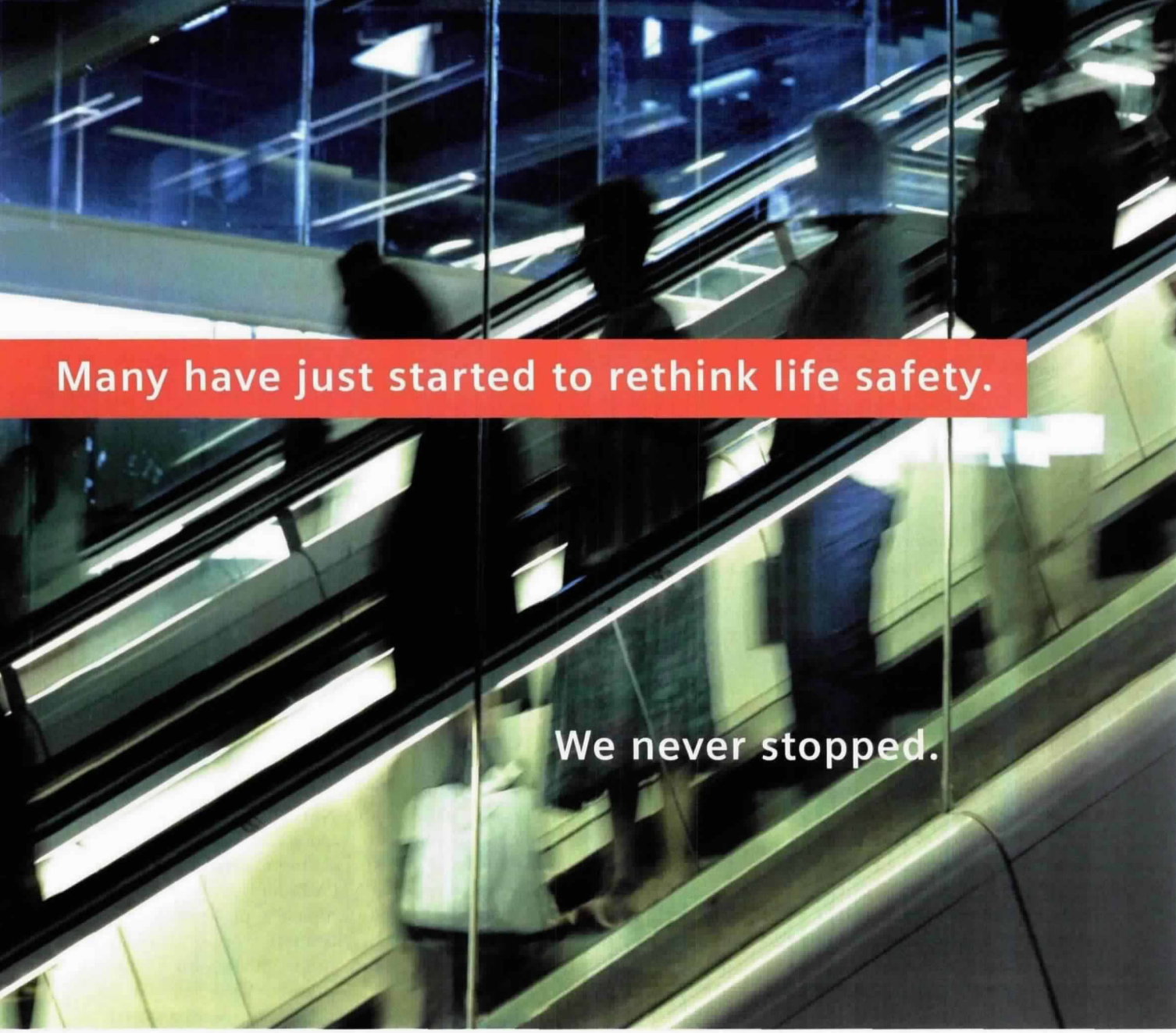
Alternative exits should be a last-ditch effort because there could be unintended consequences. For example, cutting through structural components could compromise the building's structural integrity or cause the fire to spread to uninvolved areas by creating a vent. On the other hand, when done correctly, venting can be used to direct fire, smoke, and toxic gases away from occupied areas or egress paths.

Studies show that people in unfamiliar surroundings will try to leave the building through the same door they used to enter. This is why most building codes require that the main entrance to a place of assembly provide 50 percent of its exit capacity.

Codes also require multiple and remote means of egress in assembly occupancies. As a tactical consideration, this means that alternative and remote exits are probably underused, so firefighters might be able to save lives by moving occupants toward them. People want leadership during an emergency, and firefighters must provide it.

Whenever possible, firefighters faced with a fire in an occupied assembly occupancy should apply standard operating procedures and normal tactics. When necessary, however, firefighters must be prepared to use extraordinary tactics to accomplish three main objectives: life safety, extinguishment, and property conservation.

PHOTOGRAPH: NFPA



The life safety needs of buildings have changed radically over our 130-year history and will continue to do so as safety is reassessed nationwide. By anticipating and adapting to this evolution early on, we've provided facility owners, managers and consulting engineers with effective solutions time and time again. Our selection of life safety equipment and systems is compatible with most commercial, industrial and institutional facilities. All products are manufactured to ISO quality standards and are UL listed. So whatever your application, trust our ability to deliver the ideal fit for your current and future needs. Faraday. Because thinking ahead is more important than ever. For details, visit faradayllc.com.

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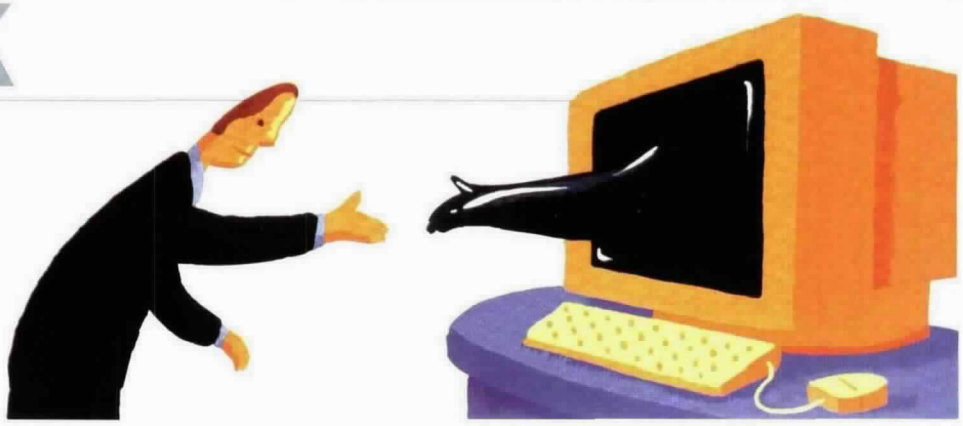

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- NFPA Research at www.nfpa.org/research, which features more than 250 free statistical and fire investigation reports, as well as fire investigation alert bulletins;
- *NFPA Journal*® at www.nfpajournal.org, featuring exclusive on-line articles available only to members, as well as articles from current and past issues;
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- *necdigest*™ at www.nfpa.org/nec, offering news about the current edition of the *National Electrical Code*® (*NEC*®), free online access to the 2002 and previous editions of the *NEC*, and more.

Editor's note

The next version of AOL, AOL 9.0 Optimized, includes a few changes, the most notable of which is a feature that hides images and disables URLs in E-mails if the sender isn't in your AOL address book. Make sure to add NFPA to your address book so you can continue to receive the latest NFPA information.

BRIAN MILLS is editor of NFPA Update.

ILLUSTRATION: VEER

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INCOMPLIANCE

Open flame devices and other ignition sources

THE FIRE LAST February at The Station nightclub in West Warwick, Rhode Island dramatically raised awareness among fire safety professionals and the public of ignition sources, such as the fireworks that started the fire, and interior finish requirements in assembly occupancies.

Obviously, controlling pyrotechnics and open-flame devices in stage shows and concerts is, and will continue to be, of major concern. However, controlling more mundane ignition sources, such as candles and tableside cooking operations, is also important in reducing the occurrence of life-threatening fires.

Sections 12.7 and 13.7 of *NFPA 101®, Life Safety Code®* address the use of pyrotechnics in new and existing assembly occupancies, respectively, requiring that such occupancies take precautions satisfactory to the authority having jurisdiction (AHJ) to prevent ignition of combustible material or injury to occupants. This same requirement applies to occupancies in which more common open-flame ignition sources, such as candles on tables and food-warming devices, are used.

Candles

In the case of candles, *NFPA 101* requires that they be securely supported on substantial noncombustible bases and that a glass globe or similar device be used to shield the flame. As a safer alternative, both 110-volt and battery-operated lights that look like candles are available.

For portable cooking devices, the *Life Safety Code* allows only small heat sources that can be easily extinguished using water, actually specifying items such as candles and alcohol-burning devices like Sterno.

Specifically, 12.7.1.4 states portable cooking equipment that is not flue-connected shall be permitted only as follows:

Equipment fueled by small heat sources that can be readily extinguished by water, such as candles or alcohol-burning equipment, including solid alcohol, shall be permitted to be used, provided that precautions satisfactory to the authority having jurisdiction are taken to prevent ignition of any combustible materials.

"Flaming sword" or other equipment involving open flames and flamed dishes, such as cherries jubilee or crêpes suzette, shall be permitted to be used, provided that precautions subject to the approval of the authority having jurisdiction are taken.

Following NFPA 58

NFPA 101 also permits listed and approved LP-gas commercial food-service appliances, in accordance with NFPA 58, *Liquefied Petroleum Gas Code*, as long as they don't have more than two 10-ounce (296-milliliter), non-refillable butane gas cylinders, each with a maximum capacity of 1.08 pounds (0.49 kilograms). The cylinders must comply with UL 147B, Standard for Nonrefillable (Disposal) Type Metal Container Assemblies for Butane, and be connected directly to the appliance, not manifolded.

They must be an integral part of the listed, approved device and be connected without using a rubber hose. No more than 24 10-ounce (296-milliliter) containers may be stored in an assembly occupancy unless the occupancy has a separate two-hour enclosure.

The 20-pound (9-kilogram) LP-gas cylinders typically connected to outdoor gas grills are obviously prohibited inside buildings, as the potential LP-gas cloud produced by a leak in this size container is destructive.

Signing off on the precautions to take for the particular circumstance requires an AHJ to exercise considerable judgment and assume considerable responsibility for determining how open-flame devices will be used.

ILLUSTRATION: DAVE EMBER

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Strong prospects for Right-to-Know Act

FIRE SAFETY ADVOCATES hope that this Congress will finally mandate that U.S. colleges focus on protecting dormitories and fraternity and sorority houses. The House and Senate passed the Campus Fire Safety Right-to-Know Act in 2000 requiring colleges to provide fire safety data and statistics to students and their parents, but it was included as an amendment in two different education bills passed by each house. That killed any chance of passing the bill during that session.

The 2000 version of the bill was introduced by three New Jersey legislators after a deadly fire at an unsprinklered Seton Hall University dormitory. Since then, according to Ed Comeau, publisher of Campus Firewatch, 49 more students have died in on- and off-campus housing fires.

NFPA statistics show that an average of 1,800 fires occur in dormitories and Greek housing each year, which means that firefighters respond to residential fires on college campuses somewhere in the United States five times a day. Only 35 percent of dormitories and Greek houses that experience fires have fire sprinkler systems, and that percentage is assuredly lower for off-campus housing, where two-thirds of students live and where more fires ostensibly occur. However, even good data on fire protection at colleges is lacking.

That is where the Campus Fire Safety Right-to-Know Act (H.R. 2683/S. 1385) comes in. Representatives Bill Pascrell, Jr. (D-N.J.), Joe Wilson (R-S.C.), and Sen. Jon Corzine (D-N.J.) introduced the 2003 version of the act on July 9 at a press conference on Capitol Hill, which included John Biechman, NFPA's vice president of Government Affairs. The bill amends the Higher Education Act to require disclosure of fire safety information on campuses and a report from the Secretary of Education to Congress on the vulnerability of campus housing and possible solutions. It calls for the same kind of reports schools make to disclose crime statistics and other safety information.

"This legislation is important to students, employees, and parents across the U.S.," Biechman said.

For example, colleges would have to disclose whether each on-campus residence is equipped with fire sprinklers or other fire safety systems and make public statistics showing the number of actual fires and deaths in each residence hall, including fraternities.

Congress is working on a reauthorization of the Higher Education Act. As the reauthorization bill moves through both houses, the Pascrell/Wilson/Corzine bills can be attached as an amendment. This means that they will be included in the same bill, rather than different bills, as happened in 2000.

Unlike the College Fire Prevention Act (H.R. 1613/S. 620), also introduced in 2003, which provides federal grants to colleges that install fire sprinklers, the Pascrell bill would not cost the federal treasury a dime. The House version of the College Fire Prevention Act would authorize $100 million a year for five years, while the Senate version would authorize $80 million a year for five years. The colleges would provide a 50 percent match. The legislation, supported by NFPA, was introduced in the House by Stephanie Tubbs Jones (D-Ohio) and in the Senate by John Edwards (D-S.C.).

Standing in the way of the Pascrell bill is the stance taken by college and university lobbies. Susan Hattan, consultant to the National Association of Independent Colleges and Universities, says her group shares the concerns of the Pascrell bill.

"But the reports required by the bill would take time and divert university and Department of Education resources," she says. "We have doubts about the cost/benefit tradeoffs."

However, Biechman thinks most colleges already have this data.

"Other than adding a new page to a Web site or a line to an existing Web site, this bill wouldn't cost them very much," he says.

ILLUSTRATION: JAMES KACZMAN

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WAYNE D. MOORE, P.E., FSFPE

BUZZWORDS

Challenge of nightclub fire alarm systems

AS LAST FEBRUARY'S fire at The Station nightclub in West Warwick, Rhode Island, clearly demonstrated, one key to successfully notifying an audience in an assembly occupancy is grabbing their attention and letting them know immediately that what they may think is part of the entertainment is really an emergency. This is traditionally the job of the fire alarm system. However, designers and installers of fire alarm systems for nightclubs face some unique challenges.

Nightclubs differ from other assembly occupancies, such as auditoriums or exhibit halls, because they can contain in a single space the maximum number of people allowed. In addition, the entertainment often produces high noise levels, and the patrons often consume enough alcohol to impair their judgment and reaction times.

NFPA 101®, Life Safety Code®, requires assembly occupancies with occupant loads of more than 300, and all theaters that have more than one viewing room, to have a fire alarm system that complies with *NFPA 72®, National Fire Alarm Code®*. It also requires a manual fire alarm box to initiate the alarm signal, with two exceptions.

The first exception permits the designer to substitute an automatic detection system that provides coverage throughout the building. The second allows the designer to substitute a water-flow-alarm-initiating device on an automatic fire sprinkler system that provides protection throughout the building.

The fire alarm system must transmit the alarm signal to a location in the building where someone is in constant attendance while occupants are present. When that person receives a fire alarm signal, he or she must notify the occupants by live or prerecorded voice announcements.

Should the authority having jurisdiction determine that a constantly attended location is impractical, the assembly occupancy must install a fire alarm system that is initiated by manual fire alarm boxes or other approved means, and it must automatically provide prerecorded evacuation instructions.

Anyone designing a fire alarm system for a nightclub must first make sure that the patrons can see and hear the notification appliances. If the system uses voice communication, the designer must ensure that the automatic or manual voice messages are intelligible. Because the sound level in occupancies such as nightclubs may be as high as 110 dBA, Section A.7.4.2.1 of *NFPA 72*'s Annex states that a system that produces an alarm "at least 15 dB above the average ambient sound level or 5 dB above the maximum sound level" might exceed the maximum sound level of 115 dBA.

Another option, according to *NFPA 72*, is to "reduce or eliminate the background noise." Some entertainment venues have road show connection panels to which performers can connect their light and sound systems. These panels can be controlled by the fire alarm system. In "less formal applications," such as nightclubs, the fire alarm system can be used to control designated power circuits.

Section 7.4.2.5 of *NFPA 72* allows a fire alarm system arrangement to stop or reduce ambient noise if the authority having jurisdiction approves, as long as the system produces "a sound level at least 15 dB above the reduced average ambient sound level or 5 dB above the maximum sound level..." after the ambient noise level has been reduced, whichever is greater." The sound level should be measured 5 feet (1.5 meters) above the floor in the "occupiable area."

Section 7.4.2.2 also allows the authority having jurisdiction or other governing codes or standards to reduce or eliminate the requirements for audible signaling when the fire alarm system provides visible signaling in accordance with Section 7.5 of the code. However, using visible notification appliances in a nightclub may present problems, as patrons might think the fire alarm strobes are merely part of the entertainer's visual effects.

After all, the occupants can only take action if they know that an emergency exists.

ILLUSTRATION: RICHARD GOLDBERG

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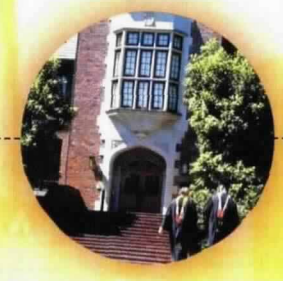

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JERRY WOOLDRIDGE

BUILDINGTOCODE

Mission: Performance-based options

ONE BENEFIT OF being the building official for the Reedy Creek Improvement District in Florida is that I can accompany visitors on the rides at Walt Disney World, as I did recently when a couple of people from NFPA wanted to experience the parks newest ride, Mission: Space. The ride, which simulates a training mission designed to prepare future families for space flight, including a trip to Mars, generates sustained G-forces close to those experienced aboard the actual space shuttle.

The experience is phenomenal, and the façade of the ride's building looks exactly like one housing a ride with a space theme should: there are no straight lines anywhere on the front. Few code provisions cover the design and construction requirements of such a facility, however, so we, as building regulators, had to find a safe way to make the facility a reality.

Early in the design process, it became apparent that we would have to use performance-based design options if the Mission: Space building were to comply with the applicable codes. We found the guidelines and requirements for incorporating performance-based options into such a facility in both NFPA 101®, Life Safety Code®, and in Chapter 5, "Performance-Based Options," of NFPA 5000™, Building Construction and Safety Code™.

Whenever one considers a performance-based design, it's important to identify the characteristics of the building's intended occupants and of the building itself. A building's characteristics include its contents, equipment, layout, and any operation not inherent in the design specifications that will affect occupant or building behavior or the rate of hazard development. For the Mission: Space building, this included a longer, staff-assisted evacuation than would be required if occupants were able to proceed to the nearest exits under their own power. We addressed this requirement, drawing on Section 5.4 of NFPA 5000, and added design elements, including smoke control, to compensate.

We also reviewed the way emergency response personnel would be used, clearly defining their availability, speed of response, effectiveness, and roles. Using the appropriate design scenarios found in Section 5.5 of NFPA 5000, which describe different fire scenes that must be modeled and analyzed, the designer modeled the building by computer to show how it would probably react to different types of fires producing different amounts of smoke.

The design scenarios also include reviews of the structural system under various conditions to ensure that a building retains its structural integrity during the time necessary to evacuate the occupants. Section 5.5.4 requires the designer to review the building for a fire that occurs when it contains its maximum occupant load and blocks the principal exit/entrance to the building.

The section of the code also asks the designer to address the concerns of occupants who will have to take alternative exit routes under crowded conditions and to ensure that the building will remain tenable under a variety of circumstances to the level established by the authority having jurisdiction (AHJ).

For issues not specifically addressed in the performance criteria, Section 5.3 stipulates that the building must meet the prescriptive requirements of the code

The AHJ should secure the services of a person or firm to perform an independent review of any building designed using performance-based codes. Section 5.1.3 gives the AHJ that right and requires the project owner to cover the costs of the review, thus eliminating the need to use tax revenues to fund extremely creative designs.

After the design has been reviewed and accepted by the AHJ, Section 5.8 specifies the level of documentation the AHJ needs to approve the building. A safety factor value, addressed in Section 5.7, is added for an extra layer of insurance.

As outlined in Section 5.1.6, the performance-based design features must be maintained throughout the life of the building.

Although most buildings are still constructed using prescriptive requirements, my team must often rely on performance-based designs.

Having reviewed performance-based designs in the past, I am becoming increasingly comfortable with the process and the opportunity for creativity this systematic approach offers. If someone in your jurisdiction proposes a performance-based design, take the time to review Chapter 5 of NFPA 5000. You might be surprised at just how well the building will be designed and function.

ILLUSTRATION: DISNEY.COM/MISSIONSPACE

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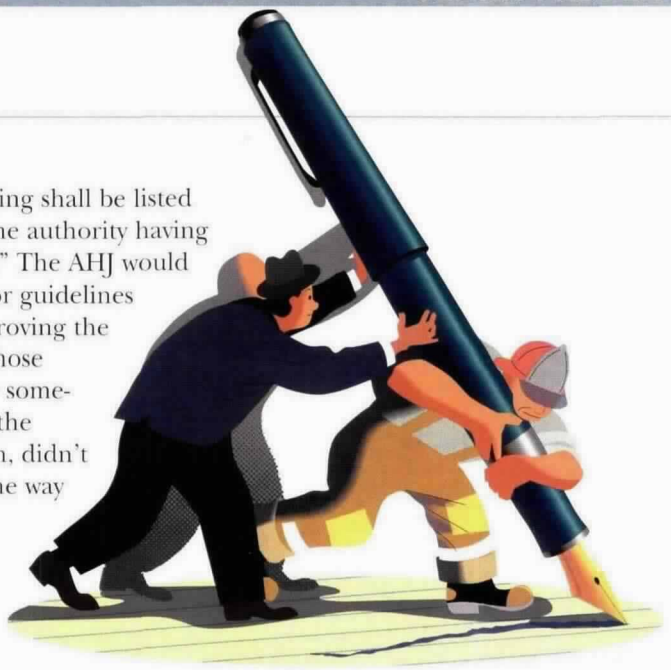

Back to the drawing board

IT'S BACK TO the drawing board for one NFPA committee, proving once again that the system works.

Ask anyone what sets NFPA apart from other codes- and standards-writing organizations, and they'll say the consensus-based process we use to develop, write, and vote on codes and standards. It's this process of open involvement, with checks and balances that ensure a certain level of safety, that's become synonymous with NFPA. But how do we know the process really works?

Here's an example.

In Dallas last May, NFPA committees presented 36 documents to the membership for adoption, the last of which was NFPA 18, *Wetting Agents*. Not only was NFPA 18 the last document on the list, it was acted upon on the last day of the meeting, and it was getting late. Regardless, there were issues to discuss, and the members weren't going to ignore them.

For years, the Foam Committee, which is responsible for NFPA 11, *Low-Expansion Foam*, and NFPA 11A, *Medium- and High-Expansion Foam Systems*, was also responsible for NFPA 18. About 7 years ago, however, the committee suggested to the Standards Council that it form a new committee to address wetting agents, reasoning that they aren't really foam and, as such, fell outside the committee's area of expertise. The Standards Council agreed, forming the Technical Committee on Water Additives for Fire Control and Vapor Mitigation.

At the time, NFPA 18 hadn't been significantly revised since 1979. The new committee set out to update NFPA 18 and add fire testing criteria.

According to NFPA 18, "wetting agents for firefighting shall be listed and approved by the authority having jurisdiction (AHJ)." The AHJ would look to NFPA 18 for guidelines for listing and approving the agents. However, those requirements were somewhat generic, and the standard, as written, didn't include much in the way of actual fire tests.

When the Standards Council formed the new committee, members set about beefing up the fire test requirements using specific, legitimate, and repeatable testing criteria. This turned out to be the most significant challenge to the development of the new standard.

On the floor in Dallas

In Dallas, members' concerns centered on the issue of test repeatability. If the tests could be duplicated for every product and every situation, would the traditional NFPA 18 wetting agents pass the tests? If they didn't, they'd have no criteria with which to obtain listing status.

Essentially, members argued, the committee had changed the focus of the document by adding the test criteria. In fact, the proposed document had a new name, *Water Additives for Fire Control and Vapor Mitigation*. The majority of the committee was of the opinion that the current wetting agents wouldn't be affected by the change in the standard. However, during the debate on the floor, it was conceded that the committee had written out the wetting agents that the original document covered.

It's important to note that some of the concerns raised in Dallas came from members of the NFPA 18 committee, who, failing to convince their fellow committee members during the ROP and ROC stages, set out to convince the membership of NFPA even if it meant going back to the drawing board.

What now?

NFPA expects the Committee on Water Additives for Fire Control and Vapor Mitigation to meet this fall to begin work again.

Its options include combining wetting agents and water additives into a new document or improving the original NFPA 18 and developing a separate standard to deal with the water additives.

Once the committee decides, it will essentially begin again at square one, developing and writing the standard, then heading into another revision cycle.

Maybe the membership will vote to adopt the next document, maybe it won't. Either way, everyone has an opportunity for input, and the majority rules.

ILLUSTRATION: ROB DUNLAVEY

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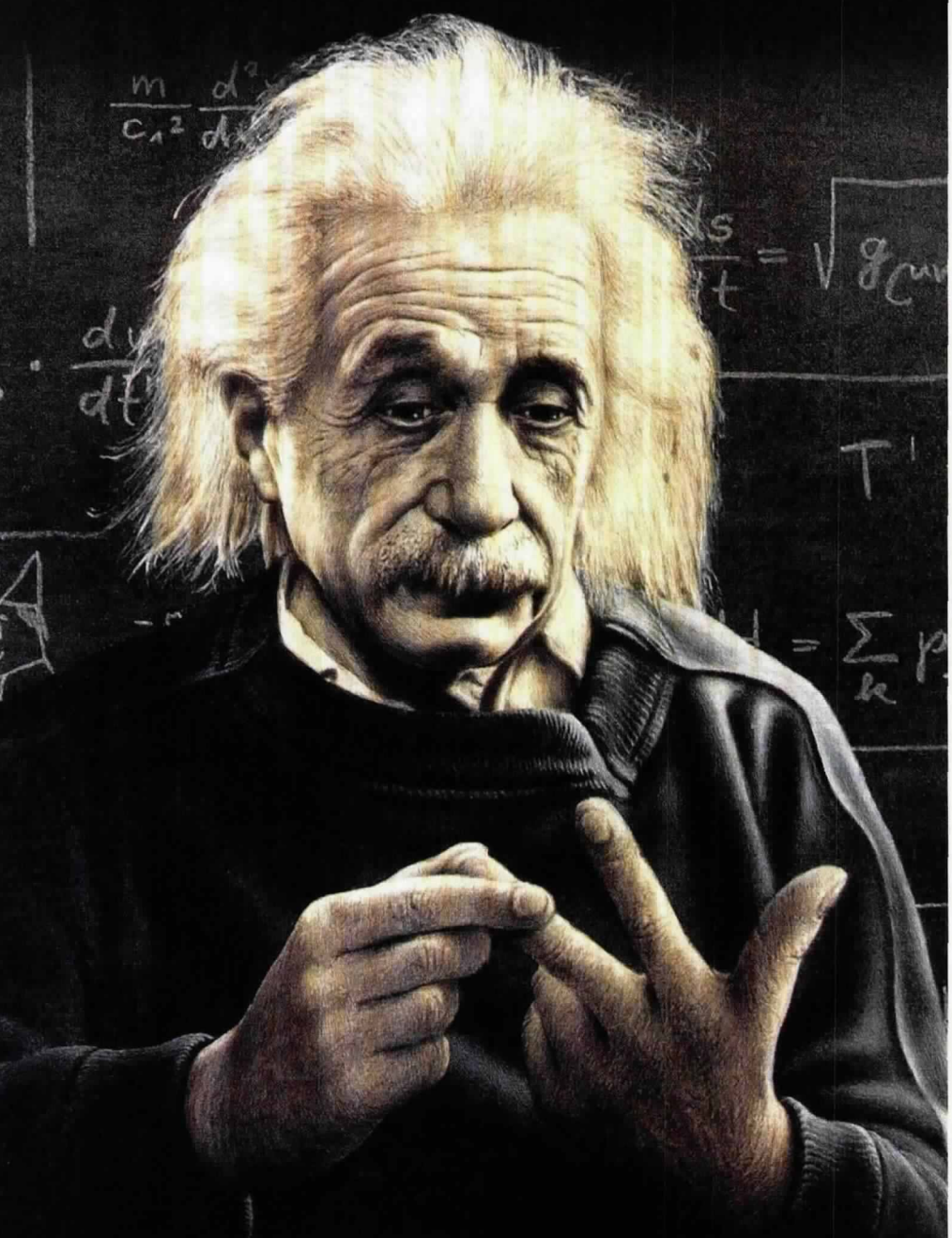

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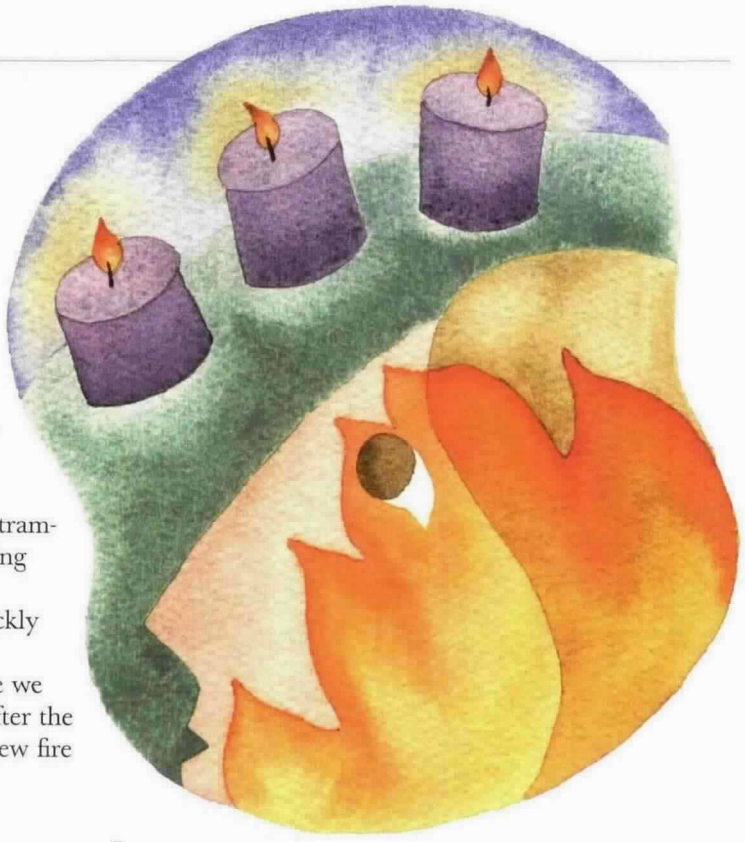

Fire safety, front and center

ON FEBRUARY 21, 2002, I awoke to my normal morning routine, which included tuning in to the 6 a.m. news for the weather report, traffic conditions, sports scores—the usual. But February 21 was anything but usual.

Images of people fleeing for their lives from The Station nightclub in West Warwick, Rhode Island, not 20 minutes from my house, filled the screen. At first, I couldn't grasp what I was seeing. Was this live? Was this happening in Rhode Island? Did I know anyone who was there?

My husband, a news editor at New England Cable News, filled me in on what was going on–the rising death toll, the initial reports on the cause of the fire, and so on. At NFPA, I spend my days educating the public about fire safety, yet I could do nothing. The fire had already happened. Prevention wasn't an option. As the day went on and the team at NFPA prepared to deal with the aftermath of the fire, I received a call I'll never forget.

"Amy, Missy was there, she was at The Station," said my husband. "She's in critical condition at Rhode Island Hospital. That's all I know."

Missy Minor, my friend and the mother of two young children, was in the hospital for two weeks suffering from second- and third-degree burns on her arms and face, in addition to smoke inhalation. Missy later told me that she had an angel watching over her that night.

The first thing she noticed when she walked into the club were the windows, which ended up being the way she escaped.

The minute she saw the first spark of flame, she grabbed her two friends and headed towards the front door, thinking of the incident in Chicago a few days earlier, in which 21 people died in a nightclub crowd crush. She was afraid of being trampled, not of dying from the toxic smoke that quickly filled the club.

The first time we visited Missy after the fire, I noticed new fire extinguishers throughout the house. At a cookout a couple of months later, I saw her keeping a close eye on the insect-repellent candles scattered around the tables. And before the grilling started, she brought out a fire extinguisher.

Although her family always had smoke alarms, they now have an escape ladder for the second floor of their home, and they have a plan for getting the kids out of the house in an emergency. It's safe to say the Minor home is now fire-safe. Because of Missy's ordeal, fire safety will always be front and center in her household and in her family's life.

In a perfect world, it would be front and center in everyone's home. All smoke alarms would be tested once a month, their batteries replaced once a year. People would practice cooking, electrical, and heating safety all the time, and every building would have fire sprinklers. Having a home fire escape plan would be as common as the weekly grocery list.

But we don't live in a perfect world, and NFPA members understand the consequences of fire better than anyone. We know that raising public awareness of fire-safe behaviors continues to be an uphill battle for fire safety educators.

While Missy always knew the importance of fire safety, it took this experience for many others in Rhode Island and around the nation to understand the danger of fire and appreciate the need for fire prevention and protection.

The better we can help people understand the basic concepts of fire safety ahead of time, the better their chances of making the right choices in a fire.

Listening to Missy talk about her experience and how it's changed her life makes me appreciate even more the work I'm fortunate to do at NFPA.

ILLUSTRATION: CYNDY PATRICK

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NFPA guides California after it adopts *NFPA 5000*™ and NFPA 1.

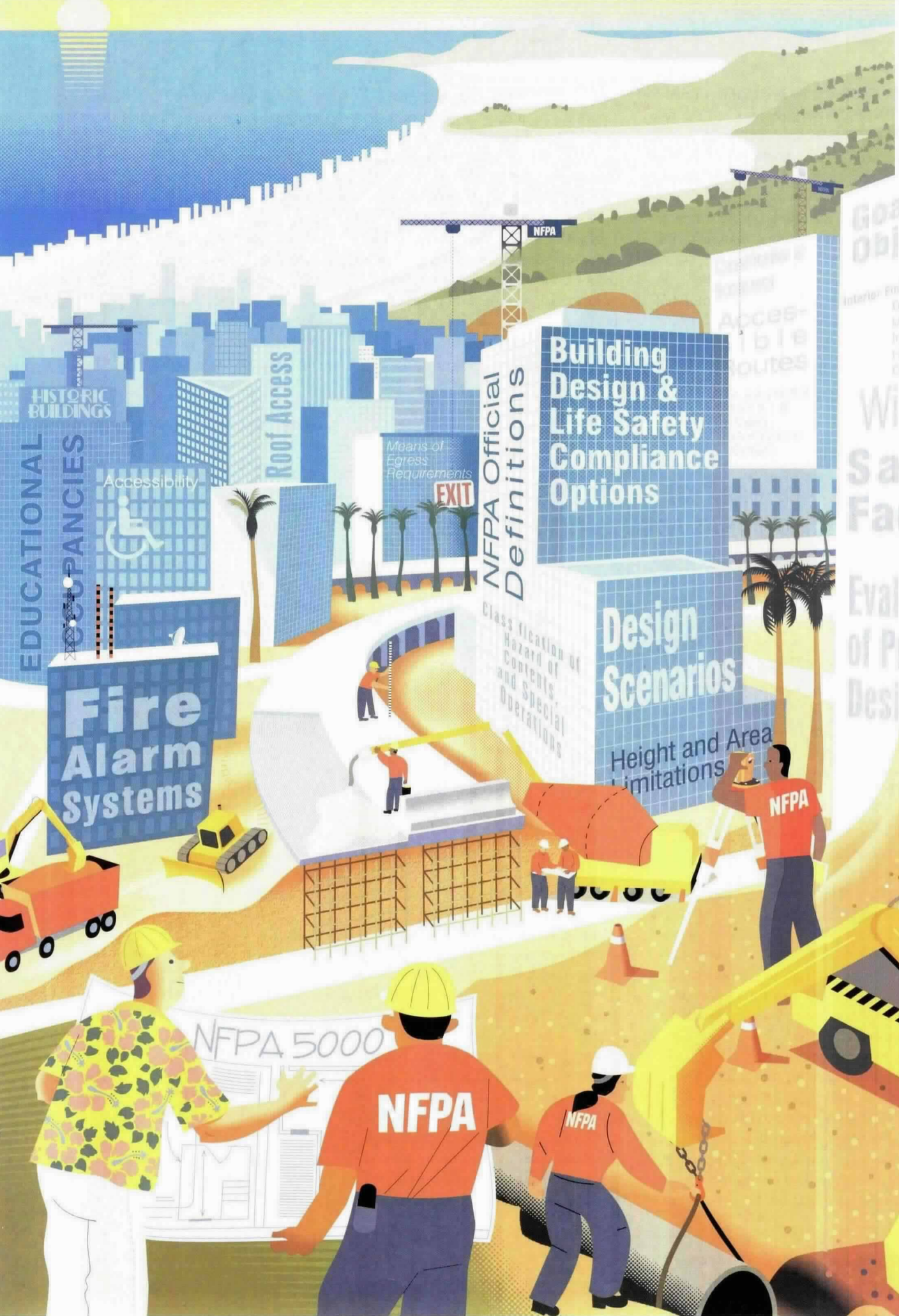
CALIFORNIA IS KNOWN for being a state of firsts, from the nation's first ban on assault weapons to the country's toughest auto emissions laws. So it's not surprising that California recently adopted the industry's most innovative model building code, *NFPA 5000™, Building Construction and Safety Code™.*

Winning approval from the California Building Standards Commission (CBSC) was a tough fight, as NFPA advocates from around the state weighed in with letters, faxes, and public statements in support of adoption. In the end, after several months of review and public input, the CBSC adopted *NFPA 5000* and NFPA 1, *Uniform Fire Code*™, in July by an 8-2 vote.

Safety advocates from across the state, including leading members of the fire service, determined that *NFPA 5000* will provide the highest levels of safety to protect people and property in California, in part because our codes are developed with input from a broad cross section of technical experts and supported by NFPA staff. The quality of those codes and NFPA's services will give California a building code and a fire code that reflect the needs of both users and enforcers, once the state's code amendment process is complete. >>

by JOHN NICHOLSON

illustration by ROB DUNLAVEY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The CBSC's review demonstrated that NFPA's codes represented the best public safety option for the state. A main selling point was our proven ability to provide jurisdictions that adopt our codes with a wide range of technical support, including on-site training, documents and training materials, and technical advisory services.

After a detailed and extensive review, California's state fire marshal wrote in his recommendation to the CBSC that NFPA's support services will make the transition from the *Uniform Building Code*, which the state was using, easier. NFPA also has an established record in public safety education, and several of our educational programs directly support the state fire marshal's mission to promote public safety.

NFPA's experienced staff of experts in structural engineering, architecture, and building systems administers professional certification programs for building inspectors and building plans examiners, and NFPA traditionally provides jurisdictions that adopt our codes with free training and codebooks. We've also posted online the complete text of *NFPA 5000* at www.nfpa.org/catalog/home/OnlineAccess/Access5000/Access5000.asp to make it easy for building officials to familiarize themselves with the new document.

In addition, NFPA is opening an office in California to support the smooth transition to the new code. The Sacramento office, known as the Western Code Support Office, joins the roster of regional NFPA offices already in place in the United States, Canada, and other countries.

"NFPA's Sacramento presence will enable our technical staff to continue to work hand-in-hand with state agencies to address California-specific code issues, expediting the preparation of proposed state amendments," says James M. Shannon, NFPA's president and CEO. "This action demonstrates our commitment to supporting the state, code users, and the people of California throughout the use of NFPA's building and fire codes."

NFPA's regional and international outreach efforts promote the adoption of our codes and standards, ensure appropriate representation at code hearings and legislative sessions, help NFPA staff coordinate activities with key constituencies, and allow us to identify ways NFPA services can be used to improve fire, building, and life safety worldwide.

THIS IS ALL PART OF WHAT NFPA OFFERS ANY JURISDICTION THAT ADOPTS NFPA CODES.

This type of technical support, which has been in place for years, is unmatched among code-writing organizations and should mean that the more Californians get to know *NFPA 5000*, the more they'll like it.

A pledge of support

In California's case, "We are fully committed to providing the support California needs for a smooth transition to *NFPA 5000*," says Ray Bizal, regional manager of NFPA's Western Building Code Field Office.

Bizal is responsible for expanding field outreach and support for *NFPA 5000* by working with state and local building officials and associations to include them in the code-development process. Throughout the intensive code-amendment process, the Sacramento-based staff will provide technical and clerical support to state agencies that have the authority to promulgate codes.

"We have offered to assist them in any way possible," Bizal says.

Currently, NFPA is working with these agencies to develop a timeline for preparing state-specific amendments to California's current model building code, which hasn't been updated since 1998, to align them with the CBSC recommendations.

The amendment process is quite involved, requiring input from the California Department of Housing and Community Development, the Division of the State Architect, the Office of Statewide Health Planning and Development, and the Office of the State Fire Marshal to process the state-specific revisions. These amendments will then be sent to the CBSC for review by its various code advisory committees, which will make their own recommendations on how best to amend the model code. The amendments will also be offered for public comment.

Eventually, the CBSC will be asked to adopt and approve these changes, and the new regulations are anticipated to take effect after their publication in late 2005. Local jurisdictions can then adopt the state code or amend it further, as long as their amendments aren't less restrictive than the state code.

Drafting amendments

Because of its fiscal constraints, California is unable to devote as much technical expertise as is needed to develop amendments to a statewide model code. As a result, NFPA is helping draft them, a valuable service available to all other states and jurisdictions considering adopting *NFPA 5000*.

"We are helping to prepare the amendments and then refine them for presentation for approval," Bizal says.

This not only provides California authorities with NFPA's renowned training and expertise, but it saves the state tax dollars, he adds.

"We've provided similar support to the city of Phoenix as it works to finalize its adoption of *NFPA 5000*," adds Bizal.

This is all part of what NFPA offers any jurisdiction that adopts NFPA codes, says David Nuss, NFPA's Denver regional manager, who's helping coordinate the amendment process for California.

"NFPA is most qualified to be providing this support," he says.

Nuss, who has more than 18 years of

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fire prevention and building code enforcement experience, is responsible for promoting the adoption and use of NFPA codes and standards, NFPA educational programs and curricula, and membership throughout his region. He also represents NFPA at code hearings, legislative sessions, fire safety meetings, and regional membership activities.

To get the Sacramento office up and running, NFPA contracted with Hughes Associates, Inc. (HAI), a fire protection engineering, research and consulting firm, and with Simpson Gumpertz & Heger Inc. (SGH), a structural engineering firm that designs, investigates, and retrofits buildings and structures of all types. These two firms will provide needed technical expertise during the amendment process, Bizal says.

"As we have always done, we will make it easy for users and enforcers to get code interpretations," says Nuss. "Our Sacramento office will offer a convenient point of contact for local jurisdictions."

The staff of HAI has an international reputation, employing experts in all facets of fire protection who are active in the NFPA codes- and standards-making process, as well as those of the Society of Fire Protection Engineers, the ASTM (American Society for Testing and Materials), and other model-code groups. These experts serve on more than 50 fire-related standards-rating committees.

HAI's Cheryl Domnitch, P.E., has 20 years' experience working with California's authorities having jurisdiction (AHJs) and using NFPA codes and standards in California.

"This places us (HAI) in a unique position because of our understanding of NFPA codes and the NFPA code-adoption process," she says.

Domnitch calls the adoptions of *NFPA 5000* and NFPA 1 significant for NFPA and the state of California. California has used the *Uniform Building Code* as the basis of its state building code for more than 20 years, and *NFPA 5000* represents a departure that will benefit the state, she says.

Aside from helping draft language for model legislation and testifying at public hearings, NFPA staff will brief California AHJs on the contents of various codes and standards, the consensus process under which the code or standard was developed, and its benefits.

Professional development

"We will also provide training for enforcement agencies," Nuss says. "First, we'll begin with the state agencies and state staff. It's premature to provide support to local agencies because many are waiting to see how the amendment process goes and what the final amendments are [before they make changes in their own building codes]."

Nuss notes that NFPA provided similar support when California adopted the *National Electrical Code*® in 2001.

Because the amendment process isn't completed, NFPA's Professional Development Division hasn't finalized its portion of the post-adoption technical support. However, it will undoubtedly include the services NFPA usually provides to adopting jurisdictions.

These include on-site training for code officials in areas such as building and life safety, fire prevention, automatic sprinkler systems, and fire alarms. Code officials also receive copies of the adopted NFPA documents and related training materials for their staffs, and they can call, write, or E-mail NFPA experts for answers to their code interpretation questions.

In addition, NFPA offers a two-day code seminar for building officials, architects, engineers, designers, building inspectors, and plans examiners that covers the development, organization, and application of the building code, explains the essential requirements for business occupancies, and gives an overview of requirements specific to other occupancies. The seminar meets the training requirements for transfer into the NFPA Certified Building Inspector and Building Plans Examiner Programs.

JOHN NICHOLSON is managing editor of the *NFPA Journal*®.

NFPA support:
It made the difference in Pasadena

"NFPA OFFERED UP a number of services that we were very much interested in," says Paul Davis, assistant for Planning and Development to the mayor of Pasadena, Texas, "such as having the code online and accessible to our contractors and engineering architecture group, and offering education and training, not only to staff, but to the community at large. We were willing to be an innovator in this region to be able to have that."

The Pasadena City Council voted to adopt *NFPA 5000* for commercial use on March 4, making Pasadena the first jurisdiction in the United States to adopt *NFPA 5000* officially. Also offering certification transfers for qualified professionals is NFPA's C3 Code Set partner, IAPMO.

For Pasadena, the support and services of NFPA and its partners made NFPA's code package stand out from its competitor's. According to Davis, it was one of the most important aspects in tipping the code-adoption process in favor of *NFPA 5000*.

"We like the services that were available, in addition to the code," says Davis. "We appreciate the NFPA staff that's working with us, and we're willing to go down this new path together. I think it will be a good relationship."

reaching out

THE MISSISSIPPI PROJECT

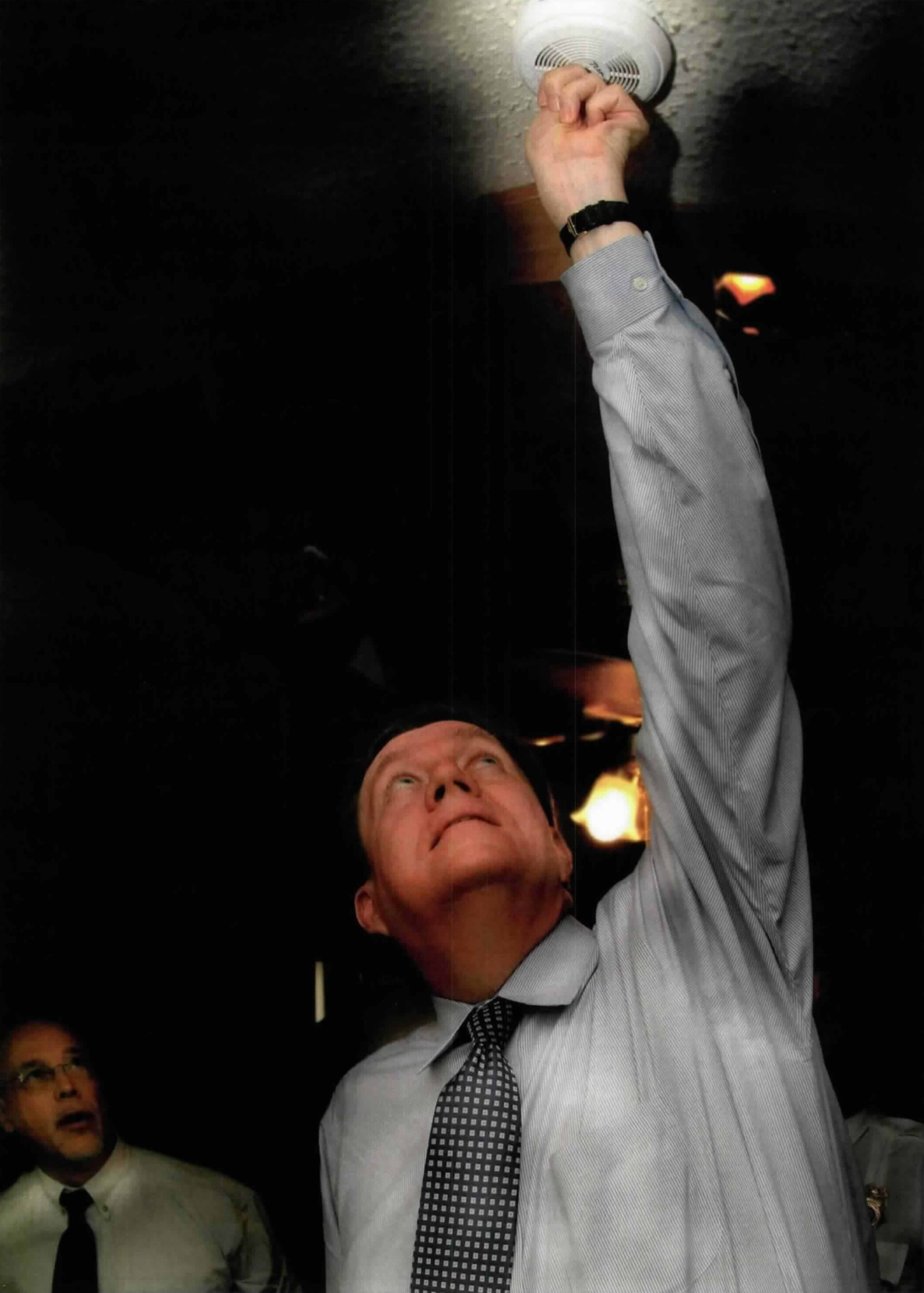
NFPA helps Holmes County, Mississippi, battle a high fire fatality rate and calls on others to do the same for high-risk communities.

by MARGIE COLOIAN

photographs by JARO VASIC

WHEN CLINT COBBINS ARRIVED on the scene of a fire in Tchula, Mississippi, early one October morning last year, the mobile home was already engulfed in flames. What he saw after he broke the window and climbed into the home shocked even Cobbins, a veteran firefighter and police officer. >>

James Shannon tests a newly-installed smoke alarm as Art Cote looks on.



Six children between the ages of 3 to 12 had died in their sleep of smoke inhalation as the result of a fire believed to have been started by unattended candles. The condition of a seventh child, an infant who'd been lodged between two older children on the floor, was unknown.

As firefighters started removing the bodies and battling the blaze, Cobbins grabbed the infant and headed outside. Although she appeared lifeless, he began CPR, and by the time medics arrived, she'd started showing signs of movement. The rescue crew took over and whisked her away to a hospital in Jackson.

The infant, four-month-old Takalay Williams, is the only survivor of that horrific fire in the small trailer, which had no smoke alarms. The children who died were her brothers, sisters, and cousins: Anita Williams, 12; Latonya Monique Banks, 10; Tonisha Williams, 8; Samantha Williams, 8; Sammie Earl Williams, 5; and Aliyoh Williams, 3.

Poverty has often been an indicator for high fire death rates, and the tragedy in Tchula was no exception. Tchula, population 2,400, is located in the Mississippi Delta in Holmes County, one of the poorest counties in the United States. Its open land, once heavy with cotton, potato, and soybean crops, has been overtaken by kudzu. Not even the recently opened Nissan plant in Canton has loosened poverty's grip on the area.

After the Tchula fire, State Chief Deputy Fire Marshal Millard D. Mackey told NFPA that, among the more than 50 fire deaths his office had recently investigated, none had occurred in a home with a working smoke detector. Fires occurred, he continued, either because smoke detectors had no batteries or, in the case of hard-wired detectors, because the electricity had been turned off.

As the community mourned the death of the youngsters, residents and officials together formed a task force comprised of leaders in Mississippi health and safety organizations, the fire service, and law enforcement to prevent future tragedies.

There was no doubt NFPA would be invited to come to the table, as well. For nearly 10 years, NFPA's Center for High-Risk Outreach, under the direction of Sharon Gamache, has worked in Mississippi on public education initiatives like *Learn Not to Burn*® and *Remembering When*™ and is looked on as a fire safety leader.

Months of discussions only strengthened the resolve of the panel to achieve at least one conceptually simple but practically difficult goal–to provide smoke alarms for 9,000 households in Holmes County. Then the CDC (Centers for Disease Control and Prevention) entered the picture, joining with NFPA to make a donation that enabled the purchase of about 1,000 smoke alarms for local homes, and the task force went to work recruiting volunteers, some from the fire service, to install the devices. However, although this undertaking was successful, and the generous gift was well appreciated, more needed to be done to realize a broader goal.

Late on a Friday afternoon in July, Judy Comoletti, NFPA's assistant vice-president for Public Education, received a call at NFPA headquarters from the U.S. Fire Administration (USFA), telling her that USFA would again fund Fire Prevention Week, as it had done faithfully for several years. When Comoletti began brainstorming with key NFPA staff about the best way to use the $125,000 donation, one option rose to the top of the list: Funding the remainder of the Holmes County smoke alarms.

With calculator in hand, Comoletti figured that filling Holmes County's need for alarms was possible–if NFPA supplemented the USFA grant with an additional gift. The alarms, with tamper-proof, 10-year lithium batteries, could be ordered from First Alert for half the retail cost, thanks to bulk buying. Comoletti spent the rest of the afternoon pounding out a proposal for the USFA Fire Prevention Week grant.

The following week, USFA approved the proposal, and "The Mississippi Project," as it was dubbed by NFPA staff, was underway. Early fire-warning systems would protect every household in Holmes County for 10 years, with one caveat. The grant required that all the alarms be installed within nine months and that a follow-up survey be completed by October 2004.

Jim Shannon and Clint Cobbins exit a home after installing a smoke alarm.

The Mississippi task force was apprised of the gift and asked to help with volunteer installation of the devices. Task force officials believed they could tackle the installations during their off-duty hours by forming groups of 50 teams, each with two members.

The day before Fire Prevention Week 2003 started, NFPA's Gamache delivered a volunteer training and planning session. A day later, NFPA and USFA officials began arriving in Tchula for the press conference that would launch the project with the installation of the first units by NFPA executives.

On the morning of October 6, as

the NFPA team prepared for the press conference, word came that a fire five hours earlier in a small home in Yazoo City, just 30 miles away, had killed five children, ages 10 and under. As in the Tchula fire that had been the genesis for the project, the children had all been siblings and cousins: William Bell, 1; Taklesha Bell, 3; Devunte Bell, 10; Kayla Williams, 7; and Tytianna Bell, 4. Again, no smoke alarms had been in the house in Yazoo County.

The press conference that took place that morning at the Tchula Fire Department to kick off The Mississippi Project was clearly marked by sadness. A solution to one high-risk community's need for smoke alarms was cause for celebration, but it only drove home the point that more had to be done to help others in need.

As news reporters and local, state, and federal officials gathered to hear about The Mississippi Project and witness the first installations, planned for that afternoon at nearby homes, speakers took to the microphone to praise the successful partnership of the task force, USFA, and NFPA. Among them were Tchula's Mayor Yvonne Brown; the State Commissioner of Insurance and State Fire Marshal George Dale; and Dr. Martha Davis, president of the Dr. Arenia C. Mallory Community Health Center. As host of the well-attended press conference, Clint Cobbins called the initiative "a dream come true," then introduced NFPA President James Shannon.

Shannon praised the task force's determination to find its own solution to the community's problem.

"They didn't wait for others to tell them what to do. They took action," he said. "Thank you for showing us the way.

"NFPA has never had a more appropriate place from which to launch Fire Prevention Week," he said of Tchula, vowing that The Mississippi Project would be the "model for the rest of the country."

After the press conference, Shannon and NFPA Executive Vice-President and Chief Engineer Arthur Cote went to neighboring mobile homes to install the first smoke alarms from The Mississippi Project. Before leaving Tchula, Shannon called on other groups, organizations, and corporations to find the resources to extend The Mississippi Project to other deserving areas in Mississippi and elsewhere.

Two days after the press conference, NFPA received a request from another southeastern community where fire had taken young lives. Could we help them–and others in need?

The challenge is on.

Arthur Cote and Jim Shannon speak with fire officials from Holmes County as they begin installing smoke alarms in a Tchula home.

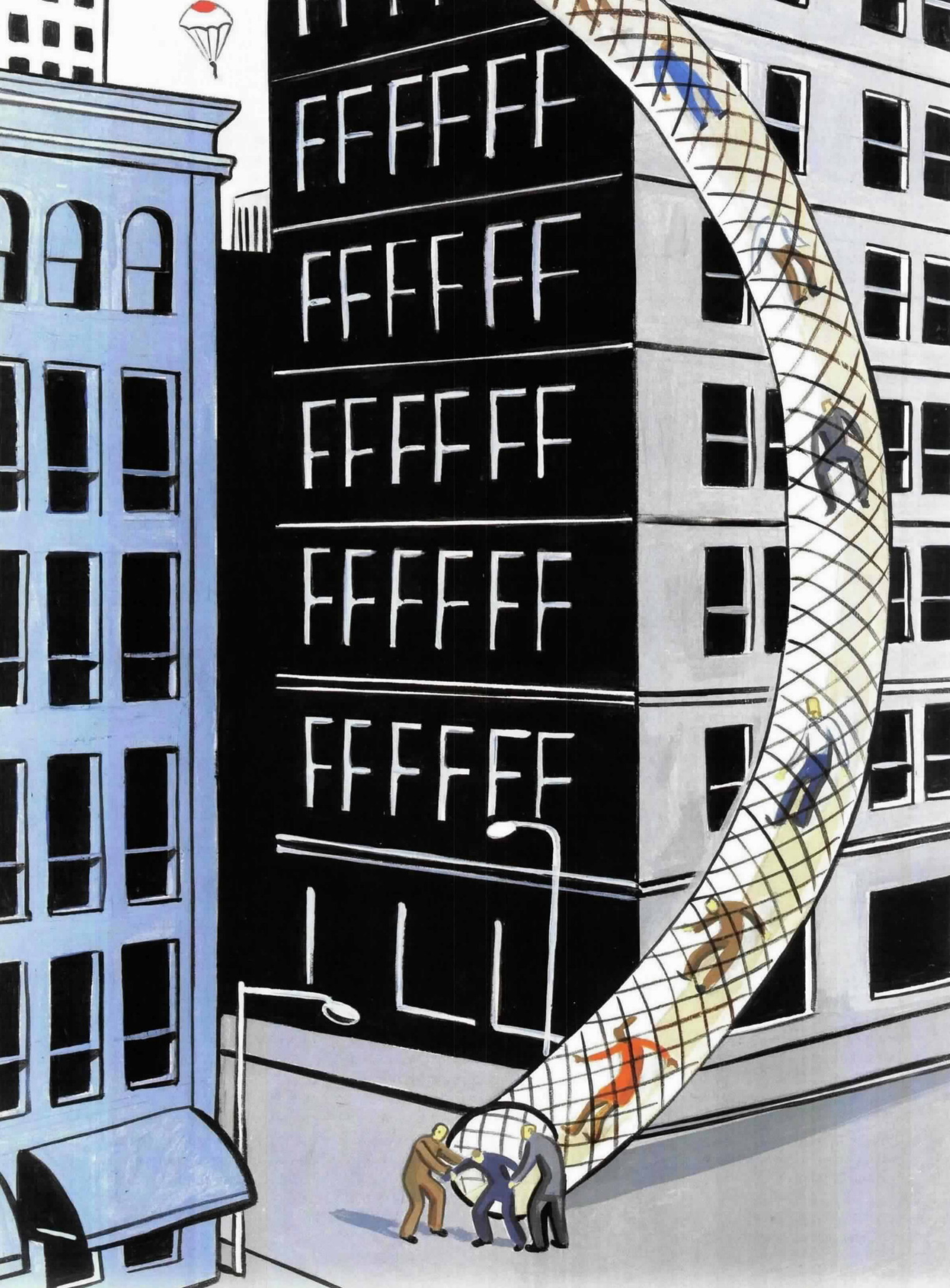
PHOTOGRAPHS: JARO VASIC

new way out ideas

by JOSEPH ZICHERMAN, Ph.D., SFPE
illustration by ALISON SEIFFER

SINCE THE COLLAPSE OF THE WORLD TRADE CENTER on September 11, 2001, the fire safety community has received numerous suggestions concerning emergency evacuation techniques for high-rise buildings, ranging from widening existing exit stairways to using specialized equipment to help occupants escape in an unorthodox manner. In general, the proposed evacuation methods can be classified as either traditional, meaning they were used in high-rise applications before 9/11, or unconventional, meaning that they are relatively new or untried concepts, or concepts that, until now, have been prohibited in the United States.

While not recognized by *NFPA 101®, Life Safety Code®*, or *NFPA 5000™, Building Construction and Safety Code™*, some of these methods are used voluntarily at building sites in the United States and by mandate in other countries. And articles on these devices have even appeared in the mainstream media, from *The Wall Street Journal* to *Popular Science*. The purpose of this article is to provide some basic information on these alternative egress devices with which we, as building safety professionals, should be familiar—even if we don't condone their use. >>



Unconventional exit strategies

Conventional approaches to high-rise fire safety planning currently integrate active and passive construction features, such as compartmentation, fire sprinklers, and pressurized stairwells, that have proven reliable over the years. Unconventional exiting approaches, on the other hand, may include such nontraditional safety measures as winch-like lowering systems, escape chutes, and parachutes designed to dissipate the kinetic energy developed by descending evacuees to deposit them safely on the ground at a manageable speed.[1] Such devices pose significant technical challenges and questions about potential regulatory issues and human behavior.

WHILE NOT RECOGNIZED BY *NFPA 101®, LIFE SAFETY CODE®*, OR *NFPA 5000™, BUILDING CONSTRUCTION AND SAFETY CODE™*, SOME OF THESE METHODS ARE USED VOLUNTARILY AT BUILDING SITES IN THE UNITED STATES AND BY MANDATE IN OTHER COUNTRIES.

Currently, unconventional exiting strategies aren't typically part of U.S. system design, emergency planning, or regulatory review, although *NFPA 101* and *NFPA 5000* do address evacuation slides to a limited extent since they're used by industrial facilities, such as oil-cracking towers, and in air traffic control towers on some military bases. Despite our lack of familiarity with, or use of, such systems in the United States, however, many are used in other countries.[2]

Winch-like systems lower evacuees from tall buildings using a cable and a braking mechanism to control the speed of descent. The lowering device most widely used today is the Japanese-made ORIRO Descenter, composed of a pulley and a steel rescue cable with woven-cotton harnesses at both ends. To use the system, an evacuee attaches the pulley to a window, roof, or balcony mounting bracket and dons the harness, in which he or she is lowered to the ground at a speed of 3 feet (1 meter) per second. As the evacuee descends, the harness at the other end of the cable rises up to the spot he or she left, allowing the next evacuee to use it. The pulley controls the descent rate using a centrifugal friction brake.

More than 100,000 UL-listed Descenters, which can hold individuals weighing up to 225 pounds (102 kilograms), are reportedly in use in Japan.

The BEST Rescue System, which is manufactured in the United States, is similar in concept to the Descenter, but it employs two fire-resistant suits instead of cotton harnesses to hold evacuees. The suits, which resemble large overalls that extend over the evacuee's head, are designed to reduce heat exposure and ease anxiety by preventing a view of the ground below. They are attached to a cable and a pulley that pulls an empty suit up for the next person to use as the evacuee descends.

A former commissioner of the New York City Police and Fire Departments, Howard Safir, is marketing the newest lowering approach, the Safir-Rosetti ResQline. This system provides a faster rate of descent using the air resistance created by a spinning turbine that dissipates the kinetic energy generated during lowering. The ResQline, which measures 3 by 3 by 1.5 feet (1 by 1 by 0.5 meters), can be installed in one or two locations per floor and on rooftops, balconies, or in any window that opens.

In case of a fire, an evacuee puts on a harness attached to a portable spool of cable. After attaching the spool to the axle of the turbine, the evacuee steps away from the building and descends at about 15 feet (5 meters) per second as the turbine controls the descent. After the evacuee lands, the next person removes the previous user's spool, and the procedure is repeated. The UL-listed system, which allows evacuees to descend roughly five times faster than the centrifugal friction brake systems of the Descenter and the BEST Rescue System, can be used for buildings of any height and is reported to be maintenance-free for indoor and outdoor use for up to 35 years.

Recently, the Azrieli Center in Israel–a mall and business towers in the center of Tel Aviv–purchased the Safir-Rosetti ResQline system.

Chute- and slide-based devices

Chute- and slide-based devices typically use a fabric tube deployed from a location up to 30 stories above the ground and require run-out room to allow evacuees to slow before exiting.

The Baker Life Chute (BLC), one of which is installed at the Ramstein Air Force Base air-traffic control tower in Germany, is a nylon netting tube attached to three metal rings at the top and bottom. The upper rings are secured to the structure from which the evacuation is taking place, and the lower rings are secured to a fixed, predetermined object on the ground. Evacuees slide down the tube and slow themselves by applying outward pressure on the net with their feet and hands. The system, manufactured by Baker Safety Equipment of Delaware, can reportedly carry as many as 30 people at a time in a continuous flow.

Another BLC system is designed to be airlifted to the top of a building during an emergency, while a third can be attached to the bucket of a fire department rescue ladder.

In the Advanced Modular Evacuation System made by an Israeli company, an enclosed chute of fire-resistant material is automatically deployed from a portal inside the building to a designated location on the ground or on an adjacent building when the building's fire alarm

system activates. Flat sections in the tube control descent speed. After the occupants have evacuated, rescue personnel can use a winch system built into the chute hardware to enter the building.

Rescue systems

Then there's the Escape Rescue System, manufactured by Escape Rescue Systems Ltd. of Kadima, Israel. It's stored folded on the roof; when deployed, multi-platform arrays are opened and lowered to sets of floors, enabling occupants to enter simultaneously through marked windows. The arrays are lowered to the ground, and tenants exit to safety as the arrays refold. Fire and rescue personnel ride the system up and into the building.

Parachute systems

Another unconventional evacuation device is the parachute, derived from classical parachutes, which requires evacuees who jump from a structure to exercise some control as the descent occurs. Professional parachutists, including BASE (building, antenna, structure, earth) jumpers, criticize the concept, saying it's the most difficult and often the most dangerous kind of parachuting.

One available parachute evacuation system is the Executive Chute, made in the United States by Destiny Aircraft Corporation of Michigan. The chute is deployed by a static line attached to a fixed object in the building to which the evacuee secures the ripcord before jumping, enabling the parachute to open in the event the evacuee freezes or loses consciousness during the jump. The rounded canopy, intended to eliminate the need for steering, should allow evacuees to float straight down after the chute deploys.

The chute can be used at any height above 12 stories, or 125 feet (38 meters), and must be inspected and repacked every 3 to 5 years.

Although about 200 Executive Chutes

PHOTOGRAPH: EVACUCHUTE

The Evacuchute is tested in this simulated high-rise escape.

This computer-generated graphic depicts how the Safir-Rosetti ResQline system is set up for use.

have been sold, mainly to private individuals, there's no documented use of them during a high-rise emergency.

Another parachute, the U.S.-made Evacuchute by Emergency Evacuation Systems, is also designed for hands-free, static-line deployment, but its cone-shaped canopy, which adds stability, allows the user to steer it away from a building. When stored properly, it's designed to last 15 years. Annual inspection and repacking are required. The Evacuchute is recommended for use at any height above 14 stories, or 140 feet (43 meters).

The Evacuchute has been commercially available since July 2002.

Regulatory and listing issues

Should the industry decide to pursue the use of unconventional emergency evacuation systems, developing regulations governing them will be challenging for a variety of reasons. Such regulations will have to acknowledge that controlled-descent devices are last resorts, to be used only when conventional exits are no longer available, serviceable, and useable. They will also have to address significantly different expectations about the conditions and risks under which these systems will be used.

Precedent for the use of unconventional approaches already exists in Sections 7.2 and 7.2.10 of *NFPA 101*. Section 7.2.10, entitled "Slide Escapes," specifically recognizes slide escapes as a means of egress when permitted in Chapters 12 through 42 of *NFPA 101*.[3] Section 7.2.10 also states that slide escapes must be of an approved type and that the rated capacity of such slides must be taken into account in overall egress planning.

Chapter 40, "Industrial Occupancies," allows slides to be used for 100 percent of the emergency exiting capacity of high-hazard occupancies, but only when potential evacuees are regularly trained in their use. And Appendix A.11.2.2 notes that escape chutes, controlled descent devices, and elevators "should not be substituted for the provisions of this Code."

UL has already listed some unconventional controlled descent devices and components, which are thus subject to ongoing inspection programs to maintain those listings. However, UL's documentation notes that the devices have been evaluated for mechanical operation only and are not intended for use as a means of egress during fires. The evaluations conducted to date address only specific properties, such as rate of descent speed, capacity, and durability or resistance to corrosion.

Interestingly, the regulatory situation surrounding controlled-descent devices appears similar to that associated with previous unsuccessful attempts to develop standards for escape hoods, which were the subject of intense debate on the floor of NFPA meetings in 1998 and 1999.

Human factors

Perhaps the most pressing questions the industry would have to answer before unconventional descent devices became conventional have to do with the users, not the equipment or the regulations governing it. The technical and engineering aspects of the controlled-descent systems currently available appear reasonable, but their wholesale application to potentially large numbers of people represents an untried concept in the United States. In fact, relying on such equipment is contrary to everything we currently understand about the interaction between human behavior and building performance.

GRAPHIC: SAFIR ROSETTI RESQLINE

The effect on evacuees of these unconventional evacuation methods would have to be studied, as would methods for coping with anxiety about using such systems in general. Current research on the use of elevators during high-rise emergencies is causing anxiety in the fire protection community, not only about the performance of the equipment, but about the anticipated responses of building occupants as well. And high-rise occupants use elevators every day. How much greater might be their fear of using an unknown device in trying circumstances?

In addition, users would have to be trained and the equipment maintained regularly if it were to be effective in an emergency. And the strengths and weaknesses of each system would have to be carefully assessed before it could be put into the field, especially into existing structures that weren't designed with their use in mind. Other issues that might affect their use, such as cross winds, would have to be evaluated as well.

Will these unconventional exiting systems become accepted tools, available to building designers, regulators, first responders, and occupants? Perhaps.

Enhancements to building performance in the coming years will certainly entail another look at nontraditional means of building evacuation. Broader use of elevators for evacuation, simultaneous evacuation of all floors in a high-rise, new ways of evacuating occupants with mobility impairments, and use of unconventional systems are all open for discussion.

First responders already use some of the systems described here, and their use in high-hazard occupancies or tall towers with limited numbers of occupants–especially those who are physically fit–may be reasonable. But developing codes and standards to address their performance and introducing them to building occupants will present extraordinary challenges.

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Notes

1. This subject was addressed in an August 25, 2003 article in *The Wall Street Journal.*

2. For example, U.S. Patent 4,018,423 protects an "Emergency Decent Device," which apparently was never exploited commercially.

3. Provisions of Section 7.2.10 also address the need for slide escapes to be of an approved type, implying that testing and listing will be required, and the rated capacity of such slides in overall egress planning. In addition, Appendix A.11.2.2 states, "Escape chutes, controlled descent devices, and elevators are permitted to provide escape routes in special structures; however, they should not be substituted for the provisions of this Code." Section 40. 2.2.11 of Chapter 40, "Industrial Occupancies," allows for the use of slides for 100 percent of the emergency exiting capacity of high-hazard occupancies, but only when their potential users are regularly trained in their use.

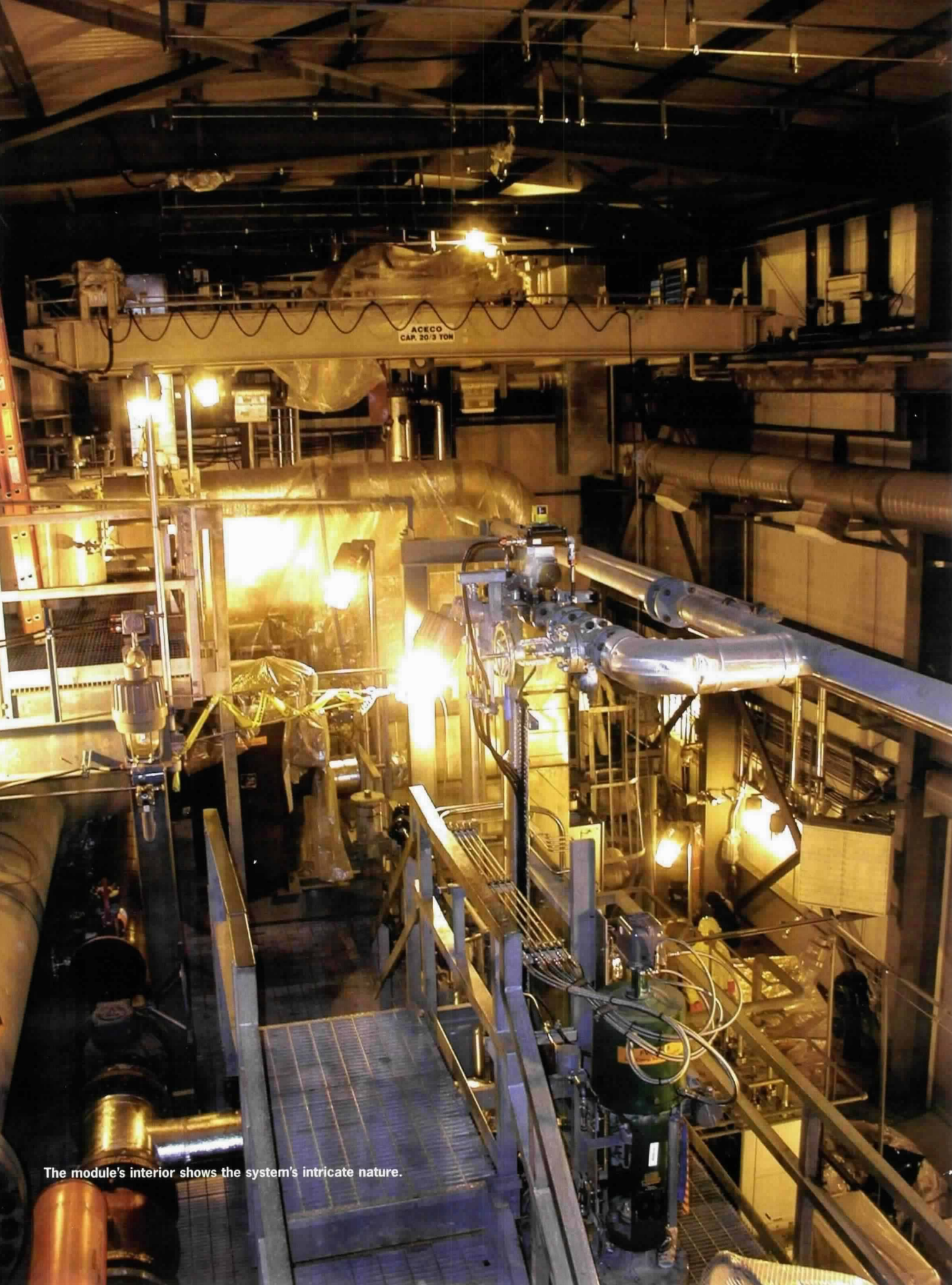
Combining total-flooding and local-application fine water-mist coverage for hydrocarbon-processing facilities

ALPINE ALTERNATIVE

IN THE REAL WORLD, oil-processing facilities are constructed in a variety of configurations, ranging from narrow and long to wide and tall, and the petrochemical hazards they present are rarely the size of those used in testing agencies' test facilities. Consequently, it's often necessary to think outside the box when designing a fire protection system for the petrochemical- and hydrocarbon-processing industries.

Such was the case with the ConocoPhillips Alaska Alpine project. From start to finish, the project went beyond the normal caterpillar-to-butterfly transition; it more closely resembled the metamorphosis of a butterfly into a Boeing 747. >>

by LARRY W. OWEN, CFPS
photographs by LARRY W. OWEN, CFPS



The module's interior shows the system's intricate nature.

When Arco Alaska, now called ConocoPhillips Alaska, Inc., of Anchorage considered fire protection options for its Alpine project, one of the factors was the life expectancy of the extinguishing agent. At that time, most of ConocoPhillips' oil-processing facilities were protected by Halon 1301, and the company wasn't convinced that the gaseous replacement agents then available would provide long-term fire protection and environmental solutions.

To survey the options available, ConocoPhillips engaged Dooley Tackaberry (DT), a fire protection company, of Deer Park, Texas. After numerous meetings and cost estimates, ConocoPhillips decided that water mist was the best long-term, environmentally safe solution, so DT set to work designing a water-mist system for the project, using hardware manufactured by Marioff, a company based in Finland.

ALL SPACES AT THE FACILITY WOULD BE PROTECTED BY A TOTAL-FLOODING SYSTEM, AND EACH PIECE OF PROCESS EQUIPMENT THAT HANDLES A HYDROCARBON LIQUID IN A SPACE WHOSE ROOF WAS MORE THAN 16 FEET (5 METERS) HIGH WOULD BE PROTECTED BY LOCAL-APPLICATION NOZZLES.

Sometimes, the hazards grow

In Alaska's Arctic environment, ConocoPhillips installs most of its oil-processing equipment in heated buildings or modules, and the initial layout of the Alpine site included modules small enough to comply with water-mist size limitations established by testing in Europe. As the design progressed, however, the modules grew until conventionally designed water-mist systems became inadequate.

The only water-mist solution suitable for the Alpine project thus evolved into a performance-based design using total-flooding and local-application coverage.

For years, carbon dioxide fire protection systems have been designed using an "either/or" approach. A combination approach is rarely used because there are established design methods for either total-flooding systems, such as those used to protect small spaces like enclosed turbines, or local-application systems for larger, unenclosed hazards, such as newspaper press lines. Unlike carbon dioxide systems, a combination approach to water-mist systems designed for hazards that don't fit the "approved" template is a possible solution. As the Alpine project grew, DT decided to use a belt-and-suspenders approach, resulting in both total-flooding and local-application water-mist coverage.

Because this would be a performance-based fire protection system, the authority having jurisdiction–the Alaska State Fire Marshal–was consulted and approved the basic design approach as long as the design was based on known test criteria. ConocoPhillips also approved the design approach.

All spaces at the facility would be protected by a total-flooding system, and each piece of process equipment that handles a hydrocarbon liquid in a space whose roof was more than 16 feet (5 meters) high would be protected by local-application nozzles. The total-flooding nozzles would cool the protected space, and the local-application nozzles would extinguish the fire.

On the surface, this combined approach might not seem like a big challenge until one explores the application rates and nozzle pressure requirements. One of the project objectives was to use as few different components as possible. To meet this objective, the same nozzles were used for both total flooding and local application, although the desired pressures and flow rates of each application are quite different. Total-flooding nozzles require a minimum pressure of 30 bar, or approximately 435 psi, while local-application nozzles require a minimum pressure of 70 bar, or approximately 1,015 psi. The total-flooding nozzle flows approximately 2.75 gallons per minute (gpm) [10 liters per minute (lpm)], while the local-application nozzles flow between 4 and 5 gpm (15 and 19 lpm). How could a single system meet these different flow and pressure requirements?

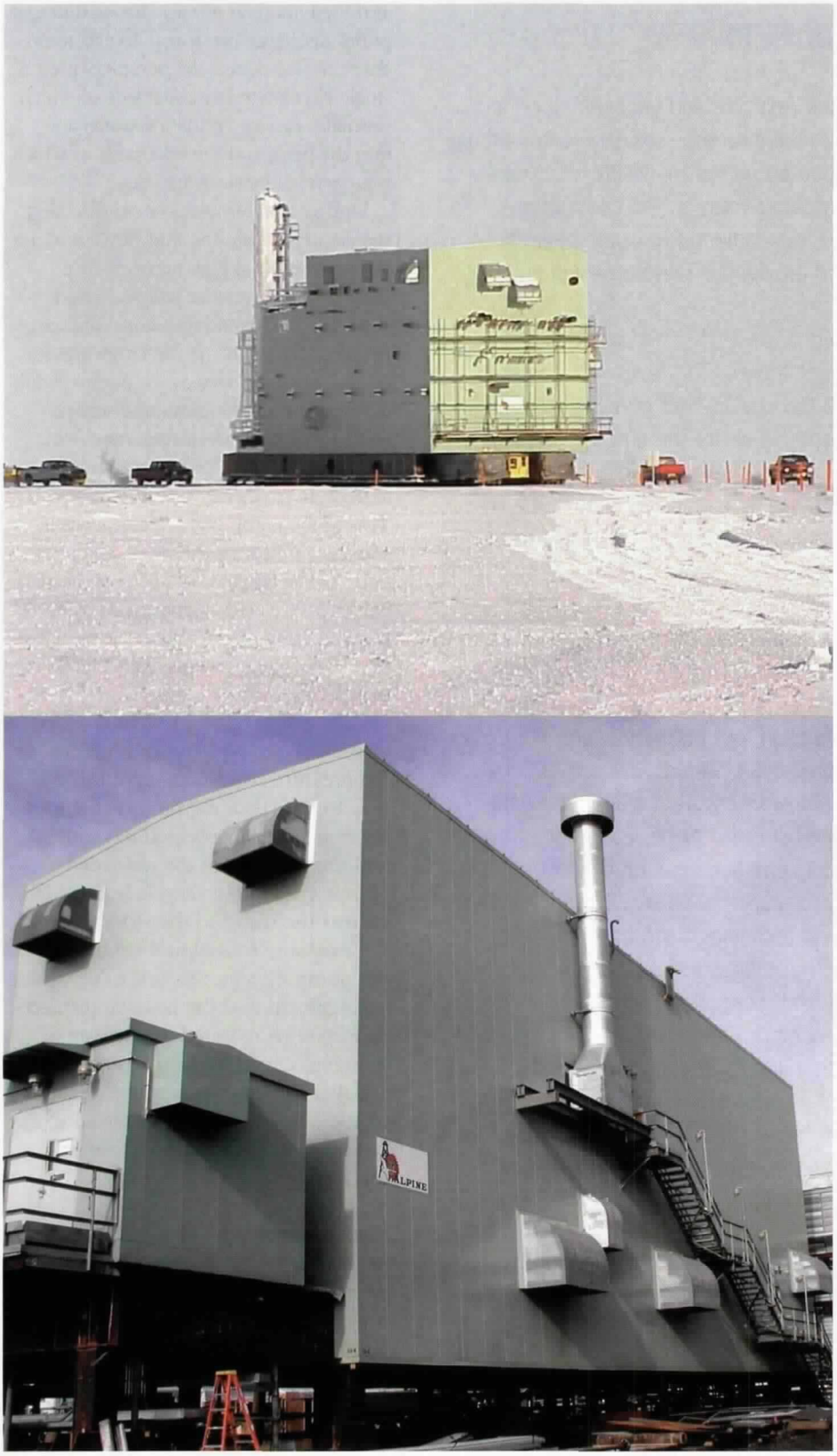
System architecture

The Alpine site's potable water comes from a lake and is prepared for use by an on-site treatment facility. The water is also filtered twice and subjected to UV-water treatment to eliminate growths. It's then stored in two elevated tanks with a combined capacity of approximately 55,000 gallons (208,194 liters), from which the water-mist system's central pumping system provides it to the suppression systems in 17 buildings. The system can protect the largest defined hazard for one hour.

In the Arctic, it's a good design philosophy to circulate the fire protection water supply throughout the facility and monitor its flow. If flow isn't present, there may be an ice plug or a break in the piping. Because the circulating water needn't be at the water-mist discharge pressure, low-pressure centrifugal pumps can be used to keep the water moving.

The Alpine project used a primary and secondary centrifugal pump, each flowing 200 gpm (757 lpm) at 50 psi, to move the water through the loop. The circulation-loop piping, which is heat-traced and insulated whenever it leaves a heated building, is made of stainless steel, as is all the piping in the water-mist system.

ConocoPhillips wanted to keep down project costs by using a single circulating loop, rather than individual high- and low-pressure loops, even though the pressure requirements of the local-application



The modules, seen on an icy Alaskan road, were fabricated in Houston and Corpus Christi, Texas, and in Kenai and Anchorage, Alaska and were carefully monitored to ensure that the systems were properly installed.

Construction Logistics

Working on this Arctic project involved complicated logistics. For example, buildings and modules were fabricated in Houston and Corpus Christi, Texas, and in Kenai and Anchorage, Alaska, and DT had to work with all the fabricators to ensure that the systems were properly installed. With four different fabricators involved, the workmanship varied a bit, but the final system installation was first-class.

The modules fabricated in Alaska followed shipping journeys similar to those made in Texas, only shorter. Once the modules arrived in northern Alaska, they were staged until an ice road could be constructed to the site. Except for the three or four months a year when the ice road is in place, the only way in or out of Alpine is by air. If a new module weren't finished on time and missed the ice road, the project would have been affected for a year, so it's easy to see how strictly enforced schedules must be on Arctic projects.

Winter is peak construction time in the Arctic because it's easier to get materials to the various sites during that period. With wind chills of -100°F (-38°C), however, the conditions are hard on both humans and materials.

Origin and development of NFPA 750

IN 1993, REPRESENTATIVES FROM the research and engineering communities, water-mist system manufacturers, the insurance industry, enforcement authorities, and industrial users met and organized the NFPA Technical Committee on Water Mist Fire Suppression Systems. The committee started work on developing a new NFPA document that would begin to standardize water-mist technology and provide for reliable design and installation of these systems.

Water-mist systems were introduced in the 1940s and were utilized for specific applications such as passenger ferries. The renewed interest in water-mist systems is due partially to the phasing out of halon and their potential as a fire safety system for spaces where the amount of water that can be stored or that can be discharged is limited. In addition, their application and effectiveness for residential occupancies, flammable liquids storage facilities, and electrical equipment spaces continues to be investigated with encouraging results.

NFPA 750 contains elements that are similar to standards on other types of fire protection systems such as automatic sprinklers, fixed water spray, carbon dioxide, and halon. In many ways, water mist can be thought of as a hybrid of those systems. Overall, water-mist systems utilize water as the extinguishing, suppression, or control medium, but do so in a nontraditional manner. In developing this standard, the committee addressed system components and hardware, system types, installation requirements, design objectives, hazard classifications, calculations, water supplies, atomizing media, plans, documentation, acceptance criteria, and maintenance considerations. The 2000 edition of NFPA 750 represented a significant advancement in water-mist technology and the knowledge base associated with its application. That edition included a new definition of water mist and a complete rewrite and reorganization of Chapter 5, "Design Objectives and Fire Test Protocols." Additionally, many new sections were added to address the design and safety considerations associated with positive displacement water-mist pumps. New guidance was provided for the measurement of the water-mist spray characteristics including drop distribution. Finally, two new appendixes were added to address many of the current and proposed fire test protocols and the reliability of water-mist systems.

The 2003 edition incorporates revisions that update the standard to comply with the NFPA Manual of Style. Style changes include restructuring of the document, rewording exceptions as requirements, and transitioning to a metric-as-primary document. The 2003 edition contains updated requirements for additives, proportioning methods, supervision, calculation methods, and inspection and testing of water-mist systems. New requirements have been added that address protection of machinery spaces on towing vessels.

and total-flooding nozzles dictate different pump discharge pressures. To accommodate this imbalance, the designers used a single circulating loop, one side of which normally carries circulating water out into the plant and the other side of which returns it to the storage tanks.

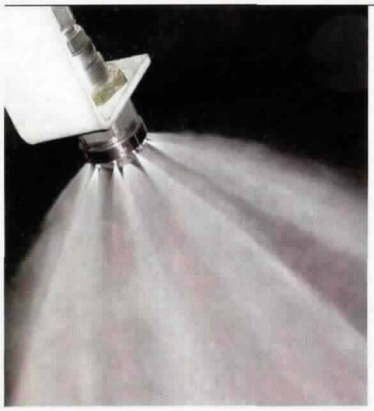
During a water-mist system discharge, the circulating pumps shut down and are isolated from the pipe network by a series of high-pressure ball and check valves. The circulating pumps' discharge line then becomes the discharge line for the low-pressure water-mist pumps, while the return line becomes the discharge line for the high-pressure pumps. Nine motors drive the high-pressure pumps, and 12 drive the low-pressure pumps. Two of the pump sets are considered standby pumps. At the most remote point of the circulating loop, two check valves prevent the high-pressure water from entering the low-pressure discharge line. This whole process takes place in a matter of seconds.

Each pump has an unloader valve that is used to regulate its pressure. As the pressure requirements of the system are satisfied, the pumps with the lower unloader valve settings unload, and the water from the unloaded pumps goes into a recycle line, which returns the water to the storage tanks.

Compared to a typical centrifugal fire pump system, this unloader valve arrangement and the positive displacement pumps required a new way of thinking. Defined quantities of water are available at the pressures dictated by the unloader valve settings, and the typical centrifugal pump curve is replaced by a stair-step curve.

Nozzle layout

At the time the Alpine project was designed, Marioff had tested its total-flooding system for spaces up to 16 feet (5 meters) high and provided spacing criteria and flow requirements for both the total-flooding and local-application nozzles. DT adapted these test criteria to the Alpine hazards. Any time a roof exceeds 16 feet (5 meters), the local-application nozzles activate to complement the roof nozzles.



DURING A WATER-MIST SYSTEM DISCHARGE, THE CIRCULATING PUMPS SHUT DOWN AND ARE ISOLATED FROM THE PIPE NETWORK BY A SERIES OF HIGH-PRESSURE BALL AND CHECK VALVES.

One feature of the Marioff system is high pressure. At 435 psi (30 bar), even its low-pressure discharge is much higher than most water-mist system discharge pressures. This high pressure results in both entrainment of the water particles in the fire plume and the penetration of the plume by the water particles. Expecting a nozzle more than 16 feet (5 meters) above a hazard and discharging at 30 bar to provide particles that penetrate a fire plume is probably fantasy. However, nozzles less than 16 feet (5 meters) high do an adequate job of delivering mist that can both penetrate the fire plume and become entrained in the plume.

System hydraulics

Another challenge was the absence of software that used the Darcy-Weisbach formulas for hydraulic calculations, rather than the traditional Hazen-Williams formulas. Hydraulic calculations using Darcy-Weisbach formulas are necessary when designing water-mist systems because their flows exceed 25 feet per second (7.6 meters per second). After searching unsuccessfully for such a software package, DT adapted a non-sprinkler hydraulic program with Darcy-Weisbach formulas to calculate the Alpine systems.

Full-scale discharge tests proved the calculations accurate, even though, as custom calculations, they weren't in a standard NFPA 13, *Installation of Sprinkler Systems*, format so reading them took a bit longer than reading a conventional NFPA 13 printout.

System controls

All the electrical components used on the Alpine project were listed or approved by a nationally recognized testing laboratory. For example, the fire alarm control panels carry Underwriters Laboratories' UL 508 labels for process control panels and UL 864 labels, listed as Dooley Tackaberry Fire Alarm Signaling Control Panels Suitable for Releasing Service. ConocoPhillips wanted this double listing to eliminate any future problems related to the use of unapproved equipment. The water-mist pumps, which are driven by UL-listed fire pump motors, were certified by DNV for their performance, and the solenoid-operated control valves, pressure switches, level switches, and flow switches all carry testing lab labels or approvals.
The control system looks for a "fail-to-start" signal from the pump motor controllers. If the control system receives one, a standby motor and pump set is activated. If the control system receives a second fail-to-start signal, a second standby motor and pump set is activated.

High-pressure, electrically operated ball valves direct water from the standby pumps to the appropriate piping, and the site-critical control system records the water-mist system pressures on a real-time basis. Solenoid-operated control valves, located in each protected space, are opened with a signal from the fire alarm control panel.

Each valve is monitored for position, and control valves are monitored for leaks.

System testing

Once the water-mist system was installed and all the piping flushed and hydrotested, full-scale water-flow tests were conducted in all protected areas in the presence of the owner, the fire protection consultant, and representatives of DT.

The performance of both total-flooding and local-application nozzles was robust, and the resulting mist in the buildings was spectacular. Everyone involved was impressed with the system's performance and the combined total-flooding and local-application approach. The positive report by the owner's fire protection consultant successfully concluded the four-year project.

But is it really the end of the journey? Hardly!

In 2003, the Standards Council issued the new edition of NFPA 750, *Water Mist Fire Protection Systems*, which provides guidance for designing, installing, and maintaining water-mist systems. As new petrochemical industry projects requiring water-mist systems are built, fire protection engineers and contractors will find NFPA 750 helpful in applying water-mist hardware. And testing currently being performed around the world will contribute a wealth of information on water-mist systems to support their increased use.

On a smaller scale, the many lessons learned on the Alpine project about using both total-flooding and local-application nozzles will serve all the parties involved for years to come. The job provided the project team with a working, full-scale, real-world laboratory and prepared team members for many future water-mist system challenges.

While water-mist systems don't fit every project, they do provide an excellent tool for the fire protection professional serving the petrochemical market.

LARRY W. OWEN, CFPS, is the International Project Director with Dooley Tackaberry, Inc., Deer Park, Texas. He is also a member of the Water Mist Fire Suppression Systems Technical Committee.

THINKING outside THE RECTANGLE

The remote area in hydraulic calculations requires fire protection engineers to understand more than they may have once considered.

DEFINING THE PROPER DESIGN criteria is, without question, a critical step in designing fire sprinkler systems. Just as important, though, are the hydraulic calculations that verify that the design criteria have been satisfied.

Unfortunately, details of the hydraulic calculation procedure are often vaguely understood. Many designers size the remote area solely by counting fire sprinklers, and the result is wrong more often than not. Others rely on their computers. If it came out of my PC, the theory goes, it must be right. While computer-generated hydraulic calculations may not always be wrong, they are incorrect often enough to make one wary of simply assuming that they're right.

The remote area is the foundation of hydraulic calculations, but several critical, fundamental issues regarding the remote area are often misunderstood. It's particularly important that authorities having jurisdiction (AHJs) understand these issues, since they're the final safety net for ensuring that appropriate systems are properly installed. >>

by STEVEN SCANDALIATO
illustration by FEDERICO JORDAN

Function of the remote area

The function of the remote area is to reflect the maximum system demand for water flow in gallons per minute (gpm) and water pressure in pounds per square inch (psi) created by a specific sprinkler system layout for a given design basis. The remote area must present the largest hydraulic demand in the portion of a building covered by its design basis. Designers ignore portions of the building with different design bases until they locate their remote areas.

Contrary to logic, the location that's the most hydraulically demanding isn't always the furthest from the riser. Rather, it's the location that creates the greatest water demand. This can be confusing because the location with the greatest water demand isn't necessarily the location with the highest pressure demand.

Say demand at one location is 50 psi (3.45 bars) at 400 gpm (1,514 liters per minute), and demand at another location is 40 psi (2.76 bars) at 600 gpm (2,271 liters per minute). How close these points come to the water-supply curve will determine which is more demanding. If you have a flat supply curve–that is, high-flow capacity–with a static pressure of 45 psi (3.10 bars), the higher pressure will be the most demanding. If you have a steep curve–that is, pressure but little flow–the higher flow is the problem. The fact is that such large flow differences will only appear if there's a need for more than one remote area.

The reason we only have to prove the most remote area is simple and logical. If we have enough water to supply the most demanding area of a building, we can safely assume that all other areas in that portion of the building will get even more water, thus exceeding the assigned design criteria. That's why you must be confident that the remote area is the most demanding location.

In a tree system, the most demanding location is fairly apparent. In a gridded system, however, it isn't. That's why Section 8.4.4.2 of NFPA 13, *Installation of Sprinkler Systems,* requires two additional calculations for gridded systems, comparing the two sides adjacent to the selected remote area. This is called peaking the demand area, and most hydraulic programs do it automatically.

Multiple remote areas

Although the sprinkler system water supply required for a single remote area often covers a building adequately, it's appropriate to provide different portions of the structure with their own system designs. Actually, buildings or even portions of buildings with a single design basis commonly have more than one remote area. One could always take the most demanding remote area of a building and base the system design for the entire structure on that layout, but that would add unnecessary cost for the building owner.

There are five primary reasons a building might require more than one remote area. The first is a change in building contents. This can be as subtle as a change in occupancy classification for the occupancy hazard fire control approach–going from light hazard to ordinary hazard group, for instance. Or it can be as obvious as a total change–like a transition from the occupancy hazard fire control approach to the fire control approach for storage. Even a change in the type of suppression system–from residential to large-drop, say–may require more than one remote area.

A building might also require more than one remote area when there's a change in design method, such as from the standard area/density method to the room design method. This also applies to a change in K factor or sprinkler type, as when an occupancy switches from a standard pendent sprinkler to a sidewall or extended-coverage sprinkler.

More than one remote area may be needed when system modifiers apply only to part of the building, such as a limited area with sloped ceilings, or when the quick response reduction applies.

Where there's a localized high demand for water, such as a limited area with hose stations, in-rack fire sprinklers, or a water curtain, more than one remote area may be necessary as well, since each such location must be balanced to the ceiling demand protecting the floor space. If there were a water curtain next to the system riser, for example, a remote area would have to be placed at that location, incorporating the flow for the water curtain, and a second remote area would be needed to show that the system was adequately supplied at the opposite side of the building.

Finally, multiple remote areas are needed when there's a large enough change in the pipe layout to make it unclear whether another area has a higher system demand. This is obvious when the layout changes from a tree arrangement to a gridded one.

Although there's no requirement that the layout in the rest of the building be identical to that in the remote area, additional remote areas should be provided if there are significant changes in the sprinkler system, such as a reduction in pipe size in the

Many designers size the remote area solely by counting fire sprinklers, and the result is wrong more often than not. Others rely on their computers. If it came out of my PC, the theory goes, it must be right.

Contrary to logic, the location that's the most hydraulically demanding isn't always the furthest from the riser. Rather, it's the location that creates the greatest water demand. This can be confusing because the location with the greatest water demand isn't necessarily the location with the highest pressure demand.

branch lines or cross mains, additional fire sprinklers on a branch line, or even additional fittings, especially on the branch lines. Additional remote areas should also be provided if there are significant changes in the area of fire sprinkler coverage.

Factors affecting location of the remote area

Water curtains and in-rack fire sprinklers typically require at least two remote areas in the portion of a building protected by a single-design basis. A remote area must be adjacent to a water curtain and directly above the storage area containing in-rack fire sprinklers, which are commonly limited to a portion of the storage area. An exception is made when the entire area contains in-rack sprinklers so that the remote area is placed solely near the most hydraulically demanding ceiling location.

There's also an exception for water curtains. If a single fire is expected to operate the water curtain sprinklers and the calculated fire sprinkler system, the water must be added to the adjacent ceiling demand. Excluding the water curtain would require physically separating the ceiling fire sprinklers and the water curtain with walls. Typically, both are exposed to a single fire, so technically the rest of the sprinkler layout could be based on the very demanding remote area with the water curtain. However, it wouldn't be the most cost-effective system because of the extra friction loss associated with the higher combined flow from the ceiling demand and the water curtain. In addition, it would have to be obvious that a more remote location wasn't hydraulically more demanding, even with the lower water flow for the ceiling fire sprinklers alone.

Differences in elevation among various portions of a building that use the same design basis must also be addressed when determining whether the remote area is the most hydraulically remote location, since changes in elevation may lead to pressure loss. A smaller pipe supplying a different location can create a friction loss that exceeds the loss of 0.433 psi/foot (.03 bars) due to elevation.

Applying the remote area

Once the designer has established the required size of the remote area, he or she must tackle several other issues that affect how this area is applied to the hydraulic calculation.

The first is ensuring that the remote area is the proper shape. For all area/density-based designs, the remote area should be rectangular, with the long side running parallel to the branch lines. According to Section 8.4.4.1.1 of NFPA 13, the length of the long side should be 1.2 times the square root of the size of the remote area. For instance, a 1,500-square-foot (139-square-meter) remote area requires a long dimension of at least 46.5 feet (14.2 meters).

Keep in mind that you must place the boundary half the distance between two fire sprinklers. If 46.5 feet (14.2 meters) is less than half the distance between the two sprinklers, you must increase the length up to that point. If 46.5 feet (14.2 meters) is slightly greater than half the distance between the two sprinklers, you must increase the length beyond the sprinkler so you're half the distance between the next sprinklers in the branch line.

The other boundary of the remote area also stops half the distance between the branch lines. When less than the area covered by an entire branch line is needed to meet the required size, individual fire sprinklers are added from that branch line as needed. This doesn't produce a true rectangle, but it will look like the example shown in Section A-8-3.3 (15) of NFPA 13 for gridded systems.

The fire sprinklers nearest the cross main should be selected because they experience the higher pressure and so create the greatest demand, thus flowing the largest amount of water. There's a lot of confusion on this point, and many people erroneously choose the sprinkler at the end of the branch line.

The second issue arises when one tries to determine the area not by the number of fire sprinklers, but by the actual floor area, taking the design area and dividing it by the area of coverage for the fire sprinklers. This is applicable only when the sprinklers are symmetrically laid out, each providing the same area of coverage. For example, 1,500 square feet (139 square meters) divided by 130 square feet (12 square meters) per fire sprinkler requires 11.5 fire sprinklers, rounded up to 12.

The problem is that the assigned area of sprinkler coverage, as required in Section 5.5.2.1 of NFPA 13, is based upon twice the distance to the wall or the distance to the next fire sprinkler, whichever is greater. For fire sprinklers 2 feet (0.6 meters) from a wall and 13 feet (4 meters) to the next fire sprinkler, with 10 feet (3 meters) spacing of branch lines, the assigned area of coverage is 130 square feet (12 square meters). However, the actual area of floor covered is only 85 square feet (8 square meters). The larger area is conservatively applied to determine the amount of water that must be discharged from the fire sprinkler, and the smaller floor area is used to determine the size of the remote area.

Finding that the actual size of a remote area based on the counted number of fire sprinklers is too small is not unusual. The floor area should always be measured when determining whether the size of the remote area is acceptable, keeping in mind that the boundaries can't be more than half the distance to the next fire sprinkler or branch line. You should use the sprinkler count as a cross-check since you must have at least that number of sprinklers in the remote area.

A third issue in determining remote area is the impact of small enclosures, such as closets and washrooms, that require only one fire sprinkler. According to Section 8.4.4.4, Exception No. 1, of NFPA 13, the discharge from these fire sprinklers needn't be included in the flow for the remote area because such enclosures generally have light fuel loads. The area of these enclosures is included in determining the overall size of the remote area.

There may be a restriction on applying this exception, which states, "Where the area of application is equal to or greater than the minimum allowed area of Figure 7-2.3.1.2." Because the figure has a minimum remote area of 1,500 square feet (139 square meters), it's unclear whether the exception applies when using quick response fire sprinklers reduces the remote area. A literal application of NFPA 13 wouldn't allow the area reduction, but until explicitly defined, it's a decision for the AHJ.

NFPA 13 doesn't explicitly address the fourth issue, the impact of walls on the remote area. It only comments upon walls in portions of a building with a different design basis and upon the room design method, which defines the remote area as the largest, most remote room based upon the separation of the room by walls with a specified fire rating. Fortunately, the intent of NFPA 13 can be determined from related criteria.

When the design basis is different, a wall is a boundary, according to Sections 7.1.2, 7.3.1.2.4, and 7.4.1.5.5 of NFPA 13. The wall needn't be fire rated, just able to stop heat.

How you treat walls when the design basis is the same, though, depends on whether you're designing a new system or modifying an existing system. In designing new systems, you can ignore walls in the portion of the building with the same design basis and select the remote area simply based on the most demanding adjacent fire sprinklers. For existing systems, however, you must treat walls as boundaries. The ease of placement is no longer the driving factor, and you should consider the impact walls will have on a fire's heat flow. Is it possible to create a more demanding remote area by ignoring walls? Certainly. Since this is another gray issue, however, the AHJ must again define what he or she will allow.

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Specific requirements in the remote area

Once you're assured the general requirements of the remote area are acceptable, you can start looking at specifics in the remote area. A good starting point is to verify that the fire sprinkler's area of coverage (As) is acceptable.

This is a bit more complicated when the ceiling isn't horizontal because there are technically two different areas of coverage. One As is applied to the maximum sprinkler spacing to account for timely activation. The spacing As is measured along the slope, as shown in Figure 5.6.4.1.3 of NFPA 13. The second As is for discharge and uses the horizontal distance between fire sprinklers, as shown in Section 8.4.3.1 of NFPA 13. This creates a smaller covered floor area, which is used to determine the amount of water the fire sprinkler must discharge for the applicable density, as well as the size of the remote area.

For example, the 130-square-foot (12-square-meter) area of coverage for a ceiling with a 3-in-12 slope—that is, sprinklers 13 feet (4 meters) apart and branch lines spaced at 10 feet (3 meters)—drops to 126 square feet (11 square meters) of floor area. The steeper the slope, the greater the reduction. A 4-in-12-slope presents 123 square feet (11 square meters) of floor area. Ceiling slope also affects the actual size of the remote area.

A second issue is the effect nonsymmetrical layouts have on the remote area. NFPA 13 doesn't require or dictate certain sprinkler layouts. Its only requirements for sprinkler locations are the maximum square footage allowed per fire sprinkler and its location in relation to obstructions. As long as the spacing does not exceed the maximums given in Table 5.6.2.2(a), the designer can use whatever layout he or she wants.

When using specific-application sprinklers, such as those for extended coverage, the minimum and maximum spacings are established by the sprinklers' listing. The manufacturer's cut sheet will provide this information, and it must be followed. As long as the layout doesn't exceed these values, however, the designer can space as he or she wishes.

Asymmetrical areas

A remote area that isn't symmetrically laid out makes the submittal review a little more difficult, in part because the last fire sprinkler on the branch line may not be the most hydraulically demanding. In such cases, the sprinkler with the largest area of coverage may be the most demanding.

In addition, the minimum amount of water that must be discharged from each fire sprinkler, defined as the area of coverage for each individual fire sprinkler times the assigned density, will vary across the remote area.

This is easy to check, but you'll need to determine the minimum discharge required from each fire sprinkler and verify that each demand is met. This will also ensure that the most demanding sprinkler will be satisfied, wherever it's located.

Finally, it's perfectly acceptable to have different orifice sizes in the design area if there's a good reason for it. Technically, Section 8.4.4.6 of NFPA 13 says that only one specified reason for making a change is acceptable: to balance the sprinkler system. This may occur when friction loss and elevation differences result in an increase in pressure between the starting sprinkler and up-stream sprinklers that is large enough to allow the required density to be delivered using a smaller orifice.

For example, a required flow of 21 gpm (79 liters), or 106 square feet (9.8 square meters) at 0.20 gpm/square feet (1.2 liters/square meters), requires a starting pressure of 7 psi (0.482 bars) with a K-factor of 8.0. With friction loss and elevation changes, the pressure at the next branch line or even outside the remote area increases, eventually reaching 14 psi (0.96 bars). At this pressure, a K-factor of 5.6 will produce the required flow of 21 gpm (74 liters).

Although this will satisfy the required density, it is not acceptable, primarily because such changes negate the reason that pressure velocity can be ignored and total pressure used to calculate fire sprinkler discharge.

There's also some concern that an orifice of the wrong size could be installed if the fire sprinkler were replaced. Of course, this concern also applies to the allowed orifice changes.

Fortunately, the potential for installing the wrong fire sprinkler is lower in newer installations because of the unique sprinkler identification numbers that NFPA 13 now requires.

The system can also be balanced by installing an orifice plate in an upstream branch line or cross main. An orifice plate is a metal plate with a hole in it that causes a loss of pressure, which, in turn, reduces the flow from the fire sprinklers downstream of the orifice plate. This isn't allowed because, although the system can still produce the required flow, the orifice can too easily be blocked or obstructed.

Two exceptions in Section 8.4.6 of NFPA 13 give examples of situations in which different orifice sizes may be acceptable in the same remote area. For instance, extended coverage or sidewall fire sprinklers in part of a room and a smaller-orifice pendent sprinkler in another part are acceptable, in part because these sprinklers are easily recognized as being different, thus reducing the likelihood of improper replacement. Different orifice sizes in a main room and adjoining small room, such as a closet, are also acceptable since solid barriers separate them, even though such a separation does nothing to offset improper replacement.

This allowance isn't limited to areas separated by barriers, either. According to NFPA 13's appendix, different orifices can be used in areas such as a foyer and an adjacent room because the foyer has a smaller floor area and less water is needed to satisfy the density to protect the smaller floor area.

These issues are just part of the hydraulic picture, but addressing them correctly should help to ensure that hydraulic calculations are based on a solid foundation.

STEVEN SCANDALIATO is a member of the technical committees on Installation of Sprinkler Systems and Water Spray Fixed Systems.

New Translation

NFPA REACHED AN agreement to translate one of its most important standards into French, opening the door to make NFPA codes and standards more widely available in Europe.

The licensing agreement allows the Centre National de Prevention et de Protection (CNPP), an insurance-industry organization that promulgates safety codes and standards throughout France, to translate NFPA 13, *Installation of Sprinkler Systems*. CNPP will then sell the document to businesses and government agencies that wish to use it outside the United States.

Although NFPA standards have been translated and used around the world, this agreement is considered a major breakthrough because it involves an exclusive arrangement with an influential association in Europe.

"We are pleased to have this agreement with France," said Arthur E. Cote, NFPA's executive vice-president and chief engineer. "It opens the door for NFPA standards to be used to complement European standards. Now other organizations in Europe may start looking to NFPA as a source of fire safety codes and standards."

NFPA and CNPP expect to reach agreements on translating NFPA 20, *Installation of Stationary Pumps for Fire Protection*; NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*; and NFPA 30, *Flammable and Combustible Liquids Code*™.

2002 Firefighter Injuries

by MICHAEL J. KARTER, JR. and JOSEPH L. MOLIS

FIREFIGHTERS WORK IN VARIED AND COMPLEX ENVIRONMENTS that increase their risk of on-the-job death and injury. A better understanding of how these fatal accidents, non-fatal injuries, and illnesses occur can help identify corrective actions, which could help minimize the inherent risks.

Each year, NFPA studies firefighter deaths and injuries to provide national statistics on their frequency, extent, and characteristics. Earlier this year, NFPA reported that 97 firefighters died on duty (see "2002 Firefighter Fatalities," *NFPA Journal*, July/August 2003).

This report addresses 2002 firefighter injuries in the United States. The results are based on data collected during the NFPA Survey of Fire Departments for U.S. Fire Experience (2002). An earlier report measured the national fire experience in terms of the number of fires that fire departments attended and the resulting civilian deaths, civilian injuries, and property losses that occurred.[1] >>

The full report is available on the Web at www.nfpa.org/Research/.

Firefighters were injured battling this blaze in Massachusetts in 2002.

PHOTOGRAPHS: SPRINGFIELD, MASSACHUSETTS, FIRE DEPARTMENT

This year's report includes among its results:

- Estimates of the total number of 2002 firefighter injuries;
- Estimates of the number of injuries by type of duty;
- Estimates of the number of exposures to infectious diseases;
- Trends in firefighter injuries and injury rates;
- Fireground injuries by cause;
- Fire department vehicle accidents and resulting firefighter injuries;
- Average number of fires and fireground injuries per department by population of community protected; and
- Descriptions of selected incidents that illustrate firefighter safety problems.

Table 1 - Firefighter Injuries at the Fireground and at Nonfire Emergencies, 1988–2002

Year	Injuries at the fireground	Injuries per 1,000 Fires at the fireground	Injuries at nonfire emergencies	Injuries per 1,000 Incidents at nonfire emergencies
1988	61,790	25.4	12,325	1.13
1989	58,250	27.5	12,580	1.11
1990	57,100	28.3	14,200	1.28
1991	55,830	27.3	15,065	1.20
1992	52,290	26.6	18,140	1.43
1993	52,885	27.1	16,675	1.25
1994	52,875	25.7	11,810	0.84
1995	50,640	25.8	13,500	0.94
1996	45,725	23.1	12,630	0.81
1997	40,920	22.8	14,880	0.92
1998	43,080	24.5	13,960	0.82
1999	45,500	25.0	13,565	0.76
2000	43,065	25.2	13,660	0.73
2001	41,395	23.9	14,140	0.73
2002	37,860	22.4	15,095	0.77

Source: NFPA Annual Survey of Fire Departments for U.S. Fire Experience (1988–2002)

Overall results

Based on survey data reported by fire departments, NFPA estimates that 80,800 firefighter injuries occurred in the line of duty in 2002.[2] This is a decrease of 1.8 percent and the lowest number since 1977, when NFPA started using its current survey methodology. However, the lower number of injuries in recent years is due, in part, to additional questions on exposures, which allow them to be placed in their own categories (see Figure 1). Previously, some of these exposures may have been included in total injuries.

NFPA estimates that there were 13,700 exposures to infectious diseases such as hepatitis, meningitis, and HIV in 2002. This amounts to 0.9 exposures per 1,000 emergency medical runs by fire departments in 2002.

NFPA estimates that there were 22,400 exposures to hazardous conditions such as asbestos, radioactive materials, chemicals, and fumes in 2002. This amounts to 23.2 exposures per 1,000 hazardous condition runs in 2002.

NFPA estimates 14,600 firefighter injuries resulted in lost time in 2002.

Injuries by type of duty

Estimates of firefighter injuries by type of duty are displayed in Figure 2. As in past reports, type of duty is divided into five categories:

- Responding to or returning from an incident, including fire and nonfire emergencies;
- Fireground, including structure fires, vehicle fires, and brush fires. This refers to all activities from the moment of arrival at the scene to departure time, such as setup, extinguishment, and overhaul;
- Nonfire emergencies, including rescue calls; hazardous calls, such as spills; and natural disaster calls;
- Training; and
- Other on-duty activities, such as inspection or maintenance duties.

Results by type of duty indicate that many of the injuries occur during fireground operations: 37,860 or 46.9 percent of all firefighter injuries in 2002. Table 1 displays firefighter injuries at the fireground and injury rates for the 1988–2002 period. Before 1988, firefighter injuries were around 100,000 per year, with no trend up or down, since NFPA's first calculation of estimates in 1977. Injuries at the fireground decreased from their high of 61,790 in 1988 to a low of 37,860 in 2002, for a decrease of 38.7 percent. The rate of injuries per 1,000 fires didn't show a consistent pattern and stayed around the same level, except for 1996–1997 and 2001–2002. This is because the number of fire incidents also decreased a considerable 30.7 percent for the period.

In addition to injuries at the fireground, an estimated 14,040 or 17.3 percent occurred during other on-duty activities, while 15,095 or 18.7 percent occurred at nonfire emergencies.

Nature of fireground injuries

Estimates of 2002 firefighter injuries by nature of injury and type of duty are displayed in Table 2. The nature of injury cause categories are based with modifications on NFPA 901, *Uniform Coding for Fire Protection.* Table 2 indicates that the four major types of injuries that occur during fireground operations are strain, sprain (41.6 percent); wounds, cuts, bleeding, bruises (21.7 percent); burns (8.5 percent); thermal stress (6.4 percent); smoke or gas inhalation (5.9 percent).

Results were fairly consistent during all non-fireground activities, with strains, sprains, and muscular pain accounting for 55.1 percent of all non-fireground injuries, and wounds, cuts, bleeding, and bruises accounting for 18.6 percent.

Causes of fireground injuries

Because fireground injuries are of particular concern, their causes were examined (see Figure 3). The definition of "cause" here refers to the initial

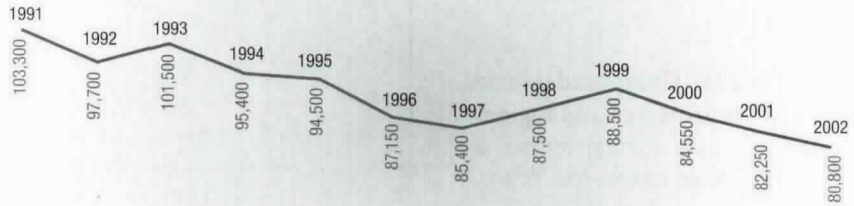
Table 2 - Firefighter Injuries by Nature of Injury and Type of Duty, 2002

	Responding to or Returning from an Incident		Fireground		Nonfire Emergency		Training		Other On-Duty		Total	
Nature of Injury	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Burns (Fire or Chemical)	145	2.5	3,205	8.5	175	1.2	300	4.0	30	0.2	3,855	4.8
Smoke or Gas Inhalation	95	1.6	2,245	5.9	110	0.7	60	0.8	65	0.5	2,575	3.2
Other Respiratory Distress	175	3.0	545	1.4	400	2.7	80	1.0	160	1.1	1,360	1.7
Burns and Smoke Inhalation	65	1.1	975	2.6	40	0.3	40	0.5	45	0.3	1,165	1.4
Wound, Cut, Bleeding Bruise	1,375	23.7	8,215	21.7	2,545	16.9	1,325	17.4	2,760	19.1	16,220	20.1
Dislocation, Fracture	190	3.3	985	2.6	315	2.1	305	4.0	545	3.8	2,340	2.9
Heart Attack or Stroke	120	2.1	345	0.9	165	1.1	50	0.7	340	2.4	1,020	1.3
Strain, Sprain, Muscular Pain	2,885	49.7	15,735	41.6	8,545	56.7	4,480	59.0	7,745	53.6	39,390	48.8
Thermal Stress (frostbite, heat exhaustion)	175	3.0	2,415	6.4	105	0.7	375	4.9	155	1.1	3,225	4.0
Other	580	10.0	3,195	8.4	2,695	17.9	585	7.7	2,595	18.0	9,650	11.9
	5,805		37,860		15,095		7,600		14,440		80,800	

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (2002). Note: If a firefighter sustained multiple injuries for the same incident, only the nature of the single most serious injury was tabulated.

The cause categories included on the survey were also based on NFPA 901. Overexertion and strain (32 percent), and falls, slips, and jumps (25.9 percent) were the leading causes of fireground injuries. Other major causes were contact with an object (11.9 percent) and exposure to fire products (11.4 percent).

Figure 1 - Total Firefighter Injuries by Year (1991-2002)



Source: NFPA Annual Survey of Fire Departments for U.S. Fire Experience (1991-2002)

Fire department vehicle collisions

Twenty-two firefighters died in motor vehicle collisions in 2002.

In 2002, there were an estimated 15,550 collisions involving fire department emergency vehicles while departments were responding to, or returning from, incidents (see Table 3). To put this number in perspective, however, fire departments responded to more than 21.3 million incidents in 2002, so the number of collisions represents about one-tenth of 1 percent of total responses. However, these collisions resulted in 1,040 firefighter injuries, or 1.3 percent of all firefighter injuries.

In addition, 1,030 collisions involving firefighters' personal vehicles occurred in 2002 while departments were responding to, or returning from, incidents. These collisions resulted in an estimated 210 injuries.

Average fires and fireground injuries per department by population protected

The average number of fires and fireground injuries per department by population of community protected in 2002 are displayed in Table 4. These tabulations show that the number of fires a fire department responds to is directly related to the population protected and that the number of fireground injuries incurred by a department is directly related to its exposure to fire–that is, the number of fires attended by the department.

The second point is clearly demonstrated when we examine the range of the statistic: from a high of 75.7 for departments that protect communities of 500,000 to 999,999 to a low of 0.2 for departments that protect communities of fewer than 2,500.

A useful way to look at firefighter injury experience and to obtain a reading on the relative risk that departments face is to examine the number of fireground injuries that occur for every 100 fires attended. This takes into account relative fire experience and allows more direct comparison between departments protecting communities of different sizes. The number of fireground injuries per 100 fires is displayed in Column 4 of Table 4.

The overall range of rates varied little from a high of 2.6 for departments that protect communities of 250,000 to 999,999 to a low of 1.5 for departments that protect communities of less than 25,000 population. Thus, the wide range noted in average fireground injuries by population protected narrows when relative fire experience is taken into account.

The overall injury rate for departments protecting communities of 50,000 population or more was 2.2 injuries per 100 fires, or 38 percent higher than the injury rate for departments protecting communities of less than 50,000 population.

The risk of fireground injury per 100 firefighters by size of community protected was also calculated and is displayed in Column 5 of Table 4. Larger departments generally had the highest rates, with departments protecting communities of 250,000 to 499,999 having the highest rate with 7.8 injuries

TABLES: CHRISTOHER McCUSKER

having the highest rate with 7.8 injuries per 100 firefighters. As community size decreases, the rate drops quite steadily to a low of 1.1 for departments protecting fewer than 2,500 people. That's a seven-to-one difference in risk of injury between communities of 250,000 to 499,999 and the smallest communities of fewer than 2,500.

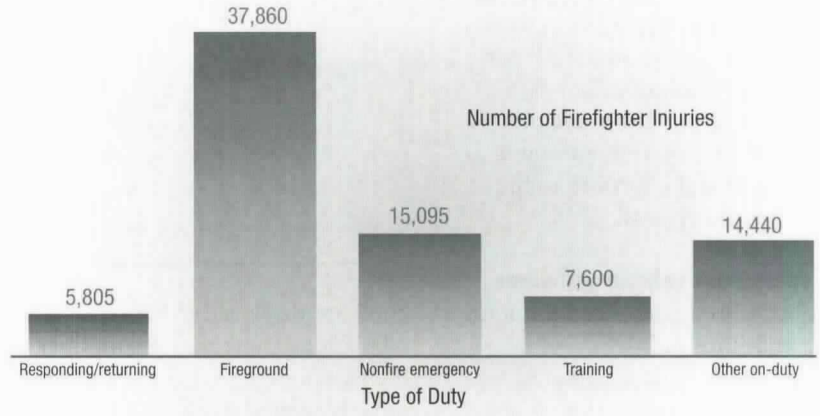
An explanation for this difference is that, although a department protecting a community with a population of 250,000 to 499,999 has, on average, more than 25 times as many firefighters as a department protecting a population of less than 2,500, the larger department attends more than 110 times as many fires. As a result, it incurs considerably more fireground injuries.

Table 3 - Fire Department Vehicle Collisions and Resulting Firefighter Injuries While Responding to, or Returning from, Incidents, 1990-2002

Year	Collisions Involving Fire Department Emergency Vehicles	Firefighter Injuries Involving Fire Department Emergency Vehicles	Collisions Involving Firefighters' Own Vehicles	Firefighter Injuries Involving Firefighters' Own Vehicles
1990	11,325	1,300	950	175
1991	12,125	1,075	1,375	125
1992	11,500	1,050	1,575	150
1993	12,250	900	1,675	200
1994	13,755	1,035	1,610	285
1995	14,670	950	1,690	190
1996	14,200	910	1,400	240
1997	14,950	1,350	1,300	180
1998	14,650	1,050	1,350	315
1999	15,450	875	1,080	90
2000	15,300	990	1,160	170
2001	14,900	960	1,325	140
2002	15,550	1,040	1,030	210

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (1990–2002)

Figure 2 - Firefighter Injuries by Type of Duty, 2002



Source: NFPA Annual Survey of Fire Departments for U.S. Fire Experience (2002).

Average fires and fireground injuries by population protected and region

Table 5 displays the average number of fires and fireground injuries per department by population of community protected and region of the country.[3] As in the nationwide results in Table 4, the results of each region of the country indicate that the number of fires a fire department responds to is directly related to the population protected, and the number of fireground injuries incurred by a department is directly related to the number of fires attended. The Northeast reported a substantially higher number of fireground injuries for most community sizes where all departments reported sufficient data by region.

Improving firefighter safety

As the statistics in this report and previous reports attest, firefighting presents great risks of personal injury to firefighters. Moreover, because of the kind of work performed and the hazards of the incident scene environment, it's unlikely that all firefighter injuries can be eliminated. A risk management system and the application of existing technology, however, can reduce present injury levels and bring about corresponding reductions in lost time and medical costs. The following are some examples of proactive actions taken at the local level that can reduce injury rates:

- Commitment by top fire service management to reduce injuries;
- Establishment of a safety committee headed by a safety officer to recommend a safety policy and the means of implementing it. The policy should include a thorough investigation of all time-loss injuries;
- Provision of appropriate protective equipment and a mandate to use it;
- Development and enforcement of a program on the use and maintenance of SCBA;
- Development and enforcement of policies on safe practices for drivers and passengers of fire apparatus;
- Development of procedures to ensure response of sufficient personnel for both firefighting and overhaul duties;
- Implementation of regular medical examinations and a physical fitness program;
- Adoption and implementation of an incident management system;
- Training and education for all members related to emergency operations;
- Implementation of programs for the installation of private fire protection systems, so that fires are discovered at an earlier stage, exposing the firefighter to a less hostile environment; and
- Increased efforts in the area of fire-safety education programs, so that citizens are made aware of measures to prevent fires and of correct reactions to the fire situation.

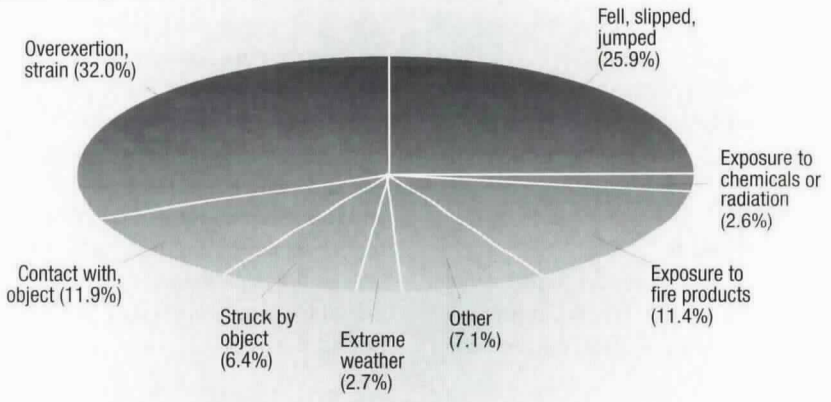
Efforts need to be made to recognize that firefighter injuries can be reduced. By addressing the priorities

Table 4 - Average Number of Fires, Fireground Injuries, and Injury Rates by Population of Community Protected, 2002

Population of Community Protected	*Average Number of Fires*	*Average Number of Fireground Injuries*	*Number of Fireground Injuries per 100 Fires*	*Number of Fireground Injuries per 100 Firefighters*
500,000 to 999,999	3,170.2	75.7	2.4	7.0
250,000 to 499,999	1,500.0	38.9	2.6	7.8
100,000 to 249,999	715.8	14.9	2.1	6.7
50,000 to 99,999	311.0	6.6	2.1	6.0
25,000 to 49,999	157.2	2.7	1.7	4.1
10,000 to 24,999	79.7	1.2	1.5	3.1
5,000 to 9,999	46.9	0.7	1.5	2.1
2,500 to 4,999	27.0	0.4	1.5	1.3
Under 2,500	13.5	0.2	1.5	1.1

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (2002)

Figure 3 - Fireground Inuries by Cause, 2002



Source: NFPA Annual Survey of Fire Departments for U.S. Fire Experience (2002)

listed above, fire service organizations can make significant strides towards reducing the number and impact of such injuries.

Every fire service organization needs to make a commitment to reduce firefighter injuries. Practically all of the priorities listed above are components of NFPA 1500, *Fire Department Occupational Safety and Health Program*, which provides a framework for a safety and health program. It is a good place to begin when developing programs for the reduction of firefighter injuries.

Definition of terms

Fire: Any instance of uncontrolled burning. Excludes combustion explosions and fires out on arrival, whether authorized or not; overpressure rupture without combustion; mutual-aid responses; smoke scares; and hazardous materials responses, such as flammable gas, liquid, or chemical spills without fire.

Incident: The movement of a piece of fire service apparatus or equipment in response to an alarm.

Injury: Physical damage suffered by a person that requires or should require treatment by a practitioner of medicine such as a physician, nurse, paramedic, or EMT within one year of the incident, regardless of whether treatment was actually received, or that results in at least one day of restricted activity immediately following the incident.

Description of NFPA survey and data collection method

NFPA annually surveys a sample of departments in the United States to make national projections of the fire problem. The sample is stratified by the size of the community protected by the fire department. All U.S. fire departments that protect communities of 100,000 or more are included in the sample because they constitute a small number of departments with a large share of the total population protected. For departments that protect less than 100,000 population, stratifying the sample by community size permits greater precision in the estimates. Survey returns in recent years have ranged from 2,700 to 3,500 departments annually. The national projections are made by weighting sample results according to the proportion of total U.S. population accounted for by communities of each size.

The results in this report are based on injuries that occurred during incidents attended by public fire departments. No adjustments were made for injuries that occurred during fires attended solely by private fire brigades, such as those at industrial or military installations.

A form that was sent to departments requesting information enhanced data collection for the selected incident summaries. The form included questions on type of protective equipment worn, age and rank of firefighters injured, and description of circumstances that led to injury.

Endnotes

1. Michael J. Karter, Jr., "2002 Fire Loss in the United States," *NFPA Journal*, Vol. 97, No. 5 (September/October 2003), p. 59.

2. Around any estimate based on a sample survey, there is a confidence interval that measures the statistical certainty or uncertainty of the estimate. Based on data reported by fire departments responding to NFPA Survey for U.S. Fire Experience (2002), NFPA is very confident that the actual number of firefighter injuries falls within the range of 71,800 to 89,800.

3. The four regions as defined by the U.S. Census Bureau include the following 50 states and the District of Columbia:

Northeast: Connecticut, Maine,

Table 5 - Average Number of Fires and Fireground Injuries per Department and Injuries per 100 Fires, by Population of Community Protected and Region, 2002

Column 1: Average Reported Number of Fires *Column 2: Average Reported Number of Fireground Injuries* *Column 3: Number of Fireground Injuries per 100 Fires*

Population of Community Protected	Northeast			North Central			South			West		
	1	2	3	1	2	3	1	2	3	1	2	3
500,000 to 999,999	*	*	*	*	*	*	3,568.6	69.7	2.0	2,685.5	60.0	2.2
250,000 to 499,999	*	*	*	1,994.3	29.3	1.5	1,418.9	20.8	1.5	1,327.1	33.1	2.5
100,000 to 249,999	851.0	27.9	3.3	745.0	17.4	2.3	876.7	14.0	1.6	446.2	9.0	2.0
50,000 to 99,999	362.8	17.8	4.9	247.0	6.1	2.5	356.7	4.8	1.4	315.0	3.8	1.2
25,999 to 49,999	146.2	4.8	3.3	134.4	3.0	2.2	177.4	1.1	0.6	204.0	2.0	1.0
10,000 to 24,999	73.4	1.5	2.0	68.1	1.0	1.5	99.9	1.2	1.2	92.6	1.4	1.5
5,000 to 9,999	40.9	0.9	2.2	38.9	0.6	1.5	60.1	0.8	1.3	53.1	0.6	1.1
2,500 to 4,999	22.7	0.4	1.8	24.0	0.2	0.8	34.8	0.3	0.9	31.6	0.3	1.0
Under 2,500	11.2	0.3	2.7	12.7	0.2	1.6	17.8	0.2	1.1	12.2	0.2	1.6
Overall Regional Rate			4.2			2.0			1.5			1.7

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (2002) *Insufficient data

Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

North Central: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

Acknowledgments

NFPA thanks the many fire departments that responded to the NFPA Survey for U.S. Fire Experience (2002) for their continuing efforts in providing in a timely manner the data so necessary to make national projections of firefighter injuries.

The authors thank the many NFPA staff members who worked on this year's survey, including Frank Deely, John Baldi, and John Conlon for editing and keying the survey forms and making follow-up calls to fire departments, and Norma Candeloro for processing survey forms and keying this report.

2002 FIREFIGHTER INJURIES NARRATIVES

Fire Suppression

A FIREFIGHTER, 32, received severe thermal burns after being trapped on the second floor at a fire involving an occupied structure.

An unattended portable heater ignited a nearby pile of clothes in a bedroom of a three-story, wood-frame dwelling. The fire quickly extended to the adjacent dining room and pantry on the first story. Upon arrival, crews entered the front door and advanced a handline to begin extinguishment. Four firefighters from the rescue company were responsible for searching the two stories above the fire for trapped occupants.

The rescue crews were divided into two teams. Two firefighters were assigned to the third story, while the victim and another firefighter searched the second story. Several minutes into the search, the fire intensified in the rear stairwell and rapidly extended throughout the structure, trapping those searching the upper stories.

The firefighters on the third story escaped unscathed through the front windows onto a porch roof and were lowered to safety by a tower ladder. One firefighter on the second story closed a bedroom door behind him, shielding himself from the flames, and avoided injury. The victim crawled to a window as the flames enveloped him. He jumped from the window, landing in the front yard where he was immediately assisted by fellow firefighters.

All members wore a full protective ensemble. The outer shell of the victim's coat and pants deteriorated, but the inner linings remained intact, limiting the firefighter's injuries.

The firefighter was hospitalized for more than three weeks with second- and third-degree burns to his arms, shoulders, hands, and legs. He returned to his normal assignment after six months of rehabilitation.

Nonfire Incident

AN ASSISTANT FIRE chief with 24 years' experience lost his lower right leg after a vehicle operated by an intoxicated driver struck him. The assistant chief was at the rear of his personal vehicle taking off his protective clothing after operating at an overturned truck on an interstate highway when a car slammed through a state police roadblock and warning flares, striking him and his vehicle.

The assistant chief spent six

2002 FIREFIGHTER INJURIES NARRATIVES

months in physical therapy and returned to full duty wearing a prosthetic limb and continues his career as a district chief. The driver pled guilty to the charges against him and was sentenced to 354 days in jail.

Nonfire Incident

A LIGHTNING STRIKE injured a firefighter, 30, while he was assisting a crash victim during a storm. The firefighter helped the driver out of the vehicle and had his left hand on a guardrail when lightning struck near the crash scene. The firefighter received a severe shock and immediately slumped over and fell against the front right tire of the vehicle. Nobody else was injured.

He complained of pain in his left shoulder and numbness throughout his left arm. He suffered from seizures and dizziness, and spent a week in the hospital. He returned to full duty after 99 days of recovery.

Fire Suppression

THREE FIREFIGHTERS WERE injured while battling a fire in a storage area of a convenience store. The fire quickly spread to a vacant apartment on the second story of the two-story building of unprotected ordinary construction.

Two firefighters received steam burns while advancing a handline into the first story. A lieutenant, 40, fractured his pelvis and five ribs, punctured a lung, and suffered multiple thermal burns while searching for trapped occupants.

Conditions had deteriorated rapidly, blocking the stairwell, and forcing the officer to find an alternate exit out of the building. He found a window, which he believed led onto a porch roof. He stepped out of the window and fell, landing on the pavement below.

The officer was wearing a complete protective ensemble and returned to light duty 20 weeks after the incident as an instructor for the department's recruit class. Three months later, he returned to his normal assignment.

Responding or Returning

WHILE RESPONDING TO a wildland fire, three seasonal firefighters suffered severe injuries after their 2001 pumper rolled down a steep embankment. The driver fractured his pelvis and right femur, received multiple lacerations, abrasions, and contusions, and was hospitalized for a month. He returned to fire duty as a seasonal firefighter 11 months after the accident. The passenger in the front seat was hospitalized for two weeks suffering from multiple fractured thoracic vertebrae, a fractured left clavicle, and contusions. He hasn't been cleared for full duty and isn't employed by the fire agency this fire season. It's anticipated he'll return to full duty, and he intends to apply for seasonal work next fire season. The third firefighter was hospitalized for a week with multiple fractures, lacerations, contusions, and abrasions. He returned as a seasonal firefighter for the 2003 fire season.

All members were wearing seatbelts, wildland protective clothing, boots, and helmets. The cause of the crash was a mechanical failure that forced the apparatus into a clockwise spin. The front drive/steering axle-end yoke retaining straps or bolts uncoupled, causing the shaft to strike the road and the driver to lose control. The driver was unable to recover, and the apparatus left the road and rolled down an embankment.

Wildland Fire Suppression

THREE MEMBERS OF an engine company were overrun by a wildland fire while performing firing operations in support of structure protection in advance of the fire. The crew was operating on a 12-foot-wide (3.6-meter-wide) dirt road that had 5- to 10-foot (1.5- to 3-meter) heavy mixed chaparral on both sides.

During the firing operations, burning conditions accelerated and the fire flared in their direction. The firefighter in front of the apparatus was forced to deploy his fire shelter. The second firefighter and the captain attempted to rescue him but retreated to the apparatus. The captain sought refuge in the driving compartment while the second firefighter retreated to the passenger compartment of the apparatus and protected himself by deploying a fire blanket.

The captain suffered burns to his hands and a sore throat. He missed a day of work. The firefighter in the road suffered minor facial and inhalation burns, with second-degree burns to his back and right arm after his shelter delaminated. The firefighter in the passenger compartment suffered smoke inhalation with 4 percent total-body surface burns on his face, back, and finger. Both firefighters were out of work for three days.

The department credits the fire shelters and protective shrouds for saving the lives and minimizing injuries. The damage to the apparatus is estimated at $18,000. Other members of the strike team rescued the injured men and transported them to the local burn unit.

Fire Suppression

A 12-YEAR VETERAN firefighter/paramedic suffered fractured ribs, a broken collarbone, two broken vertebrae, a collapsed lung, torn shoulder cartilage, and a torn biceps tendon after being struck by an aerial master stream device. The 36-year-old remained hospitalized for 9 days and on injury leave for 135 days before returning to full duty.

He was conducting ventilation operations with several other firefighters on the roof of a commercial occupancy of unprotected ordinary construction. Incident command revised the strategy to defensive operations, and master streams were used to extinguish the fire. All members operating on the roof of the structure retreated to an adjacent portion of the roof behind a four-hour-rated firewall. While they were on the roof, a mutual-aid ladder company began operating its master stream within 15 feet (4.5 meters) of the crew. Smoke or water spray momentarily obscured the nozzle operator's vision so he couldn't see the ventilation crew's hand signals. The stream moved down and horizontally, striking the firefighter and pushing him into a parapet wall.

NFPA estimates that 80,800 firefighter injuries occurred in the line of duty in 2002.

Responding or Returning

A FIREFIGHTER FRACTURED his skull, tore his rotator cuff, and suffered from post-concussion syndrome after falling from his fire apparatus while responding to a gas leak. The victim was switching seats to don his self-contained breathing apparatus when his door suddenly opened. Instinctively, he reached to close the door as the apparatus rounded a corner at approximately 15 miles (24 kilometers) per hour.

The victim was thrown from the crew cab, where he clung to the door handle and eventually fell to the pavement, striking the roadway feet first and rolling over several times. Another engine following the victim's apparatus stopped to perform medical aid and prepare him for transportation to a hospital.

A department investigation into the incident found no mechanical deficiencies or problems with the door. The cause of the incident was unintentional activation of the door handle when the firefighter changed his position. The victim was wearing a protective coat and trousers, boots, and protective hood. He wasn't wearing a helmet at the time of injury. He was hospitalized for three days and returned to office duty three months later. The firefighter returned to his normal assignment eight months after his injury.

Fire Suppression

A FIREFIGHTER, 32, was injured while operating a hoseline at a fire in a one-story, unprotected, wood-frame dwelling. The firefighter was on a 14-foot (4.2-meter) ground ladder and was approximately 10 feet (3 meters) off the ground when the nozzle reaction of the handline pushed him to the left and backwards off the ladder. He struck the top of an open door, which inverted his body, causing him to fall face first to the pavement below. He was wearing a complete protective ensemble but fractured a collarbone, arm, and knee, and cut his head. The department credits the protective helmet with limiting his head injury to a laceration. The firefighter was hospitalized for four days and returned to his normal assignment.

Fire suppression

A CHIEF OFFICER, 55, collapsed from cardiac arrest while performing duties as an incident commander at a structure fire. The chief was speaking with an apparatus operator when he fell unconscious in cardiac arrest. On scene, medical personnel successfully resuscitated the 31-year veteran. He was hospitalized for five days and released. The chief has retired from the fire service.

Keep the wet stuff on the red stuff

Water can be volatile

Water is a great tool for fighting fires, but you don't want to absorb it in your bunker gear. Water can add lots of weight to your clothing and increase your metabolic stress. Because water absorbs and stores heat, it can compromise the effectiveness of your thermal barrier.

Initial cooling effect can turn on you

Wet turnouts initially can have a cooling effect because they take longer to heat than dry gear, but the time, temperature, and amount of water in your bunker gear are unpredictable. While moisture is evaporating on the outside of your protective envelope, it can continue to collect and heat in your thermal liner. This creates an unbalanced environment where the water in your thermal barrier can heat to dangerous levels without warning.

Many scald burns come from wearing wet gear in hot places

Often, contact and compression burns are made worse by water compromising your protection. "Wet vs. Dry" TPP tests on turnout gear have indicated that your gear will lose about 1/3 of its protective performance if the liner is wetted with only two grams of water while the shell is dry.

isodri® Protective Systems fight the dangers of wet gear

isodri helps guard against the dangers of wet gear. Each and every layer of isodri is engineered to shed water, keep the protective envelope balanced, and, therefore, reduce the heat storage capacity of your turnouts.

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2002 LARGE-LOSS FIRES

Firefighters respond to a large-loss fire in Nebraska in 2002.

PHOTOGRAPH: GRAND ISLAND, NEBRASKA, FIRE DEPARTMENT

by STEPHEN G. BADGER, NFPA FIRE DATA ASSISTANT

EACH YEAR, NFPA REPORTS on large fire and explosion losses in the United States, defined as events that resulted in property damage of at least $5.0 million. In 2002, fire departments in the United States responded to 1,687,500 fires. These fires caused an estimated loss of $10.3 billion.[1] Many were small with little or no property damage reported; however, 46 resulted in losses of $5.0 million or more each.[2] Together, these large-loss fires resulted in $699.3 million in direct property loss, killed 5 civilians, and injured 38 civilians and 78 firefighters. Despite the fact that these fires accounted for only 0.003 percent of all the fires estimated to have occurred in the United States last year, they accounted for 6.8 percent of the total estimated dollar loss.

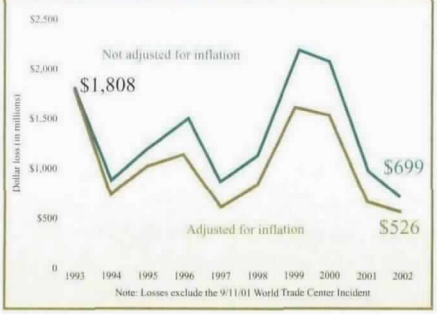
As large as the direct property loss was for such fires in 2002, total property loss for large-loss fires was actually $279.0 million, or 28.5 percent, lower than in 2001 (excluding the property losses at the World Trade Center on September 11, 2001). Before inflation adjustments, the number of large-loss fires in 2002 was the second lowest total in the 10 years since 1993, with the total loss in these fires being the lowest in that period and 48.6 percent below the 10-year average unadjusted loss total (see Table 1 and Figure 2).[3]

When adjusted for inflation to 1993 dollars, the number of fires that occurred in 2002 that could be categorized as large-loss (i.e., loss of $5.0 million in 1993 dollars) drops to 37, with a total loss of $526.0 million. This is the third lowest number of fires since 1993. The adjusted loss is the lowest over the 10-year period and is 55 percent lower than the 10-year average adjusted loss total.

By most measures, the "normal" large-loss fire and explosion problem decreased from 2001 to 2002, but year-to-year figures are volatile, and most of the measures show no consistent trend up or down over the past 10 years. >>

The full report is available on the Web at www.nfpa.org/Research/.

Figure 2
Direct Dollar Loss in Large-Loss Fires, Adjusted and Unadjusted for Inflation (1993–2002)



CHARTS: CHRISTOPHER McCUSKER

Table 1 - Large-Loss Fires That Caused $5 Million or More in Property Damage, 1993-2002

Year	Number of Fires	Fires Causing Losses of $5 Million or More In 1993 Dollars	Property Loss (adjusted)	Property Loss in 1993 $s
1993	55	55	$1,808	$1,808
1994	52	42	$837	$767
1995	44	29	$1,362	$1,220
1996	63	55	$1,544	$1,385
1997	57	39	$885	$714
1998	57	43	$1,167	$971
1999	66	52	$2,280	$1,915
2000	65	51	$2,029	$1,643
2001 *	53	36	$978	$729
2002	46	37	$699	$526

* *Excluding the 9/11/01 World Trade Center incident from the loss totals but not the fire incident totals.*

Note: Number of fires and unadjusted loss are based on data from studies that appeared in previous annual large-loss studies. Some of the information may differ from previously published material because material was updated after publication.

Note: Adjustment for inflation is based on the Consumer Price Index using 1993 as the base year. Note that adjustment for inflation not only reduces the total dollar loss for each year but also reduces the number of fires with adjusted losses large enough to qualify as large-loss fires.

Costliest fires of 2002

In August, a California fire department responded to a 911 call reporting a building fire in a complex under construction. Extinguishing this fire, which spread to a neighboring residential complex, required 11 alarms, 200 firefighters, and more than 50 pieces of firefighting equipment. It was the largest structure fire in the city's history, and caused an estimated $90.0 million in property loss and damage. Several neighboring fire departments provided assistance.

The fire originated in one of the three-story buildings being built on top of a three-story parking garage. The structure was intended to house retail and residential occupancies on a ground floor covering 6 acres (2 hectares). This was the largest building in a nine-building development that was eventually to cover 42 acres (16.9 hectares). The area where the fire originated was still open wood-frame construction.

Arriving firefighters faced the entire upper floors of the building burning. The first alarm companies employed master stream equipment in an attempt to control the spread of the fire. All firefighting activities were defensive from the start due to the tremendous amount of fire.

Airborne embers landed on the wood-shake roofs of apartment buildings and townhouses in a residential complex, which was a half-mile (.0005 kilometer) downwind. First-arriving firefighters found a fully involved two-story apartment building with flames burning through the roof, along with several smaller fires. They employed master streams here also for exposure protection. The cause of the fire is undetermined.

The second most costly fire occurred in a single-family home under construction in Texas. Over several days, the two-story, 43,000-square-foot (3,994-square-meter) house of protected ordinary construction had had its floors refinished with flammable/combustible materials. A spark from an electrical motor in the attic ignited high concentrations of vapors. Although six heads in the installed fire sprinkler system activated, water pressure was insufficient to extinguish the fire. Property damage totaled $40.0 million.

These fires, both in special properties, were two of 25 fires that caused a loss of $10.0 million or more in property damage last year (see Table 2). Together these 25 costliest incidents resulted in a combined loss of $563.3 million. This represented 80.5 percent of the total dollar loss in the 46 large-loss fires for 2002, and 5.5 percent of the total U.S. fire loss in 2002.

Where the fires occurred

Large-loss fires occurred in every property category except health care and correctional facilities (see Table 3) in 2002. Fifteen large-loss fires occurred in manufacturing properties, resulting in $194.4 million in property loss. Eight fires occurred in storage properties resulting in $82.0 million in damages. Seven fires in special properties resulted in $166.0 million in damages. Five fires in basic industry caused $77.0 million in damages. Four fires in wildland properties resulted in $79.6 million in damages. Three fires in residential properties resulted in a loss of $46.5 million. There was one fire each in public assembly and educational properties, stores, and vehicles, resulting in $20.0 million, $15.0 million, $13.0 million and $5.8 million in damages, respectively.

Forty-one of the 46 large-loss fires in 2002 occurred in structures, with a loss of $613.9 million. Four wildland fires and a vehicle fire accounted for the rest of the loss. Twenty-two of the 41 structure properties were operating at the time of the fire, including 16 at full operation and 6 partially operating or with cleaners on the premises. Another 15 were closed or had no one on the site. The operating status of the other four was unknown or not reported.

Eight of the 41 structure fires were intentionally set, as was one of the wildland fires. These nine fires accounted for 19.6 percent of 2002's large-loss fires, and resulted in a combined property loss of $138.7 million, or 19.8 percent of the loss in these same fires.

Detection and suppression systems

Of the 41 structure fires, 24 were in properties that had no automatic detection equipment present. Some form of automatic detection equipment protected 12 properties, and it's unknown or not reported if the other five properties had any detection equipment at all. This means that 33.3 percent of the properties had automatic detection equipment.

Of the 12 structures protected by an automatic detection system, five had complete coverage–two by smoke detection equipment, one by a combination smoke/heat detection equipment, one by heat detection, and one by an unreported type system. Three properties had partial coverage with automatic detection equipment–two by a combination smoke/heat detection system, and one by smoke detector. The extent of coverage of detection equipment in the other four properties wasn't reported.

Six of the 12 systems operated. Three didn't operate; two systems weren't com-

Table 2 - Large-Loss Fires of $10 Million or More in 2002

Incident and Location	Loss in Millions
Residential/business complex under construction, California	90.0
Single-family dwelling under renovation, Texas	40.0
Residential complex, explosion and fire, California	31.5
Meat processing plant, South Dakota	31.0
Warehouse, Colorado	30.0
Steel manufacturing plant, Ohio	27.0
Wildland fire, California	25.6
Electric power plant, Tennessee	25.0
Electric power plant, Pennsylvania	25.0
Wildland fire, Arizona	24.7
Paper goods manufacturing plant, Illinois	20.0
College cafeteria, Minnesota	20.0
Printing plant, Wisconsin	17.0
Wildland fire, New Mexico	16.6
Rubber products plant, Mississippi	16.1
Distillery, Kansas	15.0
High school, Washington	15.0
Manufacturing plant, Pennsylvania	14.0
Department store, Pennsylvania	13.0
Wildland fire, California	12.8
Chemical laboratory, California	12.0
Printing plant, Missouri	12.0
Vacant historical building, Minnesota	10.0
Marina, Washington	10.0
Electric power plant, Massachusetts	10.0
Total	***25 Fires $563.3***

plete; and an explosion damaged one. The operation of the other three systems wasn't reported.

Of the 41 structures involved in large-loss fires in 2002, 12 were equipped with automatic suppression equipment. Twenty-three had no automatic suppression equipment, and it's unknown or wasn't reported whether the other six properties had any type of suppression equipment present. This means that only 34.3 percent of the structures with automatic suppression equipment information reported were equipped with some sort of system.

Five of the 12 protected properties had complete coverage fire sprinkler systems. Four had a wet-pipe system; the type system for the fifth property wasn't reported. Five properties had partial fire sprinkler system coverage; four had wet-pipe systems; and the type system for the fifth property wasn't reported. The extent of coverage for one property, which had a wet-pipe fire sprinkler, wasn't reported. And there was no information on the coverage reported on the last system.

Suppression systems operated in seven of the 12 properties protected; five systems didn't operate. Two of the seven systems that operated were effective in controlling or extinguishing the fire. Five systems were ineffective–two due to being overwhelmed by rapidly spreading fire, one due to explosion damage to the system, one due to water supply problems, and one for an unreported reason. Of the five that didn't operate, three systems hadn't been completed, a structural collapse damaged one system, and one system wasn't in the area of the fire.

What we can learn

In 2002, the number of large-loss fires decreased by 13.2 percent, and the direct property loss fell by 28.5 percent. In each of the past 10 years, there had been at least one fire with direct property loss more than $100.0 million. In 2002, there were no fires with a loss of more than $100.0 million.

Each year, the large-loss fire study reports on the fraction of fires accounting for major losses that occurred in properties both protected and unprotected by automatic detection or suppression systems. Each year, a large fraction of large-loss fires are reported in properties with no such protection, with only partial protection, or with systems rendered ineffective by actions or omissions before fire began. Initial explosions or structural collapse also sometimes damage a system to the point of being inoperable or ineffective.

A look at Table 4 on automatic detection or automatic suppression equipment shows that of the 35 structures with systems fully reported, only 6 had both detection and suppression systems, 6 had just an automatic suppression system, 6 had just an automatic detection system, and 17 had neither. In 2002, losses in these properties without protection were $182.8 million.

Adherence to the fire protection principles reflected in NFPA's codes and standards is essential to reduce large-loss fires and explosions in the United States. Human error or negligence is a major factor in today's fires, but proper design, maintenance, and operation of fire protecting systems and features can keep a fire that starts through human error from becoming a large-loss fire. Reducing the risk of explosions is also important. Proper construction, storage methods, and housecleaning will make fires less likely and help control or limit the fire spread if fire occurs.

Table 3 - Large-Loss Fires by Major Property Use Classification

Property Use	Number of Fires	Percent of Fires	Total Dollar Loss	Percent of Loss
Manufacturing	15	33%	$194,370,001	28%
Storage	8	17%	$82,039,177	12%
Special Properties	7	15%	$166,010,000	24%
Industry	5	11%	$77,000,000	11%
Wildlands	4	9%	$79,628,559	11%
Residential	3	7%	$46,500,000	7%
Public Assembly	1	2%	$20,000,000	3%
Educational	1	2%	$15,000,000	2%
Stores	1	2%	$13,000,000	2%
Vehicles	1	2%	$5,800,000	1%
Totals	***46***	***100%***	***$699,347,737***	***100%***

Footnotes

1. Michael Karter, Jr., "U.S. Fire Loss in 2002," *NFPA Journal*, September/October 2003.

2. The 46 large-loss fires of 2002 are those for which losses were reported and verified.

3. The figures reported for prior years may not be the same as those originally reported, due to late arriving information.

Where we get our data

The NFPA collects its data by reviewing national and local news media, including fire service publications. A clipping service reads all U.S. daily newspapers and notifies the NFPA's Fire Analysis and Research Division of major large-loss fires. The NFPA's annual survey of the U.S. fire experience is an additional data source, although not the principal one. We also contact federal agencies that have participated in investigations, the state fire marshal's offices, and military sources. Once an incident has been identified, we request information from the fire department or the agency having jurisdiction. The diversity and redundancy of these data sources enable NFPA to collect complete data available on large-loss fires.

Acknowledgments

The NFPA thanks the U.S. fire service for its contributions of data, without which this report wouldn't be possible. In many cases, the fire departments were unable to contribute information to NFPA because legal action is pending/ongoing, or they're unable to determine many pieces of information we need to make our study as complete as possible. Thanks to Norma Candeloro for providing the support this study requires.

Table 4 - 2002 Large-Loss Incidents

MANUFACTURING

South Dakota
Dollar Loss: $31,000,000
Month: January
Time: 2:30 a.m.
Property Characteristics and Operating Status: No information reported.
Fire Protection Systems: No information reported.
Fire Development: No information reported.
Contributing Factors and Other Details: None reported.

Indiana
Dollar Loss: $27,000,000
Month: October
Time: 3 a.m.
Property Characteristics and Operating Status: This one-story steel manufacturing plant was of unprotected ordinary construction. The ground floor area was not reported. The plant was in full operation at the time of the fire.
Fire Protection Systems: There was no automatic detection system present. There was a complete coverage sprinkler system of unreported type present. The system operated but was overwhelmed by the spreading fire.
Fire Development: The fire originated in a hanging natural gas furnace and swept through the plant.
Contributing Factors and Other Details: None reported.

Illinois
Dollar Loss: $20,000,000
Month: April
Time: 6 p.m.
Property Characteristics and Operating Status: This one-story paper product manufacturing plant was of protected noncombustible construction and covered 243,000 square feet (22,574 square meters). The plant was at full operation when the fire broke out.
Fire Protection Systems: There was a partial coverage combination smoke and heat detection system present. The system was not located in the area of origin and it was not reported if the system activated. There was a complete coverage wet-pipe sprinkler system present. The flow from this system was not sufficient. The main switch to the fire pump was found shut off. How or when it was shut off was not reported.
Fire Development: An incendiary fire was set in the rolled paper storage area. This fire is still under investigation.
Contributing Factors and Other Details: None reported.

Wisconsin
Dollar Loss: $17,000,000
Month: July
Time: 9:23 p.m.
Property Characteristics and Operating Status: This 110-foot-high magazine printing plant with automated rack storage retrieval was of unprotected noncombustible construction and covered 61,600 square feet. (5,722 square meters) The plant was in operation when the fire broke out.
Fire Protection Systems: There was a complete coverage smoke detection system present but its installation was not yet complete. There was a complete coverage wet-pipe sprinkler system present. A building collapse before the fire damaged and rendered useless the sprinkler system and risers.
Fire Development: A building collapse caused stored magazine paper to come in contact with a broken 400-watt metal halide light bulb. Fire then spread rapidly throughout the collapsed structure. The reason for the collapse was not reported.
Contributing Factors and Other Details: The paper contents and windy conditions contributed to rapid fire spread. The suppression system was damaged in the collapse and did not operate. The collapse also blocked alleyways, hampering firefighting operations.

Mississippi
Dollar Loss: $16,070,001
Month: May
Time: 6 p.m.
Property Characteristics and Operating Status: This one-story rubber reclaiming plant was of unprotected noncombustible construction and covered 60,000 square feet (5,574 square meters). The plant was in full operation at the time of the fire and explosion.
Fire Protection Systems: There was a complete coverage heat detection system present. This system did not operate because an explosion destroyed a large portion of it. There was a local suppression system in the drying system, which operated but was not effective. There was a complete coverage wet-pipe sprinkler system present. The system was damaged by the explosion and was not effective in the area of origin but did control the fire in the area unaffected by the blast.
Fire Development: A fire in a rubber dust particle drying system was not fully extinguished by the dryer's suppression system, allowing the fire to extend through a vent pipe located above the roof. Embers ignited accumulated rubber dust on the roof. The fire then spread to the bagging station where a rubber dust explosion occurred throughout the plant, igniting more rubber dust and combustibles.
Contributing Factors and Other Details: Five civilians were killed and seven injured in this fire.

Kansas
Dollar Loss: $15,000,000
Month: September
Time: 2:26 p.m.
Property Characteristics and Operating Status: This 70-foot-high (21-meter-high) alcohol distillery was of unprotected noncombustible construction. The area covered was not reported. The plant was in operation at the time of the explosion and fire.
Fire Protection Systems: There was no automatic detection system present. There was a partial coverage

wet sprinkler system present. It was not effective due to damage caused by the explosion.
Fire Development: A manhole cover door left open in a lower vapor chamber still allowed vapors to escape into the still house. An unknown ignition source caused an explosion that ruptured additional pipes, allowing a large amount of grain alcohol to flow and continue to burn.
Contributing Factors and Other Details: Four civilians were injured in this fire.

Pennsylvania
Dollar Loss: $14,000,000
Month: October
Time: 9:43 p.m.
Property Characteristics and Operating Status: No information reported.
Fire Protection Systems: No information reported.
Fire Development: No information reported.
Contributing Factors and Other Details: Two firefighters were injured.

Missouri
Dollar Loss: $12,000,000
Month: April
Time: 12:15 p.m.
Property Characteristics and Operating Status: This 16-foot-high (4-meter-high) printing plant was of unprotected ordinary construction and covered 7,500 square feet (696 square meters). One employee was working in a computer room at the time of the fire.
Fire Protection Systems: There was no automatic detection system present. There was a partial coverage wet-pipe sprinkler present. This system operated and extinguished the fire in the covered area.
Fire Development: Several fires were set in a solvent room, the mezzanine, and basement areas.
Contributing Factors and Other Details: None reported.

Washington
Dollar Loss: $8,000,000
Month: May
Time: 3:25 AM
Property Characteristics and Operating Status: This one-story rendering plant was of unprotected noncombustible construction and covered a ground floor area of 20,000 square feet (1,858 square meters). The plant was closed at the time of the fire.
Fire Protection Systems: There was no automatic detection or suppression equipment present.
Fire Development: A fire of undetermined cause broke out in the area of a centrifuge and prebreaker machinery in the product rendering area.
Contributing Factors and Other Details: None reported.

STORAGE

Colorado
Dollar Loss: $30,000,000
Month: December
Time: 8:47 a.m.
Property Characteristics and Operating Status: This 24-foot-high (7 meter-high), one-story general products warehouse was of protected ordinary construction and covered a ground floor area of 120,415 square feet (11,186 square meters). The warehouse was closed at the time of the fire.
Fire Protection Systems: There was no automatic detection system present. There was a complete coverage wet-pipe system present. The system activated but was ineffective when it was overwhelmed by the fire's growth.
Fire Development: Several incendiary fires were set in this warehouse to cover up a burglary.
Contributing Factors and Other Details: One firefighter and four civilians were injured.

Washington
Dollar Loss: $10,000,000
Month: January
Time: 6:41 p.m.
Property Characteristics and Operating Status: This marina contained several docks and multiple finger piers. The dock that was the scene of this fire had 52 slips available for vessel moorage. The dock and cover structure were predominantly wooden.
Fire Protection Systems: There was no automatic detection or suppression system present.
Fire Development: This fire started in a 46-foot (14-meter) yacht moored at one of the 52 slips. An electrically energized device aboard this vessel ignited nearby combustibles. The fire then spread to many other vessels and the wooden marina structure. The fire spread through the dock area and destroyed or damaged many other vessels.
Contributing Factors and Other Details: None reported.

Nebraska
Dollar Loss: $9,000,000
Month: May
Time: 6:52 p.m.
Property Characteristics and Operating Status: This 40-foot-high (12-meter-high), one-story aircraft hangar was of unprotected wood-frame construction and covered a ground floor area of 21,600 square feet (2,006 square meters). The hangar was in operation but mechanics were not in the area of ignition.
Fire Protection Systems: There were no automatic detection or suppression systems present.
Fire Development: A crew using a cutting torch had worked on an overhead sliding door before 2 p.m. A spark ignited wood members above the opening, and fire entered a void with rolled insulation. It then burned undetected to the roof trusses for some time. Airport fire crews fought the fire until the local fire department received a 911 call and responded.
Contributing Factors and Other

Table 4 - 2002 Large-Loss Incidents

Details: Winds were 30 mph at the time and assisted the spread of flames to the void space where the fire burned undetected for some time.

SPECIAL PROPERTIES

California
Dollar Loss: $90,000,000
Month: August
Time: 3:36 p.m.
Property Characteristics and Operating Status: This six-story combination residential and business structure was under construction and was of unprotected wood-frame construction and covered 225,000 square feet (20,902 square meters). There were workers on site when the fire broke out.
Fire Protection Systems: There was no automatic detection system present. There was a partial coverage sprinkler system present but it was not fully installed or operational yet.
Fire Development: A fire of unknown cause and origin spread rapidly in the exposed wood structural members. Embers from this complex spread to a nearby apartment complex and ignited a second fire.
Contributing Factors and Other Details: Open stage of construction allowed fire to spread rapidly.

Texas
Dollar Loss: $40,000,000
Month: July
Time: 1:05 a.m.
Property Characteristics and Operating Status: This 2½-story single-family house undergoing renovations was of protected ordinary construction and covered a ground floor area of 43,000 square feet (3,994 square meters). An associate of the construction company was staying in an adjacent structure.
Fire Protection Systems: There was a partial coverage combination heat and smoke detection system present. A single-station detector did sound and alerted an occupant of the adjacent structure. The installation of the rest of the system was not yet completed. There was a partial coverage wet-pipe sprinkler system in the house. This system's installation was not yet complete.
Fire Development: A high concentration of fumes from floor refinishing was ignited in the attic space by an electric fan motor.
Contributing Factors and Other Details: The attic was open the entire length of the house. The installation of detection and suppression equipment was not complete.

Minnesota
Dollar Loss: $10,010,000
Month: September
Time: 7:52 p.m.
Property Characteristics and Operating Status: This vacant three-story warehouse was of heavy timber construction and covered 18,480 square feet (1,716 square meters). This structure was one of many on the grounds of a historical prison facility.
Fire Protection Systems: There was no automatic detection or suppression system present.
Fire Development: This incendiary fire had grown rapidly before the arrival of firefighters. Upon arrival firefighters had to make a defensive attack on this fire.
Contributing Factors and Other Details: None reported.

BASIC INDUSTRY

Pennsylvania
Dollar Loss: $25,000,000
Month: July
Time: 9:45 p.m.
Property Characteristics and Operating Status: The electric generating plant was in full operation at the time. No other information was reported.
Fire Protection Systems: No information reported.
Fire Development: No information reported.
Contributing Factors and Other Details: None reported.

Tennessee
Dollar Loss: $25,000,000
Month: September
Time: 8:30 a.m.
Property Characteristics and Operating Status: This 120-foot-high (36-meter-high) utility shaft in a hydroelectric plant was of fire-resistive construction. The ground floor area was not reported. The plant was in full operation with five employees inside at the time of the fire.
Fire Protection Systems: There was no automatic detection or suppression equipment present.
Fire Development: The fire began in a vertical cable shaft and burned so intensely and rapidly to the control room that firefighters were unable to enter the area for some time. Prolonged chafing of a 480-volt cable caused the insulation to rub off and shorted out the cable. The arc ignited cable insulation. The chimney effect in the shaft caused the fire and smoke to spread rapidly. A plant fire brigade responded and attempted to extinguish the fire.
Contributing Factors and Other Details: Due to the topography, radio communication was very poor. Most communication was done face to face. The concrete construction trapped the heat. Five civilians were injured.

California
Dollar Loss: $12,000,000
Month: January
Time: 5:32 a.m.
Property Characteristics and Operating Status: This four-story biological laboratory was of protected noncombustible construction and covered a ground floor area of 15,525 square feet (1,442 square meters). The building was partially operating at

the time of the fire.
Fire Protection Systems: There was a complete coverage combination heat and smoke detection system present. This system did activate and alerted occupants and the fire department. There was a partial coverage wet-pipe sprinkler system but it was not in the area of the fire and did not activate.
Fire Development: The cause of this fire was not determined. The fire broke out in a lab work area, burned intensely throughout the lab, and eventually burned through a wall and into an adjacent lab.
Contributing Factors and Other Details: Normal lab chemicals fueled the fire.

Massachusetts
Dollar Loss: $10,000,000
Month: October
Time: 4:26 p.m.
Property Characteristics and Operating Status: This eight-story electric generation plant was of unprotected noncombustible construction and covered a ground floor area of 60,000 square feet (5,574 square meters). The plant was in full operation at the time the fire broke out.
Fire Protection Systems: An automatic detection system alerted occupants. The type of system and coverage were not reported. There was a suppression system present. Its type and coverage were not reported. The system did operate but was not effective. The reason for this was not reported.
Fire Development: An improper start-up of an electrical turbine generator caused an explosion and an ensuing oil fire. The oil fire burned until firefighters and plant workers could shut down valves stopping oil flow to the generator.
Contributing Factors and Other Details: Four firefighters were injured.

WILDLAND

California
Dollar Loss: $25,583,244
Month: February
Time: 11:14 a.m.
Property Characteristics and Operating Status: Wildland-urban interface.
Fire Development: Embers from a controlled fire ignited this wildland fire. Then, sparks from this blaze ignited several other fires. In the end, 5,763 acres (2,332 hectares) burned, destroying 43 residences, 49 outbuildings, and 38 vehicles. Another 14 residences, 4 outbuildings, and 4 vehicles were damaged.
Contributing Factors and Other Details: Three firefighters and 11 civilians were injured. Low relative humidity, winds of 35 to 55 miles per hour (56 to 88 kilometers), and temperatures higher than normal were contributing factors. Over 900 firefighters and support crews were needed to control and extinguish this fire.

Arizona
Dollar Loss: $24,686,000
Month: June
Time: 4:11 p.m.
Property Characteristics and Operating Status: This fire was in a forest and wilderness area. The landscape was chaparral, ponderosa pine, juniper, and brush.
Fire Development: This fire complex began as two separate fires. A person looking for work ignited the first fire and two days later a lost hiker set a second fire as a signal fire to draw attention of rescuers. Five days after the original fire, the two grew into one, at which point 235,000 acres (95,102 hectares) burned. By the time the fire was extinguished, it had grown to 467,066 acres (189,016 hectares) and destroyed 467 homes.
Contributing Factors and Other Details: More than 4,400 firefighters and support crews were needed to control and extinguish this fire. It took more than two weeks to contain this fire.

New Mexico
Dollar Loss: $16,574,000
Month: March
Time: 11 a.m.
Property Characteristics and Operating Status: Wildland urban interface, with a housing subdivision.
Fire Development: A grass fire believed ignited by an ember from a chimney spread rapidly into a timber area. The fire spread to 985 acres (398 hectares) before it was controlled. During the fire, at least 29 homes were destroyed.
Contributing Factors and Other Details: Winds of 40 to 55 miles per hour (64 to 88 kilometers per hour), intensified this grass fire. Contributing factors included drought conditions, low relative humidity, steep terrain, and limited access.

California
Dollar Loss: $12,785,315
Month: August
Time: 2:08 p.m.
Property Characteristics and Operating Status: Wildland urban interface fire.
Fire Development: Investigators believe this fire started when a main rotor blade struck a power line. The wire was not cut but a pole rattled with sufficient force to break another cable, which fell onto trees. The fire burned 61,690 acres (24,965 hectares), destroyed 45 residences, 121 outbuildings and 171 vehicles, and damaged 3 residences, 1 outbuilding and 2 vehicles before it was controlled and extinguished.
Contributing Factors and Other Details: Thirty-eight injuries were reported. Winds influenced the fire spread. 1,259 firefighters and support crews were needed to control this fire.

Table 4 - 2002 Large-Loss Incidents

RESIDENTIAL

California
Dollar Loss: $31,500,000
Month: August
Time: 5:46 a.m.
Property Characteristics and Operating Status: An explosion occurred in a one-story single-family house of protected ordinary construction that covered 1,400 square feet (130 square meters). The residence was occupied at the time of the explosion and ensuing fire.
Fire Protection Systems: No automatic detection or suppression system was present.
Fire Development: This home was tented for fumigation when natural gas escaped from a broken riser to the gas meter. Investigators believe the source of ignition was an electrical appliance. An estimated 115 neighboring structures were destroyed or damaged by the blast.
Contributing Factors and Other Details: Ten civilians were injured.

Indiana
Dollar Loss: $9,500,000
Month: April
Time: 7:42 a.m.
Property Characteristics and Operating Status: This four-story college dormitory building was of protected ordinary construction and covered 13,950 square feet (1,296 square meters). The dormitory was occupied at the time the fire broke out.
Fire Protection Systems: There was a complete coverage smoke detection system and manual pull stations present. The system operated and alerted occupants. There was no automatic suppression equipment present.
Fire Development: The source of this unintentional fire that broke out in a fourth-floor dorm room is undetermined. Arriving firefighters were told of several trapped persons. They were rescued and all other people in the building were evacuated. The fire spread into and throughout the attic, roof, and fourth-story areas. A ceiling collapsed during firefighting operations, trapping several firefighters. Firefighters then withdrew and went to a defensive attack.
Contributing Factors and Other Details: Three firefighters were injured.

PUBLIC ASSEMBLY

Minnesota
Dollar Loss: $20,000,000
Month: January
Time: 12:09 p.m.
Property Characteristics and Operating Status: This one-story cafeteria on a university campus was of protected noncombustible construction and covered a ground floor area of 22,500 square feet (2,090 square meters). The cafeteria was operating with maintenance personnel in the building.
Fire Protection Systems: There was no automatic detection or suppression equipment present.
Fire Development: This fire broke out when molten slag ignited a plastic conveyor belt. Maintenance personnel had cut steel bearings from the dishwasher conveyor system minutes before smoke was seen coming out of the dishwasher room. The plastic conveyor belt, plastic dish transport trays, and fiberglass ceiling tiles fueled the fire.
Contributing Factors and Other Details: An air exchange system was operating, drawing the fire and smoke throughout the building.

EDUCATIONAL

Washington
Dollar Loss: $15,000,000
Month: January
Time: 11:44 p.m.
Property Characteristics and Operating Status: This three-story high school was of unprotected ordinary construction with a ground floor area of 58,000 square feet (5,388 square meters). There were several people within the building when the fire broke out.
Fire Protection Systems: There was partial coverage smoke detection with manual pull stations present. The system was not in the room of origin but did activate and alerted a central station company. There was no suppression equipment present.
Fire Development: This was an incendiary fire. No additional details are available.
Contributing Factors and Other Details: Floor and ceiling collapses endangered four firefighters inside before firefighters withdrew from the building.

STORE

Pennsylvania
Dollar Loss: $13,000,000
Month: January
Time: 10 p.m.
Property Characteristics and Operating Status: This one-story home repair specialty sales shop was of unprotected wood-frame construction and covered 7,500 square feet (697 square meters). The shop was closed when the fire broke out.
Fire Protection Systems: There was no automatic detection or suppression equipment present.
Fire Development: This fire was set in a rear stockroom.
Contributing Factors and Other Details: Eight firefighters were treated for exposure to a material that caused facial irritation.

VEHICLE

Florida
Dollar Loss: $5,800,000
Month: May
Time: 12:45 p.m.
Property Characteristics and Operating Status: This fire was on board a 110-foot (34-meter) yacht in a dry dock of a marina. The marina was in full operation at the time of the fire.
Fire Protection Systems: Not applicable.
Fire Development: Ordinary combustibles were ignited during welding operations in the hull of this vessel.
Contributing Factors and Other Details: Three firefighters were injured.

SECTIONNEWS

In This Issue

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Architects, Engineers, and Building Officials

WEB SITE: http://www.nfpa.org/aebo
CHAIR: John Kampmeyer, Triad Protection Engineering Corp.

HOT ISSUES

NFPA members making a difference

AEBO Section Member Brenda Bronson, P.E., a fire protection engineer with the General Services Administration, Rocky Mountain Region, has been working with the Colorado Juvenile Firesetter Prevention Program by enlisting volunteer contractors and suppliers to install residential fire sprinklers in group homes in Colorado.

Fire departments statewide submitted a list of facilities in their jurisdictions that urgently needed sprinkler protection, and a panel from the program chose the most at-risk facilities to participate.

Brenda began her efforts at the 2000 World Safety Conference and Exposition® in Denver, where she networked with other NFPA members who were able to donate their time and services to the project. Thanks to their efforts, the last group home in the project has been sprinklered.

Brenda would like to thank Bob Kehrer of Tyco-SimplexGrinnell–Denver, Stephen Scandaliato and Kerry Madigan of the Scandaliato Design Group, Brett Dickerson of Advanced Fire Technology, and Linda Camm, president of DecoShield Corporation, for donating the labor, materials, and services to this worthy undertaking.

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Aviation

WEB SITE: http://www.nfpa.org/aviation
CHAIR: Dennis Kennedy, P.E., Tyco Suppression Systems

HOT ISSUES

Committees busy with revisions

Fall is a busy time for all NFPA technical committees, including the aviation committees. On October 28 and 29, the Aircraft Rescue and Fire Fighting (ARFF) Committee met in Montréal to act on public comments on NFPA 405, *Recurring Proficiency for Airport Fire Fighters*; NFPA 408, *Aircraft Extinguishers*; and NFPA 422, *Aircraft Accident Response*. The ARFF Committee published its draft revisions of these documents in the May 2004 *Report on Proposals*, and comments on the changes are due by October 10, 2004.

On November 11 and 12, the Airport Facilities Committee will meet in Miami to act on public comments on its proposed revisions of NFPA 409, *Aircraft Hangars*, and NFPA 423, *Aircraft Engine Test Facilities*.

Although NFPA 410, *Aircraft Maintenance Operations*, is in the same revision cycle as these documents, the Aircraft Maintenance Operations Committee is waiting to see the extent of public comments before scheduling a meeting. Committee members will teleconference to make sure they have covered all the concerns in their extensive revision of NFPA 410, in which they changed the requirements for paint hangars where entire aircraft are painted and other hangars where components are painted. The committee coordinated its efforts with the Airport Facilities Committee, as some of NFPA 410's provisions involve construction criteria that are more appropriate in NFPA 409, which covers construction and fire protection, than in NFPA 410, a maintenance-activity document.

The Aviation Section doesn't plan to be on the program for the 2003 Fall Education Conference in Reno in November. Section Chair Dennis Kennedy of Tyco Suppression Systems has asked that anyone who wishes to be considered for the aviation program during the May 2004 World Safety Conference and Exposition® in Salt Lake City submit an abstract to Section Executive Secretary Mark Conroy at mconroy@nfpa.org. The Section Board will develop the program later this year.

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Building Fire Safety Systems

WEB SITE: http://www.nfpa.org/bfss
CHAIR: Neal Krantz, Siemens Fire Safety, Livonia, Michigan

HOT ISSUES

New standpipe requirements

The Building Fire Safety Systems Section is sponsoring a presentation on the 2003 updates to NFPA 14, *Installation of Standpipe and Hose Systems*, on November 18, during NFPA's Fall Educational Conference in Reno, Nevada. David R. Hague, P.E., NFPA staff liaison for NFPA 14, and Kevin Kelly from the NFSA, an NFPA 14 committee member, will present.

Among the changes they will discuss are revisions to training requirements for fire brigades, Class III hose station locations, interconnection of standpipes, and horizontal standpipes.

Training

While previous editions of NFPA 14 allowed building occupants to use the hose stations for Class II and III standpipes, the 2003 edition requires that 1½-inch hose stations be used only by

trained individuals. A label indicating that the fire hose is for use by trained personnel will help reinforce this requirement.

Class III system hose station locations
A new requirement eliminates the 130-foot (40-meter) travel distance for locating a Class II hose station when it is part of a Class III system in sprinklered buildings only. The NFPA 14 Technical Committee doesn't intend to require the 130-foot (40-meter) limitation for Class III standpipe systems in buildings protected throughout by an approved automatic sprinkler system.

Interconnecting standpipes
Two or more standpipes installed in the same building should be interconnected as close to the water supply as possible. This revision will allow standpipes to be interconnected at other floor levels, which may be more convenient than interconnecting them at the bottom floor, as the previous requirement mandated.

100 psi for 2 ½-inch hose connections
The minimum water pressure for the hydraulically most remote 2½-inch hose connection is now 100 pounds per square inch (6.95 bars), with no exceptions. Previously, the authority having jurisdiction could allow a pressure of 65 pounds per square inch (4.48 bars), based on the fire department's equipment and firefighting tactics, and pressures less than 100 pounds per square inch (6.95 bars) were allowed in fully sprinklered buildings. The new pressure requirement will ensure that the fire department has enough pressure to operate the higher demand of modern fog nozzles.

Horizontal standpipes
Class I and Class III horizontal standpipes supplying three or more hose connections will demand 250 gallons (946 liters) per minute per hose connection, for a total minimum demand of 750 gallons (2,839 liters) per minute for the hydraulically most remote horizontal standpipe.

This new language is intended to provide a demand for large-area, low-rise buildings and other structures that might have a horizontal standpipe system.

Plan to attend this presentation to learn about all the changes to NFPA 14 and how they will affect standpipe design.

Hanger rod orientation

by ROLAND HUGGINS, P.E.

The requirements for hanging sprinkler pipe in NFPA 13, *Installation of Sprinkler System*, and the *Sprinkler Handbook* have caused some confusion about the orientation of sprinkler piping hanger rods. Some contend hanger rods must be in a true vertical orientation, while others hold that they should be perpendicular to the supported pipe, regardless of the rods' orientation.

According to Paragraph 9.1.2.5 of NFPA 13, "Threaded sections of rods shall not be formed or bent." Thus, one cannot bend a rod when installing it on a sloped ceiling. However, this criterion applies explicitly to the threaded sections of a rod. The solid section of a solid rod with threaded ends can be bent. Furthermore, hanger rods must be installed perpendicular to the pipe. Listed attachments that pivot where they connect to the building, allowing a straight rod between the pipe and the structure, allow all-thread rods to meet both criteria.

The *Sprinkler Handbook* also attempts to ensure that threaded rod won't bend after it's been installed by requiring it to be in a "true vertical position," or perpendicular to the floor. Apparently, this is an effort to counter the force of gravity, which the authors evidently assumed would place a non-axial load on the rod that could bend it.

However, a closer look at the issue shows that the gravitational force on the hanger when the pipe is not parallel to the floor is straight down, which creates two forces on the pipe at the hanger. One is parallel to the pipe and is resisted by the cross main. The other is perpendicular to the pipe and is resisted by the hanger. If the cross main were not there, the pipe would slide down the swivel ring.

To help understand the direction of the loads, picture the direction the pipe would move if the hanger were disconnected. It would move downward, pivoting around the cross main in an arc that started perpendicular to the original location of the pipe. In reality, the rod must be perpendicular to the pipe to avoid a non-axial load. Installing all-thread rods perpendicular to the pipe is the industry norm and complies fully with NFPA 13.

AFSA will pursue revising the language of the handbook in the next edition.

Huggins is vice-president of Engineering at the American Fire Sprinkler Association.

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Education

WEB SITE: http://www.nfpa.org/edsection
CHAIR: Peg Carson, Carson Associates

HOT ISSUES

Pass it along

by PEG CARSON

One benefit of attending NFPA meetings is networking with colleagues facing similar challenges. It's wonderful to find a solution to a problem or a new idea that's sure to work when you get home. I'd like to pass along some ideas from other educators that may work for you.

Peggy Harroll, fire safety education coordinator for the Plano, Texas, Fire Department shared this idea during a session at the World Safety Conference and Exhibition® in Dallas. It may increase participation in your smoke alarm check and installation program.

The week before visiting a neighborhood to offer free smoke alarms, Peggy and volunteers from the department staff make a preliminary visit. They place door hangers on each home to let people know that the fire department will be in the neighborhood the following Saturday.

The message, in English and in Spanish,

The message, in English and in Spanish, tells the residents that an on-duty crew will make a follow-up visit to check alarms, replace batteries if needed, or install a free smoke alarm. To reassure people that this is not a scam, the fire department's phone number and logo are included. When firefighters make their call on Saturday, they carry copies of the door hangers, which is helpful if they don't speak Spanish.

The department usually gets a few phone calls between visits, some to say the residents will be away but would like to schedule a visit another time, others to verify the information. Department personnel feel that this successful program is made moreso by the consideration shown to residents. I hope you can use this idea and that you pass it along.

Look for these resources

The NFPA Center for High-Risk Outreach has posted a report of the Steering Committee for Fire Safety for People with Disabilities that identifies a strategy for encouraging the use of fire safety solutions. The strategy will benefit from national attention, but it will require local action. The committee represents national organizations and agencies that are concerned about, and advocate for, both fire safety issues and people with disabilities.

You can read the report at www.nfpa.org/Education/HighRiskOutreach.

Keep your eye on the ball

by LYNN SCHOFIELD

Summer has faded into fall, and, like the world we live in, the way we do our jobs and protect our neighbors and friends changes, too. Here is one last lesson from the days of summer.

At my daughter's fast-pitch softball game recently, one batter, down two strikes, stepped out of the box, took a deep breath, and prepared to do battle with the pitcher again. She fouled off the next five pitches, fast balls, curve balls, and rise balls. Then it happened. Our pitcher threw a change-up. Unlike the fast ball or curve ball, the change-up is painfully slow to the plate. The batter swung well before the ball reached the plate, and was out.

What is the lesson in all of this? On September 11, 2001, we, as a nation, were caught by a change-up. We didn't expect it, and we weren't prepared to deal with the changes it brought to our lives. As we scramble to make up for our lack of vigilance, however, I wonder if we are spending too much time and too many resources learning to hit the change-up at the expense of preparing for, and dealing with, the other pitches that still come across our plate.

Last year, more people died in my community in motor vehicle crashes than died in the United States in terrorist incidents. The same can be said for fire deaths and unintentional injuries. One hundred people died in a fire in a nightclub, in part because the club had no fire sprinklers. These are not new issues. They are the fastballs that have been thrown at us for years. But our focus has changed to look for a different pitch.

As fire and life safety educators, fire protection specialists, firefighters, and citizens, perhaps it's time to step out of the box and focus again on our mission of protecting lives and property. I'm not advocating ignoring the very real threat of terrorism, just putting it into perspective. I don't know if or when there'll be another terrorist attack, but I do know that about 40,000 Americans will die in motor vehicle crashes next year, and more than 3,000 people will die as a result of fire. Approximately 100 firefighters will make the ultimate sacrifice as well.

This is our opportunity to step up to the plate and re-focus our energy. We can take our swings as advocates and educators and educate city, state, and federal leaders about our continuing life safety issues. We have to protect our communities from all of the "pitches" that come our way, not just the unexpected change-ups.

Let me share the advice I give to my daughter before each game: Dig in your feet. Take a deep breath. Focus on the pitcher's hip. And for goodness sake, keep your eye on the ball.

Schofield is with the Provo, Utah, Fire Department and director of the NFPA Education Section.

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Electrical

WEB SITE: http://www.nfpa.org/electrical
CHAIR: Richard Loyd, R&N Associates
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Fire Science and Technology Educators

WEB SITE: http://www.nfpa.org/firescience
CHAIR: Ronald Hopkins, Eastern Kentucky University

HOT ISSUES

From the Chair

by RON HOPKINS

The Fire Science Technology and Educators Section continues to grow and become more active in NFPA activities. In two years, section membership has more than doubled, and we continue to sponsor educational programs during both the Fall Education Conference and the World Safety Conference and Exposition® (WSCE).

Section election results

Section members elected Patrick Kennedy and Jeff Hartle to the section Executive Board for two-year terms. We welcome these two outstanding members back to the Board and thank our members for participating in the election process.

At the next election, section members will choose section officers. If you are interested in running for office, please contact the chair of the Nominating Committee, who was appointed at the section meeting in May, or Staff Liaison Frank Florence.

Fall Education Conference

The section Executive Board will meet during the NFPA Fall Education Conference in Reno. If you plan to attend the conference and would like to attend the Board meeting, please contact Ron Hopkins or Frank Florence for the location and time.

The section will also sponsor several programs during the conference.

Student research poster program

The section Board is planning another poster program during the 2004 WSCE to

showcase student research projects at the graduate and undergraduate levels. Faculty members are encouraged to promote the program and encourage students to submit their research. For an application and guidelines, contact Ron Hopkins. The deadline for submission is January 2004.

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Fire Service

WEB SITE: http://www.nfpa.org/fireservice
CHAIR: Terry Allen, Chief, Cambridge, Ontario, Canada

HOT ISSUES

Bio-terrorism: planning the response
by STEPHEN N. FOLEY

Even before the tragedies of September 11, 2001, U.S. emergency response agencies felt the country and its citizens were vulnerable to a biological threat such as the Sarin attacks in the Tokyo subway in March 1995. Since September 11, local, state, and federal response agencies have struggled to obtain the training, protective clothing, and appropriate detection and decontamination equipment that is necessary to respond safely to, and operate safely at, such incidents.

The lead federal agency responsible for responding to bioterrorism is the Office of Health and Human Services (HHS), specifically the Centers for Disease Control and Prevention (CDC) in Atlanta. While the HHS's resources are vast, they take time to mobilize. As a result, state and local public health officials may become de facto on-scene incident commanders, even if they have little or no training in incident management.

This potential scenario became a reality on the morning of October 15, 2001, when a staff member at the Hart Senate Office Building (HSOB) opened an envelope containing anthrax (*Bacillus anthracis*).

The U.S. Capitol Police were the initial responders. Specially trained members of the Hazardous Devices Unit (HDU) immediately backed up the initial response, testing the suspicious powder twice for *B. anthrax* using commercial rapid tests. The results, obtained within 15 minutes, suggested that the powder was anthrax, a finding later confirmed by the Department of Defense.

The Capitol's Office of Attending Physician (OAP) immediately deployed personnel to collect nasal swabs from Senate staff members and first responders, who hadn't donned their personal respiratory protection equipment before they arrived on the scene. The HSOB ventilation system was shut off, and those who had been there then were decontaminated, interviewed, and detained until late afternoon. That evening, the OAP decided, in concert with the Capitol Police, the Architect of the Capitol, and others, to shut down the HSOB.

During the next three days, OAP staff continued to collect nasal swabs from everyone who was in the building on

October 15 as well as those other members on Capitol Hill who asked for them. The OAP also dispensed an antimicrobial prophylaxis pending the results of the epidemiologic investigation.

A CDC team arrived in Washington on October 16 and assumed command of the incident, along with the Capitol Police. The U. S. Marine Corps Chemical, Biological Incident Response Force, the U.S. Environmental Protection Agency, the U.S. Department of Labor Occupational Safety and Health Administration, the District of Columbia, and other regional and federal responders provided additional resources.

Although the specifics of this incident and those that occurred later that fall are the subject of an ongoing investigation and cannot be discussed, we can say that a coordinated response was critical in containing the toxin and providing immediate treatment.

This type of multi-agency/multi-discipline response requires unified command, a concept that's been used in the past at such incidents as the1994 Northridge, California earthquake and the bombing of the Alfred P. Murrah Federal Building in 1995. Unified command provides agency representatives and dedicated resources to help on-scene personnel develop and support an incident action plan (IAP) outlining specific strategic goals and assigning certain agencies the tactical objectives to support those goals.

Unified command is a team effort, allowing all agencies with geographical, functional, or statutory responsibility for an incident to establish a common set of objectives and strategies to which they can all subscribe without abdicating authority, responsibility, or accountability. The resulting organization may be a mix of personnel from several different agencies, "performing functions as appropriate."

The various agencies retain administrative and policy control of their resources, which are deployed by a single operations section chief who will normally be from the jurisdiction or agency most involved in the incident. The unified command should agree on a choice of operations section chief, since he or she will have full authority to implement the operations portion of the IAP, as well as other general staff personnel who will implement their portions of the IAP.

An integral part of the IAP is a site safety plan that identifies certain hazards, levels and types of personal protective clothing and equipment, medical capabilities, weather conditions, and other safety-related issues. Typically, an IAP is updated every operational period.

Presidential Directive 5, an updated National Response Plan, and the use of a National Incident Management System are all key to an integrated response. Standardized training, credentialing for command and staff positions, and the formation of local and state incident management teams will further help first responders manage these types of incidents and provide a safer environment for those operating on the scene.

Portions of this article were extracted from Opening a *Bacillus anthracis*-Containing Envelope, Capitol Hill, Washington, D.C.: The Public Health Response, *Emerging Infectious Diseases [serial online], Oct. 2002; 8. This paper is available at http://www.cdc.gov/ncidod/EID/vol8no10/02-0332.htm.*

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Health Care

WEB SITE: http://www.nfpa.org/healthcare
CHAIR: Richard Strub, Grace Healthcare, Chattanooga, Tennessee

HOT ISSUES

Chair's corner

by DICK STRUB

Historical Perspective of Continuing Long-Term Care Problems

The long-term care industry is in the midst of a deepening financial crisis that will have an adverse effect on many nursing home residents, two of three of whom rely on Medicaid for their care. Medicaid has chronically under-funded the cost of long term care—by more than $3.5 billion in 2000 alone—and the continued threat of Medicaid cuts looms.

To better understand the situation in which the industry finds itself, we must review the history of Medicare, from the implementation of the prospective pay system (PPS), which was part of the Balanced Budget Act (BBA) of 1997, to the October 1, 2002, Medicare "Cliff," when many "add-ons" were allowed to sunset.

The PPS for skilled nursing care was implemented in mid-1998, as mandated by the BBA of 1997, but it was done so poorly that it resulted in cuts far deeper than Congress intended. Five-year spending levels are $37 billion lower than the pre-PPS spending projections and $17 billion lower than spending levels Congress included in the BBA. In 2000 alone, Medicare spending for skilled nursing care was $3.6 billion lower than Congressional Budget Office projections. As a result, five of the top long-term care provider chains declared bankruptcy.

In response to those bankruptcies and the financial condition of the industry, Congress provided some relief by providing Medicare add-ons through the Balanced Budget Refinement Act of 1999 and the Beneficiary Improvement and Protection Act of 2000. While these acts did not bring the payment structure back to pre-PPS standards, they did provide the industry with much-needed financial relief.

On October 1, 2002, however, Congress allowed the add-ons to sunset, resulting in a $1.8 billion Medicare cut for nursing home care in fiscal year 2003. These cuts led three long-term care chains to declare bankruptcy this year and forced a number of facilities to close their doors. Caregiver jobs have been cut, and access to quality long-term care has been adversely affected.

There is also a chronic workforce shortage in long-term care. Nearly 100,000 nursing/nursing assistant vacancies are currently unfilled, a gap that limits the quality of care providers can give. Furthermore, Medicare therapy caps of $1,590 per patient per year limit the amount of physical, speech, and occupational therapy nursing home residents may receive, no matter how great their need. A resident who requires more therapy, such as a stroke victim, will only receive therapy until that cap is reached.

In addition, skyrocketing liability insurance costs and increased litigation have forced some providers to operate without insurance or declare bankruptcy. Several provider chains have left states where liability costs are prohibitively high.

According to a Health and Human Services Administration report prepared by the Centers for Medicare and Medicaid Services (CMS), "nursing facilities' access to equity financing is essentially nonexistent, and debt financing is available only to a few.... Investor sentiment is mostly negative due to uncertainties related to government payment and the rising cost of liability insurance."

While the problems of Medicaid and Medicare are many and admittedly serious, the question is whether we, as a nation, are prepared to abandon our nursing home residents in their time of need.

Fall Education Conference schedule

The Health Care Section is offering a full program at the 2003 Fall Education Conference in Reno, with three educational sessions, an Executive Board meeting, a business meeting, and a host of task group meetings.The following is a preliminary schedule.

Friday, November 14
Pre-conference seminar registration:
7:00 a.m. to 8:00 p.m.

NFPA 99, *Health Care Facilities*, seminar:
8:00 a.m. to 4:30 p.m.

Saturday, November 15
Pre-conference seminar registration:
7:00 a.m. to 8:00 p.m.

NFPA 99 seminar: 8:00 a.m. to 4:30 p.m.

Registration: 2:00 to 5:00 p.m.

Sunday, November 16
HCS information room:
7:00 a.m. to 5:00 p.m.

Registration: 7:30 a.m. to 5:00 p.m.

Codes and standards review task group:
7:30 to 8:00 a.m.

Codes and Standards Review Forum:
8:00 to 11:45 a.m.

Education sessions: 8:00 a.m. to 5:30 p.m.

NFPA 99C, *Gas and Vacuum Systems*, seminar: 1:30 to 5:15 p.m.

Monday, November 17
HCS information room:
7:00 a.m. to 5:00 p.m.

HCS information room task group:
7:00 to 8:00 a.m.

HCS LRP task group:
7:00 to 8:00 a.m.

HCS membership task group:
7:00 to 8:00 a.m.

Registration: 7:30 a.m. to 5:00 p.m.

Opening General Session: 8:00 a.m.

HCS education task group:
11:00 a.m. to 12:00 p.m.

Education sessions: 1:00 to 5:00 p.m.

HCS Executive Board meeting:
3:00 to 5:00 p.m.

Tuesday, November 18
HCS information room: 7:00 a.m. to 5:00 p.m.

Registration: 7:30 a.m. to 5:00 p.m.

Education sessions:
8:00 a.m. to 12:00 p.m.

Luncheon:
12:15 to 1:45 p.m.

Education sessions:
1:45 to 5:45 p.m.

HCS business meeting:
2:00 to 4:00 p.m.

Wednesday, November 19
Registration: 7:30 a.m. to close of Technical Committee Report session

Education session:
8:00 a.m. to 12:00 p.m.

Fire Modeling Alcohol-Based Hand Solutions:
8:00 to 9:45 a.m.

Technical Committee Report session:
1:30 p.m. to completion

Fall Education Conference program
This year, the section is offering three educational sessions. The first is the codes and standards review forum, which will provide insight into proposed changes to the documents up for vote at the Fall Education Conference and how they will affect the health-care industry. The format of the forum has changed to meet the criteria for obtaining CEUs. It will now have learning objectives, as well as open discussion from the audience.

The second program is a four-hour training program on NFPA 99C, *Gas and Vacuum Systems*. This program, presented by David Mohile, chair of the Technical Committee on Piping, will cover the entire gas and vacuum system, including source equipment, manifolds, valves, piping materials, brazing requirements, and testing criteria.

The last program is a panel discussion on alcohol-based hand sanitizers, which have been a topic of controversy that the codes and standards don't fully address. ASHE recently sponsored a Gage-Babcock research project to investigate the fire hazard of the sanitizers and to develop guidelines for their placement and storage. Gage-Babcock conducted an extensive computer modeling simulation and analyzed the codes that pertain to this subject. The panel will discuss the results of this research and its impact on the industry.

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International Fire Marshals Association

WEB SITE: http://www.nfpa.org/ifma
CHAIR: Ron Farr, Kalamazoo Township Fire Department

HOT ISSUES

IFMA provides assembly occupancy leadership

On March 13, Chief Ron Farr, then International Fire Marshals Association (IFMA) president, testified on IFMA's behalf at a special meeting of NFPA's Technical Committee on Assembly Occupancies, convened following the tragic fire on February 20 at The Station nightclub in West Warwick, Rhode Island to review relevant safety issues in public assembly occupancies. During the meeting, Chief Farr also participated in the deliberations on proposed code changes.

Shortly after the meeting, IFMA's Executive Board was advised of proposed tentative interim amendments (TIAs).

The Board did not believe the proposed TIAs adequately addressed some key issues, so it submitted its own TIAs to NFPA 101®, *Life Safety Code®*, and NFPA 5000™, *Building Construction and Safety Code™*. IFMA also sought representation on the Technical Committee on Assembly Occupancies, and the Standards Council appointed two IFMA members and three additional fire prevention officers on April 1.

On July 9, the committee met again to address the proposed TIAs. IFMA's representatives and the other fire prevention members of the committee succeeded in guiding the committee to recommend revised TIAs. The revised TIAs were submitted to the NFPA Standards Council during its July 16 meeting, at which Chief Farr again testified. The Standards Council approved the revised TIAs, which require automatic sprinkler protection in all new bars and nightclubs with occupant capacities of 50 or more, and in existing bars and nightclubs with an occupant load of 100 or more.

"The Board thanks all who assisted IFMA in this process," said Chief Farr. "Without the help and strong support of members across the U.S., IFMA would not have been successful in achieving this significant increase in public safety. With continued dedication and active participation by members, IFMA will continue to be a leader in fire safety."

Professional development

The International Fire Marshals Association Fire Protection Institute currently offers two training programs, "Management Institute for Fire Marshals" and "Principles of Fire Protection Engineering." IFMA hopes to roll out a new course early in 2004 in cooperation with the Society of Fire Protection Engineers on evaluating performance-based designs. The course is designed for authorities having jurisdiction who are responsible for approving or reviewing performance-based designs. Anyone interested in attending or sponsoring a program may contact Executive Secretary Steven F. Sawyer at (617) 984-7423 or ssawyer@nfpa.org. Check www.nfpa.org.ifma for complete details.

And don't forget...

IFMA turns 100 in 2006. If you have any ideas how to celebrate the occasion, please contact Committee Chair John Robison at firemarshal@insurance.state.al.us.

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Industrial Fire Protection

WEB SITE: http://www.nfpa.org/industrial
CHAIR: Mike Newman, Johnson & Johnson

HOT ISSUES

Chair's corner

by MIKE NEWMAN

The Industrial Fire Protection Section (IFPS) Board kicked off this fall's activities with a meeting at NFPA headquarters in Quincy, Massachusetts, at which we welcomed newly elected Board members and officers.

This meeting also gave us a chance to discuss issues of mutual interest with NFPA leadership and staff. It was a productive way to get back to work after the summer break.

If you plan to attend the 2003 NFPA Fall Education Conference in Reno, please note that the IFPS will sponsor several informative sessions. Visit www.nfpa.org for details.

I have already had a few inquiries about the IFPS Fire Protection Week Contest, and it looks to be another year of top-notch entries. Please check the Web site for further details. The more entries, the better. Judging this contest is one of the highlights of the winter Board meeting.

Thanks to all our members for their input and interest in the section.

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Latin American

WEB SITE: http://www.nfpa.org/latinamerican
CHAIR: Eduardo Abé, Tecin Rosenbauer S.A., Buenos Aires, Argentina

HOT ISSUES

Section Board meets in Quincy

Under the leadership of José Figueroa, the Latin American Section will make member participation and communication a priority.

"I want the members to get to know the benefits of participating in the Latin American Section and, most important, to communicate to the Board their needs so that we can present them to the Association," Figueroa said. As a first step, he held a business meeting on October 14 and 15 to develop a business plan for the next two years.

During the first day of the meeting, attendees toured the new FM Global Technology Center laboratory, one of the worlds' largest and best-equipped full-scale fire-testing facilities. Figueroa organized the visit to emphasize the critical role fire protection plays in reducing losses. You can view the Global Technology Center at www.fmglobal.com/research_standard_testing/test_center.html.

The next day, the Board developed a business plan that will enable section members to participate in section activities and become more involved in NFPA programs that promote professional development and safety practices in fire protection and the built environment, areas in which there is currently a lot of activity in Latin America. The Board would like the section to help you determine the best way to put these programs into practice in your countries.

Attendees also discussed Internet

communication and *NFPA Journal Latinoamericano*, and met with several NFPA staffers to address pending matters relating to section operations. For a full report of the meeting, visit www.nfpa.org/las.

Previous section chairs Eduardo Abé and Jaime Andrés Moncada gave the section a solid foundation, and the Board is confident we can reach our objectives during the next few years.

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Lodging Industry

WEB SITE: http://www.nfpa.org/lodging
CHAIR: Thomas Daly, Hilton Hotel Corporation

HOT ISSUES

California drafting rule on mattress flammability

by THOMAS G. DALY

California's Bureau of Home Furnishings and Thermal Insulation (BHFTI) has proposed a new rule and testing requirement for mattress flammability that would apply to all occupancies, regardless of their level of fire protection. Final written testimony was due July 31, and a final hearing was to be scheduled later. Any such rule must be approved by the state's Office of Administrative Law.

The California Hotel and Lodging Association (CH&LA) filed a series of comments on the proposed rule stating that the BHFTI hadn't followed the dictates of the enabling legislation as to what the rule was to contain. The legislation directed that such standards not affect mattresses used in sprinklered hotels, following the recommendations of the *NFPA 101®, Life Safety Code®*, which exempts mattresses from such regulation regardless of occupancy as long as the occupancy is sprinklered.

Although BHFTI could have adopted NFPA criteria, including NFPA 272, *Standard Method of Test for Heat and Visible Smoke Release Rates for Upholstered Furniture Components or Composites and Mattresses Using an Oxygen Consumption Calorimeter*, and the pass/fail criteria found in the *Life Safety Code*, it decided instead to develop Technical Bulletin 603 and its own pass/fail criteria. Nothing in BHFTI's supporting documentation relates its proposed criteria to empirical evidence.

CH&LA also noted that the BHFTI pass/fail criteria of 200 kW peak heat release and 25 MJ total heat release was excessive. The *Life Safety Code* recommends 250 kW and 40 MJ, respectively, in unsprinklered occupancies.

As of mid-August, BHFTI had not scheduled the final hearing.

Information on the pending rule, to become effective in January 2005, can be found at www.bhfti.ca.gov. We will update you as to the outcome.

California to ban fire retardant

In early August, California Governor Gray Davis signed legislation banning polybrominated diphenyl ethers (PBDEs), a fire retardant widely used in plastics, televisions, upholstered furniture, and foams. The ban is scheduled to go into effect in 2008. PBDEs are an alleged hazard for mice, though no studies have replicated a potential for harm in humans.

Through effective lobbying, the hotel industry has successfully exempted fully sprinklered hotels from such regulations. For example, upholstered furniture in public areas of a sprinklered hotel needn't meet the state's Technical Bulletin 133.

By increasing its flammability requirements while banning effective fire safety chemical treatments, California is making it difficult for many occupancy groups, including hotels, to specify products they routinely use, a situation that will ultimately have an adverse economic effect.

Section sponsors Fall Educational Conference session

The Lodging Industry Section will sponsor a session at the NFPA Fall Educational Conference in Reno titled "Case Study—Upgrading Fire Department Emergency Communications Capability in High-Rise Buildings." Executive Committee Member Byron Briese, P.E., will present the session on Monday, November 17, from 1 to 4:45 p.m. at the Reno Hilton. All section members and anyone else who is interested are encouraged to attend. For additional details, e-mail lodging@nfpa.org.

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Metropolitan Fire Chiefs

WEB SITE: http://www.nfpa.org/metro
CHAIR: Wes Shoemaker, Fire and Paramedic Chief, Winnipeg, Manitoba, Canada

HOT ISSUES

Metro Chiefs, U.S. Fire Administration develop metropolitan incident management teams

In the fall of 2002, Metro Chiefs Section Chair Mario Trevino and U.S. Fire Administrator David Paulison signed a memorandum of understanding (MOU) agreeing to a set of strategic objectives, including:

- Establishing metropolitan-area incident management team (IMT) regional overhead teams, based on U.S. Forest Service models;
- Developing IMT capability;
- Providing mutual-aid staff/unified command training and development;
- Using the integrated emergency management system; and
- Developing and implementing a nationwide credentialing system similar to the U.S. Forest Service's Red Card program.

The U.S. Fire Administration assembled a focus group that met in Gettysburg, Pennsylvania, for four days to develop course curricula for incident management team development. The 28-member group represented federal, state, and local government fire service professionals, many of whom had extensive experience working on incident management teams. Recently retired Fire Chief Tim Fuller of St. Paul, Minnesota; Fire Chief David Daniels of Fulton County, Georgia; Fire Chief Gary Morris of Seattle, Washington; and Fire Chief Bill McCammon of Alameda County, California, represented the Metros.

The MOU guided the group, which addressed the issues facing metropolitan areas interested in starting IMTs by develop-

ing recommendations for a how-to program.

The group recommended promoting the development of Type 3 teams representing a larger regional or state involvement with specific training requirements and certifications. The teams would have an all-risk mission, using the National Wildland Coordinating Group incident command system position descriptions and training curriculum as a foundation.

Finally, the group felt that a marketing strategy was essential to dispel the lack of understanding of the benefits the teams provide and the resistance to command-level assistance from other organizations.

At the end of the four days, everyone felt that they had accomplished a great deal, but that there was considerable work ahead to develop and promote the teams envisioned in the MOU. The Metro chiefs who attended are committed to seeing the process through and will work on the next steps.

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Rail Transportation Systems

WEB SITE: http://www.nfpa.org/rail
CHAIR: James Gourley, Fire Protection Engineer, Glenside, Pennsylvania
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Research

WEB SITE: http://www.nfpa.org/researchsection
CHAIR: Samuel Dannaway, Dannaway and Associates

HOT ISSUES

Eighth Suppression and Detection Research Applications Symposium scheduled for January

Fire protection engineers and fire prevention officers are urged to mark their calendars for The Fire Protection Research Foundation's eighth annual user-oriented Fire Suppression and Detection Research Application Symposium at the Holiday Inn Select, Orlando International Airport, from January 21 to 23, 2004. Practitioners and researchers will present more than 25 papers detailing results from a variety of research initiatives in fire suppression and detection, emphasizing case studies and the real-world application of new documentation in designs, approvals, and codes.

The theme of this symposium is "Bridging the Gap" between practitioners and researchers, and between detection and suppression innovations.

For more information, contact Conference Coordinator Eric Peterson at epeterson@nfpa.org or at +1-617-984-7281.

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Wildland Fire Management

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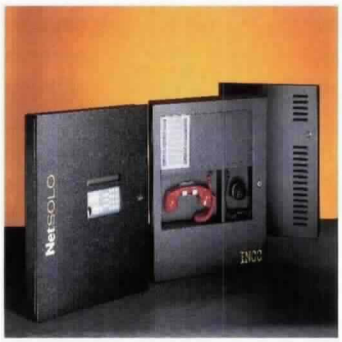
CHAIR: Bill Terry, USDA Forest Service
HOW TO REACH US: Jim Smalley, Executive Secretary, +1-617-984-7483, jsmalley@nfpa.org

Network Controls

Imagine full network control, digital messaging, live voice and fire fighter telephone communications distributed throughout a network fire alarm system… on a single pair of wires. For over 26 years, FCI has stood for quality and value… NetSOLO® BROADBAND adds muscle and speed. For information, visit us at www.firecontrolinstru-ments.com.

FCI

Circle Reader Service Card No. 100



Control Panel

Gamewell's new IdentiFlex 602 is the ideal solution for your small to medium-sized installations of commercial, institutional, and industrial life safety applications. The IdentiFlex 602 analog addressable control panel operates in single or dual loop mode, supports up to 252 analog devices, and is networkable using SmartLink peer-to-peer protocol.

Gamewell

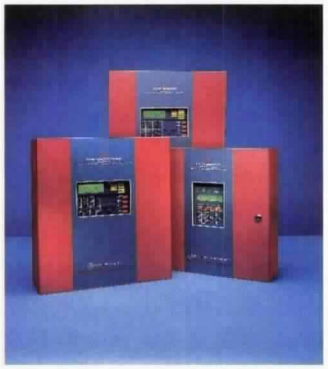
Circle Reader Service Card No. 104

Control Panel

Fire-Lite Alarms, part of Honeywell's Fire Systems Group, the leading manufacturer of quality life safety systems, offers a complete line of addressable fire alarm control panels, including the MS-9200, MS-9600, and MS-9200UD. All three panels feature advanced auto-programming capabilities, reducing installation time and overall cost. For more information visit www.firelite.com.

Fire-Lite Alarms

Circle Reader Service Card No. 101

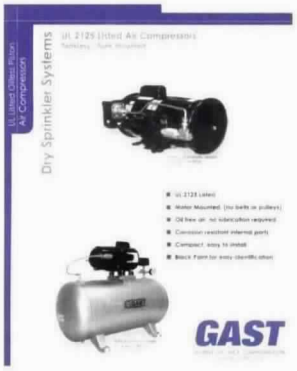


Air Compressors

UL-listed air compressors that meet the new UL 2125 standard, *Motor-Operated Air Compressors for use in Sprinkler Systems*, are featured in Gast manufacturing's *Dry Sprinkler Systems Brochure*. The air compressors are available in riser-mount styles, for horizontal and vertical mounting, and in tank mounted styles. For additional information, contact Gast Manufacturing, Incorporated, (800) 952-4278, or visit www.gastmfg.com.

Gast Manufacturing

Circle Reader Service Card No. 105

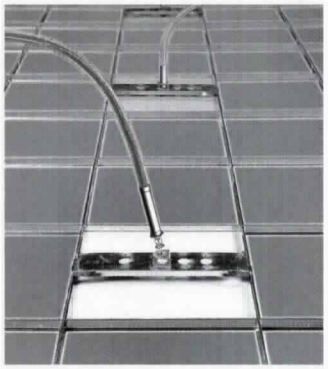


Fire Sprinkler Connection

The first UL-listed and FM-approved flexible fire sprinkler connection designed for use in suspended ceilings. In a quarter of the time it takes for a hard-pipe installation, you can easily install a Flexhead exactly in the center of a tile. Call (800) 829-6975 or visit us online at flexhead.com for more information.

Flexhead

Circle Reader Service Card No. 102



Product Video

New video shows how an FM-200 Waterless Fire Protection system protects critical assets from fire and water damage. See how long a fire can burn before sprinklers activate. See an FM-200 system detect and eliminate fire within seconds. Call (877) 686-7888 or visit www.fm-200.com to request a copy.

Great Lakes Chemical Corporation

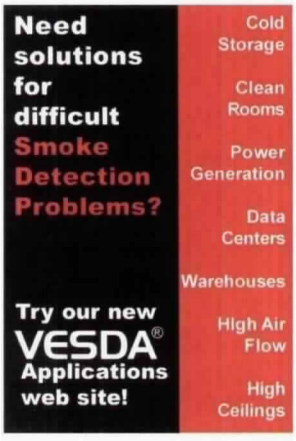
Circle Reader Service Card No. 106

Product Information

Smoke detection solutions on our VESDA Applications web site include multi-page application guides complete with illustrations, market specific PowerPoint presentations, brochures, 3-D animations and video, and much more. We're continuously updating this area with complimentary information and multi-media support tools. Register or log-on today at www.visionusa.com/vesda.

Vision Fire and Security

Circle Reader Service Card No. 103



Linear Heat Detection

For applications where spot detectors are ineffective, the Kidde LHS™ fixed-temperature linear fire sensor cable is the answer. Available in five alarm temperatures from 155°F to 465°F, the Kidde LHS linear heat sensor also can locate fire by zone when used with the Kidde PEGAsys™ intelligent control panel. Visit kiddefiresystems.com for more information.

Kidde Fire Systems

Circle Reader Service Card No. 107

Locking Cap

As communities improve Homeland Security, the vulnerability of automatic sprinkler systems and the potential compromise of fire department connections (FDC's) merit attention. Unprotected FDC openings invite miscellaneous foreign objects. Caps are available in male plugs and large diameter Storz. They are easily removable by fire department personnel with a Knox Keywrench™. Visit www.knoxbox.com.

Knox Company

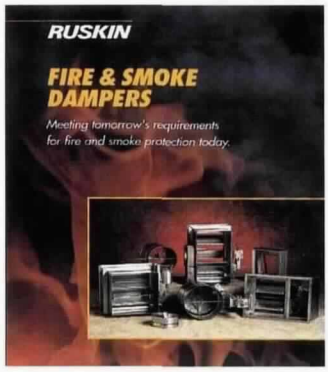
Circle Reader Service Card No. 108

Fire & Smoke Dampers

Ruskin offers the most complete line of UL-classified products in the industry. Ruskin UL-classified products are designed to provide the superior performance required to meet the challenges faced by both designers and installers of fire- and smoke-control systems. For a free copy of Ruskin's Fire & Smoke Dampers brochure or a selection and application manual, call (816) 761-7476.

Ruskin

Circle Reader Service Card No. 112

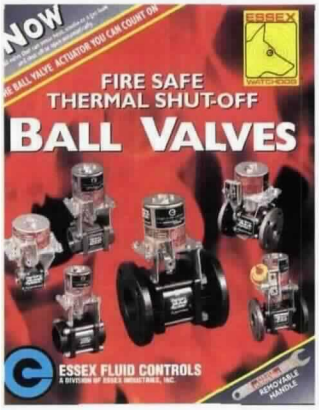


Fire Safe Valve Actuator

Free brochure for FM-approved WATCHDOG® fire safe valve actuator. This fusible link shutoff valve actuator is a self-contained, spring-loaded device that automatically shuts off or opens fire safe ball valves to prevent toxic materials from spreading. Available with heat-activated thermal links, or ETL Links. The units can be manually operated. Web site www.essexind.com.

Essex Fluid Controls

Circle Reader Service Card No. 109



Valves

The line is FM-approved to 300 psi for deluge, dry-pipe, and preaction systems. Available in sizes 1½ inch to 12 inches in a variety of materials and coating. Quality assurance and control are ISO 9001-certified. Every single valve is tested at the sophisticated high-pressure and flow test rig. Visit us at www.inbal-valves.com. Complete presentation and data sheets are available on CD.

Inbal Valves

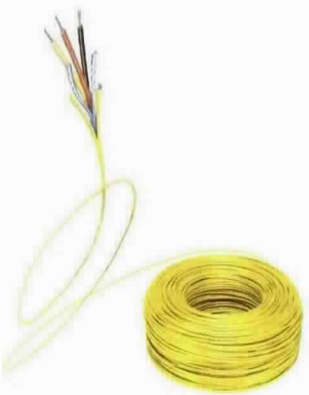
Circle Reader Service Card No. 113

Dual Temperature Detection

Protectowire Model TRI is a unique heat sensing cable capable of initiating separate pre-alarm (155°F) and alarm signals (200°F) on a single detection circuit. When used with a Protectowire FireSystem Control Panel, TRI-Wire provides Confirmed Temperature Initiation for activating extinguishing systems, and initiates the control panel display. Visit www.protectowire.com.

The Protectowire Company

Circle Reader Service Card No. 110



Control Panel

NOTIFIER's ONYX Series offers an extremely flexible network solution for all your fire detection needs: Compatible with BACnet compliant HVAC systems; Enhanced survivability through distributed control; Faster network communications; True "Peer-to-Peer networking; Small System networkability; Design Flexibility; Reduced costs. Everything you would expect from NOTIFIER. Visit www.notifier.com

Notifier

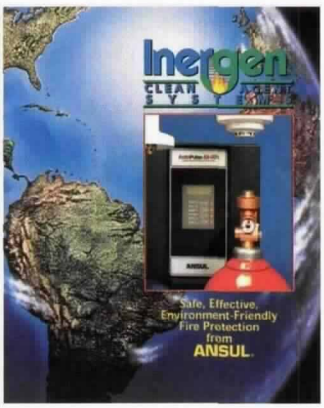
Circle Reader Service Card No. 114

INERGEN® Clean Agent Systems

INERGEN systems protect normally occupied areas containing sensitive electronic equipment, irreplaceable documents, and other valuable artifacts and assets. An inert gas mixture, INERGEN agent requires no cleanup, contains no chemicals, is non-toxic and non-conductive, and will not produce corrosive decomposition products. It's approved by UL, FM, ULC, and many other laboratories. (800) 346-3626, www.ansul.com.

Ansul

Circle Reader Service Card No. 111

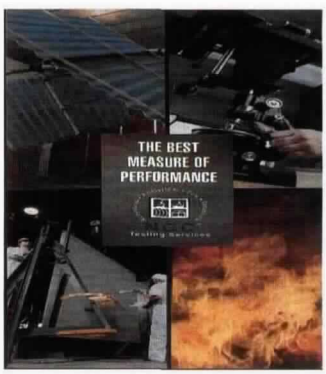


Fire Testing Services

Over 35 years of providing fast, cost-effective evaluations of materials, products, and systems for fire endurance and flame spread from the developmental stage through the certification process. Accredited lab with full-scale, floor-ceiling and partition fire test capabilities. Acoustical testing is also available. For more information, call (716) 873-9750 or visit our web site, www.ngctestingservices.com.

NGC Testing Services

Circle Reader Service Card No. 115

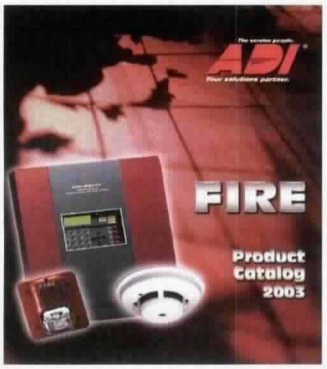


Product Catalog

The 2003 ADI Fire Catalog features conventional, addressable, and voice evacuation control panels; ADA compliant notification appliances and explosion-proof signals; smoke, beam, gas and carbon monoxide detectors; sprinkler monitoring and water flow detection devices; emergency lighting products; and fire alarm cable. Call (800) 233-6261 for your free copy.

ADI

Circle Reader Service Card No. 116

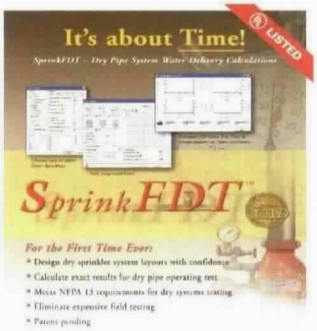


Sprinkler System Software

SprinkFDT is the latest software offering from Tyco Fire & Building Products' SprinkCAD division. SprinkFDT (Fluid Delivery Time) empowers a sprinkler designer to predict the time it takes to trip a dry valve and deliver water to the remote area without the requirement of a physical trip test. For more information visit www.sprinkcad.com.

Tyco Fire & Building Products

Circle Reader Service Card No. 120



Fire Alarm Control/ Communicator System

Silent Knight introduces the IntelliKnight Model 5700, a 50-point class leading single loop addressable fire alarm control/communicator system that provides you with the revolutionary value and performance of addressable sensing technology combined with exclusive, built-in digital communication, distributed intelligent power, and easy to use interface.

Silent Knight

Circle Reader Service Card No. 117

Life Safety Technology

Genesis™ Signals including Horns, Strobes, and Speakers are the latest evolution in life safety technology from EST. These revolutionary signals feature an aesthetic design like nothing you've ever seen before. These sleek signals only extend 1-inch from the wall, making them the most compact UL/ULC listed signaling devices available today.

EST

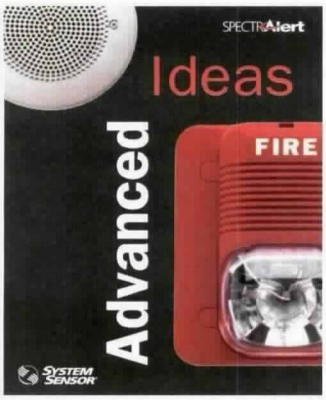
Circle Reader Service Card No. 121

Notification Devices

System Sensor's Selectable Output Series™ notification devices feature the industry's widest range of candela settings - 15, 15/75, 30, 75 and 110 candela. Models operate at dual voltage levels, self-adjusting for 24 or 12 volts. Two- and 4-wire models fit standard back boxes with no encroachment. For more information visit www.systemsensor.com.

System Sensor

Circle Reader Service Card No. 118



Signature Series Intelligent Detectors & Modules

The Signature Series line of input devices - including intelligent detectors and modules - leads the industry with its multisensor technology! When combined with an intelligent EST control panel, Signature Series devices are perfect for retrofit applications because all detectors and modules have the unique ability to use existing wiring.

EST

Circle Reader Service Card No. 122

Deluge Valve

Tyco Fire & Building Products introduces DV-5 – first in a series of deluge valves featuring a distinctive diaphragm operation for horizontal and vertical installations. With a one- or two-piece diaphragm design, external resetting, and no linkage or clapper assembly, the DV-5 eliminates cumbersome deluge valve maintenance. For more information visit www.tyco-fire.com.

Tyco Fire & Building Products

Circle Reader Service Card No. 119

Computers

Comark manufactures UL864 Recognized Computers and Displays. We provide configuration control, as well as UL864 File submission and maintenance. Based on Intel PIII or P4 processors, all systems are high-temp tested and burned-in to ensure reliable operation. We have your Fire Alarm, Access Control, and Building Automation solutions. Call (800) 280-8522, x 105.

Comark

Circle Reader Service Card No. 123

Clean Extinguishing Agent

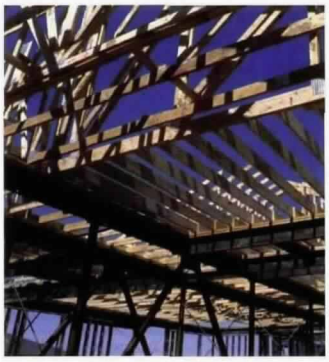
HALOTRON® I, a clean fire extinguishing agent that leaves no powder residue and replaces Halon 1211, is available worldwide for fire extinguishers; aircraft rescue and firefighting vehicles; limited flooding applications; portables and wheeled units. Also EPA SNAP list for commercial/industrial, maritime and military use. FAA-approved for use on-board commercial aircraft. Visit www.halotron-inc.com.

American Pacific Corporation
Circle Reader Service Card No. 124

Fire Retardants

Hoover Treated Wood Products, Inc. offers Pyro-Guard® interior fire-retardant treated lumber and plywood and Exterior Fire-X® for weather-exposed applications. FRTW will slow the advance of flame and allow time for firefighters to do their job. Building codes often allow FRTW to be used in lieu of non-combustible materials. Visit us at www.frtw.com.

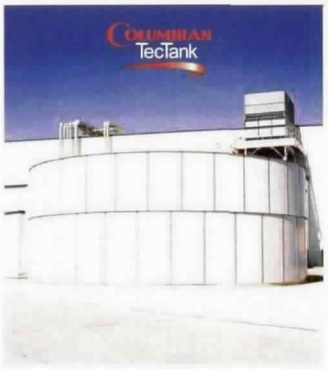
Hoover Treated Wood Products, Inc.
Circle Reader Service Card No. 128



Water Tanks

Columbian TecTank tanks are NFPA 22, Water Tanks for Private Fire Protection, and FM compliant. Their Trico-Bond™ 478 "finish" is factory applied and baked on in our ISO 9001-certified facilities to give you the highest quality product. For further information, call (815) 748-3228 or e-mail sales@columbiantectank.com.

Columbian TecTank
Circle Reader Service Card No. 125



Releasing Control Panel

SimplexGrinnell strengthens its Special Hazards fire protection capabilities with a new releasing control panel designed for suppressing fires in computer rooms, petrochemical facilities, power plants and other high-risk environments. The Simplex, 4004R Suppression Releasing Panel controls the release of extinguishing systems where the risk of a fast-spreading fire is high.

SimplexGrinnell
Circle Reader Service Card No. 129

Pipe Concealment System

The Soffi-Steel™ System is today's premier modular steel pipe concealment system, custom designed to provide a durable, maintenance-free facing that's attractive and quickly installed. It can be used to conceal fire sprinkler, plumbing, HVAC, and hydronic piping. The Soffi-Steel™ System is available in various finishes and sizes. Call Grice Engineering at (800) 800-3213 or visit www.soffisteel.com.

Grice Engineering
Circle Reader Service Card No. 126

Fire Alarm Test Equipment

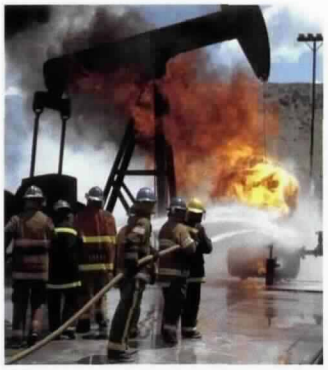
HSI Fire & Security Group, a new division of Home Safeguard Industries, introduces VersaTools™ includes the VersaTest™ aerosol dispenser for functional testing smoke and CO detectors and the VersaPole™ telescoping fiberglass test pole with 20' extendable reach. Optional 4' extensions are available. HSI has expanded its Smoke Detector Tester™. Visit www.homesafeguard.com.

HSI Fire & Security Group
Circle Reader Service Card No. 130

Fire Science Academy

World-renowned for its industrial curriculum, hands-on training props, and use of liquid fuels in real-life situations, the University of Nevada, Reno, Fire Science Academy serves industries, agencies, and governments around the world. Courses available in crisis and emergency management, incident command and response, hazardous materials, and aircraft rescue and fire fighting. For more information, visit www.fireacademy.unr.edu.

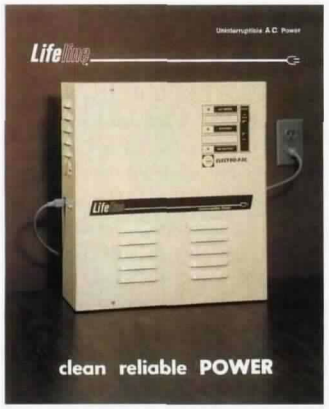
University of Nevada, Reno
Circle Reader Service Card No. 127



Uninterruptible Power

Fire Alarm Power Supply Unit suitable for providing uninterruptible power and fire protective signaling service to NFPA 72 systems. UL Standard UL1481 and UTRZ. UPS power rating 600VA. External batteries on a rack provide 4 hours back-up time–300W load. Two hours back-up time–600W load.

Instrumentation & Control Systems, Inc.
Circle Reader Service Card No. 131



Clean Agent Retention

The system shown tests tall buildings for smoke movement and smaller systems test for Clean Agent Enclosure Integrity in compliance with NFPA and ISO. Door-fans will show how agents such as FM200 and INERGEN will be lost and how smoke can damage delicate equipment and create life safety hazards. Demo software at www.retrotec.com.

Retrotec

Circle Reader Service Card No. 132

Mobile-Modular Training

Practice NFPA 1001 skills with Mobile FireTrainer® that includes forcible entry, ventilation, search and rescue, fire suppression, and rapid intervention. Features two computer-controlled, interior fires plus a flashover effect. Certified safety to NFPA and UL standards. An eligible purchase under the FIRE Act grant program. For information visit www.symtron.com.

Symtron Systems Inc.

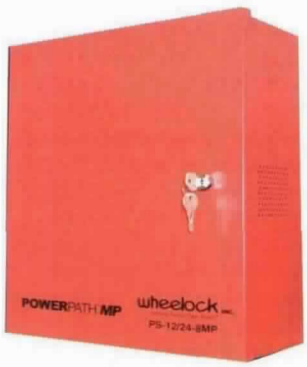
Circle Reader Services Card No. 133

Power Supply/Charger

POWERPATH MP Series PS-12/24-8MP is a power limited 8-ampere power supply/charger used to expand the supervised power capability of a Fire Alarm Control Panel for Notification Appliance Circuits as well as providing 3.5A of auxiliary power to support door holder system accessories. During an alarm, the door holder power is released and directed to the NAC Circuits. For more information, visit www.wheelock-inc.com.

Wheelock, Inc.

Circle Reader Services Card No. 134



Level & Content Tester

An Ultrasonic Liquid Level tester for Fixed Fire Extinguisher Systems is available from Link Instruments Ltd. The ULLC2001 Ultrasonic Liquid Level Comparitor is UL-listed, supplied with precision-made transducers, and uses micro-pic technology components. Each unit is programmed with the customers name in its display. Levels on CO_2, Halon, FM200 and other equivalents are easily compared and located. For information, visit www.linkinst.com .

Link Instruments

Circle Reader Services Card No. 135

Leak detection system

The Fenwal Leak Detection System consists of a patented Leak Detection Cable that runs throughout the protected area and links to a control unit. The Fenwal LDZ4 and LDZ8 Leak Detection Zone Controllers monitor up to 1,000 feet (305 meters) of the special cable per zone. For larger areas, the Fenwal LD5000 Distance-Read Leak Detection System pinpoints leaks in 5,000 foot (1,524 meter) long cable systems. For more information visit www.fenwalfire.com.

Fenwal

Circle Reader Service Card No. 136

Fire pump controller

The FDM Medium Voltage Microprocessor-based Fire Pump Controller is based on the AMPGARD controller design, which incorporates Eaton's industry leading Cutler-Hammer TRITON SL Series Medium Voltage Vacuum Contactor. The SL-400 Contactor utilizes vacuum interrupters that exhibit a long electrical life and a high iterruption capacity and are available from 2200 - 7200 volts.

Cutler-Hammer

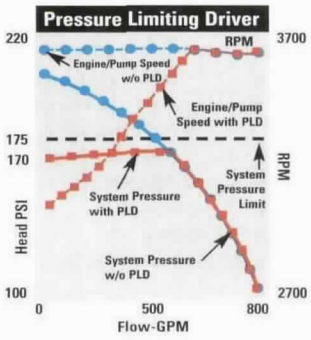
Circle Reader Service Card No. 137

Pressure Limiting Driver

When fire pump system pressure rises above system limits, Clarke Fire Protection Products' new variable-speed Pressure Limiting Driver (PLD) kicks in to drop engine RPMs and limit system pressure to a safe range below the system limit. To learn more, call Justin Strousse at (513) 719-2307.

Clarke Fire Protection Products

Circle Reader Service Card No. 138



Wall and ceiling applications

Conceal-Alarm, the architectural solution for fire alarm appliances, allows architects and engineers to place fire notification devices where the need to be without compromising the interior design and visual appeal of the facility. Conceal-Alarm is listed with both UL and CSFM. For more detailed information on Conceal-Alarm's custom-finished wall and ceiling applications, visit www.concealite.com.

Concealite

Circle Reader Service Card No. 139

Building A Safer World

NFPA World Safety conference & exposition

SALT LAKE CITY 2004

disciplines:

- FIRE & LIFE SAFETY
- ELECTRICAL
- SECURITY
- BUILDING DESIGN & MANAGEMENT
- FIRE SERVICE

conference tracks:

- LIFE SAFETY
- CODES & STANDARDS
- DETECTION & SUPPRESSION
- NEC FORUM
- FIREFIGHTING OPERATIONS/ EMERGENCY RESPONSE
- BUSINESS CONTINUITY
- LEADERSHIP/PROFESSIONAL DEVELOPMENT
- RESEARCH & TESTING
- SAFETY & SECURITY

This year's exposition will play host to more than 250 exhibitors and will feature two new pavilions. The NEC pavilion will feature products and services for design, installation and maintenance of electrical systems and equipment. The security pavilion will feature the latest in security products and systems that help to protect people, premises, and property. The exposition is your opportunity to find solutions to your fire protection, life safety, and electrical challenges with the most up-to-date products and services available in the industry.

NFPA®

Salt Palace Convention Center
Salt Lake City, Utah

Conference: May 23 – 26, 2004
Exposition: May 23 – 25, 2004

Visit www.nfpa.org/meetings for conference updates and more information as it becomes available.

WHAT'S HOT

THERMAL IMAGER
The Bullard T3 Series Thermal Imager is the smallest, lightest-weight, toughest firefighting thermal imager in the world. Now, Bullard expands and enhances the performance of our palm-sized units with two new models: the enhanced T3LT™ and the high-performance T3MAX™. With the same tried-and-true simplicity and durability as the original T3, the new models incorporate an upgraded Raytheon Amorphous Silicon engine for improved image clarity and picture definition.
Circle Reader Service Card No. 140

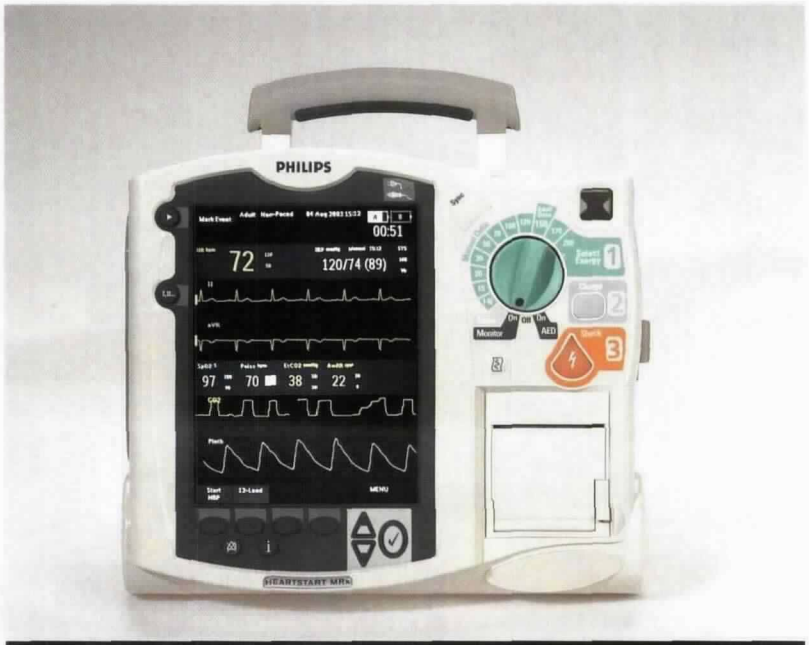
CONCEALED FIRE SPRINKLER
Victaulic Company of America's model V3804 quick-response, low-flow concealed fire sprinkler offers protection for residential applications. The V3804 permits up to one-quarter inch or eight millimeter adjustments to accommodate residential installation needs and incorporates 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. For more information, visit www.victaulic.com.
Circle Reader Service Card No. 141

DOOR HARDWARE
Corbin Russwin Architectural Hardware's ED5002 Series line of double cylinder exit devices incorporates double cylinder function rim, SecureBolt™ and mortise exit devices. Providing extra security in any application, ED5002 Series are also an ideal fit with Corbin Russwin's line of double cylinder classroom security products.
Circle Reader Service Card No. 143

DOOR CONTROL
Rixson Specialty Door Controls' new patch fittings attach to the bottom and top of full glass or Herculite® doors and act as a closer arm or top pivot arm. The result is that the door appears suspended, providing a solution that is both aesthetically appealing and highly functional. For more information visit www.rixson.com.
Circle Reader Service Card No. 142

SOFTWARE SOLUTION
TISCOR has six new software applications to simplify facilities' processes for tracking assets, tools, general files, inventory, legal evidence documents, and laboratory equipment. Each application offers the latest in mobile hand-held computing technology. As with all of TISCOR's software solutions, the tracking systems operate using TISCOR's software, hand-held computers, and bar codes. The products eliminate hand-written log sheets and time-consuming data entry. Contact TISCOR at (800) 227-6379.
Circle Reader Service Card No. 149

FOAM PUMP
Wircor's Hypro's FoamPro systems deliver fully automatic foam proportioning with pinpoint accuracy over the widest range of flows and pressures and provides more knockdown power than water.
Circle Reader Service Card No. 144



MONITOR/DEFIBRILLATOR
Philips' HeartStart MRx provides several best-in-class advantages important to both EMS and hospital users. It features the longest battery-powered operating time, as well as the largest color display and fastest time to shock of any monitor/defibrillator, taking less than five seconds to administer a shock. The HeartStart MRx features unparalleled automated self-tests that check for readiness as well as an exceptionally rugged design.
Circle Reader Service Card No. 145

CONTROL PANEL

Silent Knight's new IFP-50 intelligent analog/addressable fire control panel has drift compensation and features two notification appliance circuits that can be programmed for notification outputs or auxiliary power. The fire panel also has a built-in dual line digital fire communicator, Form C trouble relay, and two programmable Form C relays. Each of the addressable devices can be individually tested to simplify trouble-shooting. A pre-trouble maintenance alert works to identify problems before they happen. The new fire panel also uses a built-in digital communicator for remote reporting of system activity and system programming. For additional information, visit www.honeywell.com.
Circle Reader Service Card No. 146

MONITOR

Thermo Electron Corporation's Genesis Multi-Gas Monitor toxic sensors simultaneously monitor combustible gases, oxygen, and up to two toxic gases, Cl2, CO, H2S, HCN, NH3, NO, NO2, PH3, or SO2. The Genesis can be used as a diffusion-style monitor or with a built-in sample pump, hand-aspirated pump or extender cable for confined space entry. For more information, visit www.thermo.com.

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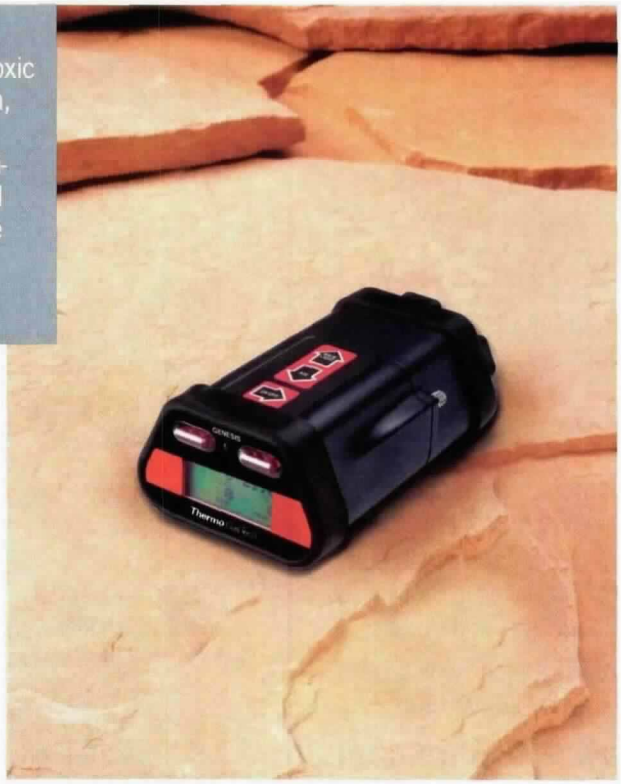

FLASHLIGHT

Pelican Products serves the fire service industry with a full line of high-quality, industrial strength safety approved flashlights and equipment protector cases. Pelican flashlights are the most safety approved flashlights made, and Pelican protector cases are unbreakable, watertight, and corrosion proof. For further information, visit www.pelican.com.

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December 1–2
CFPS Primer, Orlando, Florida. Call +1 800 344-3555 or +1 508 895-8300.

December 1–5
NFPA Seminars, (*National Electrical Code*, *Life Safety Code*, Automatic Sprinkler Systems, Low-Voltage Wiring, and *National Fire Alarm Code*), Orlando, Florida.
Call +1 800 344-3555 or +1 508 895-8300..

December 8–12
NFPA Seminars, (*National Electrical Code*, *Life Safety Code*, Automatic Sprinkler Systems *National Fire Alarm Code*, NFPA 79, and NFPA 30), St. Louis, Missouri. Call +1 800 344-3555 or +1 508 895-8300.

January 21-23, 2004
Fire Suppression & Detection Research Application Symposium, Orlando, Florida.
Hear cutting edge technical papers on research projects and testing in progress, case studies, performance measurement for design and codes, new strategies, technologies and systems.
For more information, go to www.nfpa.org/foundation; or contact Eric Peterson, The Fire Protection Research Foundation at (617) 984-7281; E-mail epeterson@nfpa.org.

February 24-27, 2004
SICUR: International Security, Safety and Fire Exhibition. The Juan Carlos I Exhibition Centre, Madrid, Spain. Telephone: (34) 91 722 50 42 - 91 722 50 00; Fax: (34) 91 722 57 88; E-mail: sicur@ifema.es. http://www.sicur.ifema.es/ferias/sicur/default_i.html.

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National fire protection consulting firm with career growth opportunities has a need for entry level and senior level fire protection engineers, designers and code consultants. Offices located in the Boston, Charlotte, Chicago, Dallas, Denver, Las Vegas, Los Angeles, Miami, Phoenix, San Diego, San Francisco, and Washington, DC areas. Competitive salary/benefits package.
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Fire Protection Program Department Chair/Instructor

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LOOKINGBACK

Iroquois Theatre Fire, Chicago, Illinois December 30, 1903

PHOTOGRAPH: CORBIS

For more information, visit www.nfpajournal.org

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FIRE CONTROL INSTRUMENTS

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Kidde Fire Systems

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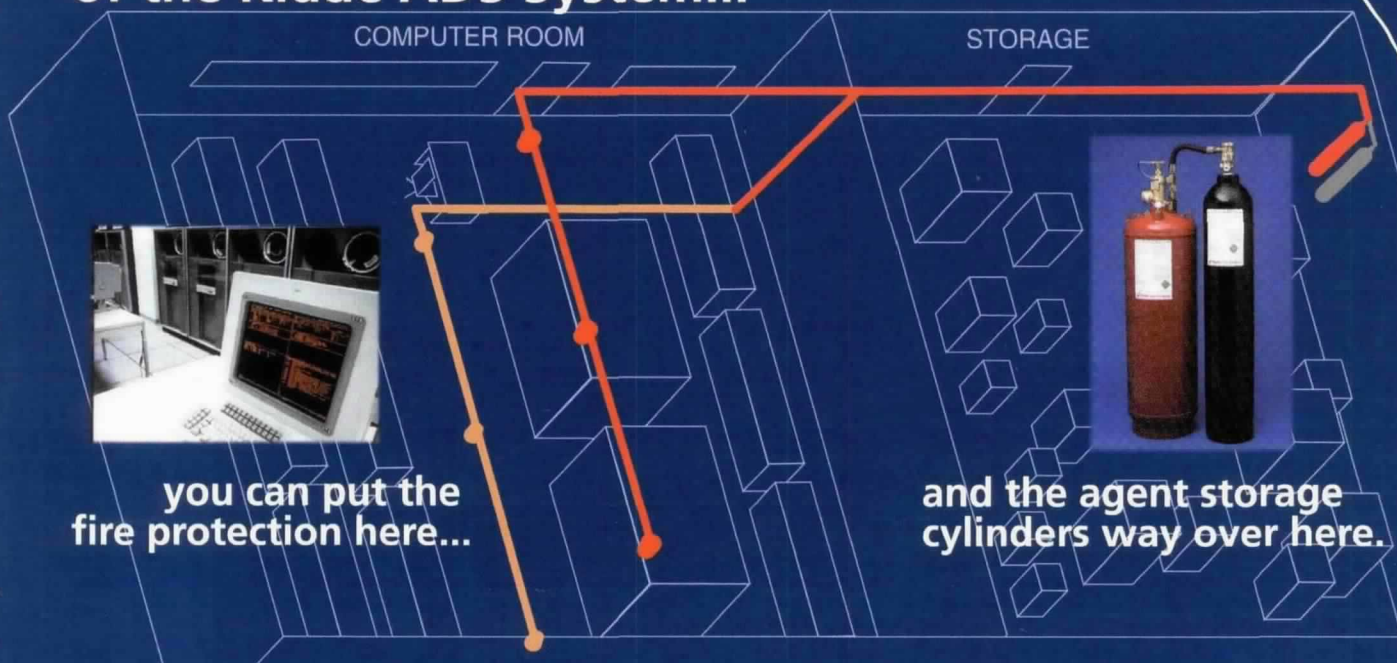

you can put the fire protection here...

and the agent storage cylinders way over here.

From the two fire protection leaders – Kidde Fire Systems and Great Lakes Chemical Corp. – comes the Kidde Advanced Delivery System. Thanks to what our engineers call "piston flow" patented technology, the Kidde ADS System gives you a design flexibility not previously found in special hazard fire suppression systems. Now you can provide fast, clean (FM-200), safe fire protection for a high-value asset – a vital data processing center or a museum filled with priceless treasures – without disturbing the aesthetics or the operation of the facility.

Our innovative technology uses nitrogen to "push" the FM-200 agent through a piping network into the protected enclosure. This means the Kidde ADS System can offer longer pipe distances for larger hazards, while still using smaller pipe sizes than regular FM-200 systems. And more economical protection for many of these applications. Not to mention a compact system that blends nicely into its surroundings.

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