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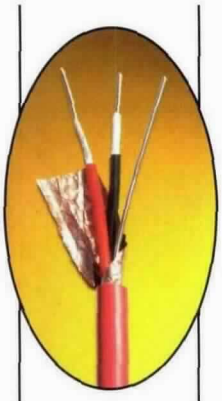

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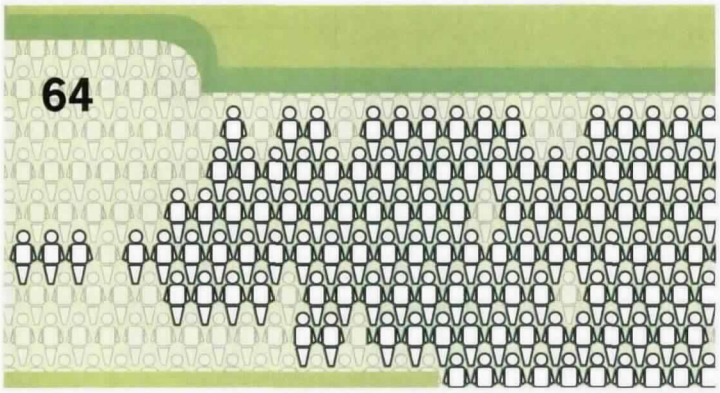

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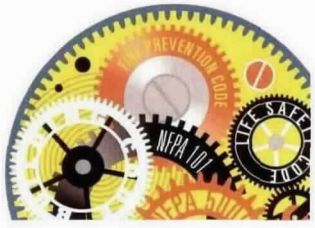
July/August 2003 | Volume 97 | Number 4

FEATURES

COLUMNS



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nfpa JOURNAL®

Volume 97/Number 4

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Fax (970) 223-3991
clouis@nfpa.org

Southern California
Michael Cosenza
Roy McDonald Associates
Cell (562) 400-0158
Fax/Office (562) 920-9779
mcosenza@nfpa.org

Northern California
Ian McDonald
Roy McDonald Associates
(510) 832-6300
Fax (510) 832-6302
imacdonald@nfpa.org

Pacific Northwest
Jim Olsen
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(503) 640-2011
Fax (503) 640-3130
jolsen@nfpa.org

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NFPA has been a worldwide leader in providing fire, electrical, building, and life safety to the public since 1896. The mission of the international nonprofit organization is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training and education.

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Threats to our security require support for our first responders

DURING THE PAST MONTHS, I have testified in both the Senate and the House urging federal support for our nation's first responders because of the continuing threat to our homeland security. In both the Senate Commerce Committee hearing and the House Science Committee I have been asked different versions of the same question: Isn't funding our fire service a

local responsibility? Why should the federal government assume the financial burden of paying for what has throughout history always been an obligation of cities and towns?

These are valid questions. But these are not ordinary times. Since September 11, 2001, I have spent a great deal of time with fire service personnel from all over America. Their time, energy, and resources are stretched to the breaking point because of the demands placed on them by the new threats for which they must prepare. In big cities and small towns across America, we expect and the federal government expects our first responders to be prepared to deal with a range of threats that had not been serious concerns just two years ago.

A needs assessment that NFPA conducted for FEMA demonstrates how severe the problem is for our whole fire service.

- Only 1 in every 10 fire departments has the personnel and equipment required to respond to a building collapse or the release of chemical or biological agents. One in ten.
- Half of our firefighting force lacks the formal training in technical rescue, which involves unique or complex conditions–precisely the situation they would encounter in a terrorist attack.
- As we send our firefighters into a building or any rescue situation, one-third of the protective clothing they are wearing is more than 10 years old.
- At least 65 percent of cities and towns nationwide lack sufficient fire stations to achieve widely recognized response-time guidelines.
- On a typical fire department shift, 45 percent of first responding firefighters lack portable radios. Thirty-six percent lack self-contained breathing apparatus.
- Forty-two percent answer an emergency call without a PASS (Personal Alert Safety System) device. For those of you who don't know, PASS devices help locate firefighters who are trapped inside buildings. They are crucial should an attack like the one on the Twin Towers occur.

The role of our fire service and other first responders is different today from what it has been at any other point in our history. Never before have enemies from outside threatened America like this. Our fire service is being asked to respond to a national emergency by our national government. The national government is equipped to assess the threat and coordinate through the Department of Homeland Security preparedness efforts. America's fire service and community of first responders have answered the call admirably and done their best to protect us all. However, the only way the gaps identified in our needs assessment can be closed is with some federal assistance. That is how this situation is different and why NFPA is doing everything it can to urge the federal government to help our fire service and other first responders to do the job we have asked them to do.

James M. Shannon
President and Chief Executive Officer, NFPA

PHOTOGRAPH: KATHY TARANTOLA

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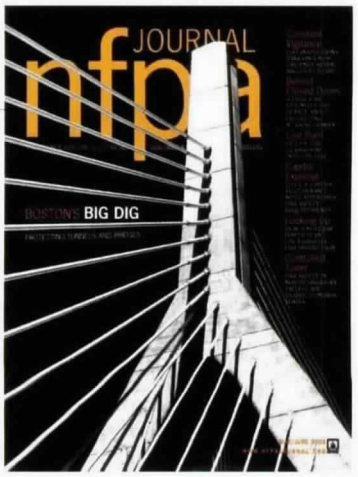

A Day Too Late

The "Over Under" article [on NFPA standards for bridges and tunnels] in the May/June 2003 issue came a day too late for our design team. This article would have saved us some time targeting the issues. Now that the differential equations for fill times have been solved, the heat transfer calculations for heat input have been determined, and life cycle costs with different insulation thickness have been examined, I would now like to add or expand on a few points.

First is fire department coordination. With a Class I system, they will be the ones operating the standpipe. Think of how many times the phrase "with the authority having jurisdiction" appears in NFPA standards. Coordination should include type and class of standpipe system, pressure requirements, number of hose valves at stations, fire department connection locations, testing, and all the other points mentioned in the article.

Take special care when selecting components. For pipe material, steel is more versatile and comes with a wide selection of products for joining and supporting versus cement-lined ductile iron pipe, which is more durable, lasts longer, and provides better flow characteristics. Expansion joints and loops require pipe guides to avoid buckling, and grooved joints may require anchors at changes of direction adjacent to long pipe runs. Pay particular attention to support selection and NFPA requirements. Most catalogued and listed supports are not applicable for custom installations.

Finally, a note should be included for existing structures when considering protection of piping. After all, the standpipe will most likely be installed exposed to the fire zone. Examine all component temperature ratings. In addition, ... establish what temperature limits you will use for thermal expansion. If the intent is to operate the standpipe during a fire, consider whether the upper temperature limit will be designed to withstand fire temperatures instead of climatic temperatures, or if your standpipe is outdoors, you may then need to consider solar radiation.

Carlos Alvarez
MDM Consulting Engineers

New Sponsor Offers Thanks

On behalf of Pella Corporation, I want to thank NFPA for the warm welcome received at the World Safety Conference and Exposition®, as a new sponsor of Fire Prevention Week. We were honored to be recognized at the Opening General Session in Dallas May 18, and to have the opportunity to personally meet so many dedicated leaders in the field of fire safety during the conference.

As an industry leader in life improvement, Pella is pleased to partner with NFPA, and the Home Safety Council to help save lives through this essential campaign which stresses the importance of planning and practicing a home fire escape plan. In addition to our sponsorship of Fire Prevention Week, we are launching a year-round home fire safety campaign involving our nearly 7,000 team members who manufacture, and market and service quality windows and doors, to help raise home fire safety awareness and preparedness in their home communities.

We congratulate NFPA on an outstanding World Safety Conference and Exposition, and look forward to a strong partnership, which will help save lives for many years to come.

Kathy Krafka Harkema
Corporate Public Relations,
Pella® Windows & Doors
Pella Corporation
Pella, Iowa

Technical Note

I enjoy reading your magazine. Just one technical note. I've noticed that the word "fumes" is often misapplied to describe any airborne gas that can either ignite or cause illness.

The technical definition of "fumes" is small, solid particles formed by the condensation of the vapors of solid materials. Fumes are generally formed by processes, such as internal combustion engines or welding.

Natural or liquid propane gas are gases and flammable or combustible liquids such as kerosene or heating oils give off vapors when heated to their flash point.

Thanks for letting me explain the difference.

David R. Burns
Fire Chief
Minooka, Illinois, Fire District

Second-Floor Sprinkler in Club Fire

I was just reading John Nicholson's article ["Looking Back," May/June 2003 www.NFPAJournal.org] on the Happy Lands Social Club comparison to the recent tragedy in Rhode Island. One point was inaccurate. For all the problems associated with the illegal social club, there was in fact a sprinkler system. This is what kept the fire

from spreading to the second floor. I was the officer in charge of the second ladder company at the fire and assigned to search the second floor. The sprinkler head at the top of the stairway landing was operating and contributed to the difficulty in venting the second floor.

Robert McMahon
Ladder 31 (ret.), FDNY

NFPA RESPONDS:
Thanks for adding to our information about that tragic fire.

Abandoned Common Sense
After reading John Paradise's article "Live Burn" in the May/June '03 issue, I found it unbelievable how some people abandon all common sense when they put on turnout gear or, even worse, a white helmet. As a survivor of the Parsippany '92 incident, I speak from experience. One thing that played through my head while lying in St. Barnabas' burn unit is that once this incident is exposed, it would eliminate the chances of it happening to anyone else. Obviously not the case.

I do see the need for live burn training, but as "boring" as it might be, it has to be done in a controlled structure. The risks are high enough when you're doing the job. Why risk it all by intentionally building a hazardous condition and sending in your own men–even worse, probies?

I recommend to anyone joining the fire service, listen and learn as much as possible–but NEVER lose your common sense, either on the fireground or the training ground.

Jeff Berry
Parisippany-Troy Hill, New Jersey, District One, Fire Department

NFPA RESPONDS:
On June 2, NFPA posted NFPA 1403, *Live Fire Evolutions*, online as a PDF download, allowing users to review,

copy, and print the document at will. NFPA 1403 provides internationally recognized safe practices for conducting firefighter-training exercises that involve live fire in structures and in outside properties.

"It's troubling to NFPA that U.S. fire departments lack the training, personnel, and equipment necessary to properly do their jobs. We're working with federal officials to turn that around. Meanwhile, offering on-demand access to key consensus codes and standards and other NFPA information is one way that we can help fire departments bridge their resource gaps," says NFPA President James M. Shannon.

Another Hazard

The May/June issue's "Structural Ops" column provides an excellent discussion of the hazards that might be found in a truck terminal. I would like to add another, which, while not very likely, could be devastating if it did occur.

I refer to the shipment of high-energy gamma radiation sources in general cargo. They're packed in containers [with] some degree of fire resistance, predicated on the possibility of a fire in a highway crash. A fire in a terminal could well provide a much more serious exposure, which could partially or completely destroy the lead shielding. An unshielded 1,000-curie Cobalt-60 gamma radiation source will provide 1,600 R/hr (roentgens per hour) at a 3-foot (91.4-centimeter) distance. A fatal exposure would occur in a short time with no warning.

However, this hazard can be avoided. Gamma radiation can't be a hazard without sending out signals of its presence and strength. These signals can be detected by the right "radio," a gamma radiation-measuring device. The potential for a "dirty bomb" attack has caused the dusting off and reactivation of civil defense radiation detectors. Personal radiation measuring devices are being supplied to haz-mat units.

As a former public safety liaison officer with the U.S. Atomic Energy

Commission, I taught the facts about radiation exposure to classes of fire instructors and fire protection engineers across the country. I also provided this tactical suggestion: At any fire in transportation of general cargo where there may be unknown contents, make a gamma radiation survey. If radiation above background is detected, back off to where the level drops to normal and summon expert assistance.

If a heavy lead container is found undamaged, be aware that a low level of radiation is permitted at the surface of the container. This level is predicated on the assumption that transport personnel will be near the container for a short time ….

Francis L. Brannigan
Safety and Fire Protection Engineer

NFPA Clarifies Fire Statistics

In "Behind Closed Doors," May/June issue, Robert Solomon was quoted as saying that before the Greenwood Health Center fire in Connecticut last February, there hadn't been a multiple-death nursing home fire since a Virginia incident in 1989 that killed 12 people. In fact, Mr. Solomon said that the 1989 fire was the last nursing home fire with a death toll comparable to that of the Connecticut incident. The last multiple-death nursing home fire (where "multiple death" means three or more fatalities) occurred in 1999.

In addition, Robert Duval's statement that the preliminary reports indicate that the building met the provisions of the 1997 edition of NFPA 101®, *Life Safety Code®*, was premature. The investigations by the state of Connecticut and NFPA are still being conducted. It hasn't been determined if the building met or didn't meet NFPA 101.

In the same article, Tom Jaeger was quoted as saying that nursing homes in the United States have averaged 1.0 fire death a year in the last 20 years and 0.3 fire deaths a year in the last 10 years. However, Mr. Jaeger was mis-

quoted and meant to identify these rates as the average death tolls in multiple-death fires for these periods, not in nursing home fires in general. Even so, Mr. Jaeger's calculations missed a 1999 incident that occurred in Pennsylvania and a late death in another incident. Taking these into account, nursing homes averaged 1.3 fire deaths a year from 1983 to 2002 and 0.7 fire deaths a year from 1993 to 2002, both in multiple-death fires only.

Readers may be interested in more details of Mr. Jaeger's cost estimate for sprinklering the remaining unsprinklered nursing homes. The article indicates that 25 percent, or 4,250, of the 17,000 U.S. nursing homes are unsprinklered.

Unsprinklered nursing homes tend to be larger, on average, than sprinklered nursing homes, providing roughly 400 square feet (37 square meters) per resident compared to the 353 square feet (32.7 square meters) per resident in the Greenwood Health Center, and 140 beds per facility compared to an average of 107 beds per facility nationally. Mr. Jaeger's experience with sprinkler retrofits indicates that $4 per square foot (0.09 square meters) is reasonable. Multiplying 4,250 by 400 by 140 by 4 yields an estimate of $952 million, or roughly the $1 billion cited in the article.

John R. Hall, Jr.
Assistant Vice-President
NFPA Fire Analysis and Research

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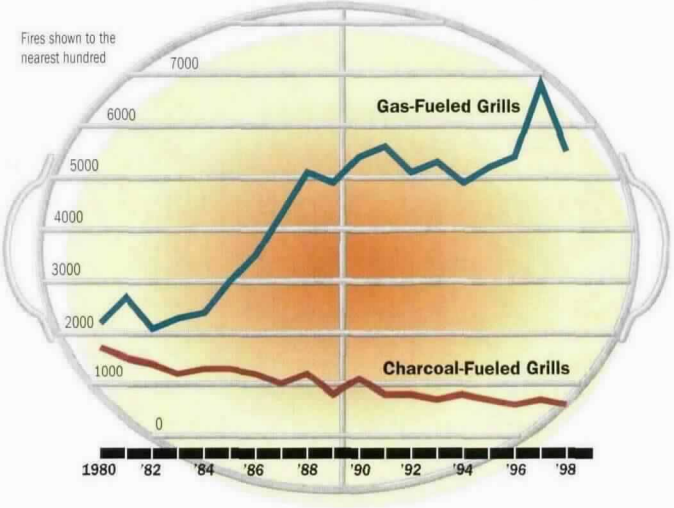
In the next issue
- Fire safety and college dorms
- 2002 U.S. Fire Loss Report
- Fire Prevention Week 2003
- Recruiting Fire Protection Engineers
- 2002 U.S. Large Loss Fire Report

Gas- and charcoal-fueled grill fires

by JOHN NICHOLSON

Home Fires Involving Barbecue Grills, by Year

Structure and Outdoor Fires Reported to U.S. Fire Departments



Deaths and Damages from Grill Fires, by Year

Year	Civilian Deaths		Civilian Injuries		Direct Property Damage (millions)	
	Gas	*Charcoal*	*Gas*	*Charcoal*	*Gas*	*Charcoal*
1980	*	*	54	43	$1.5	$3.5
1981	*	*	70	23	$2.9	$5.7
1982	*	*	51	44	$1.9	$4.9
1983	0	4	61	49	$5.3	$6.4
1984	*	*	53	13	$3.9	$8.1
1985	7	0	53	19	$5.6	$4.4
1986	0	3	65	24	$5.0	$6.9
1987	3	0	58	12	$5.9	$5.2
1988	*	*	81	28	$16.8	$10.6
1989	0	6	56	23	$8.1	$7.1
1990	9	0	70	22	$12.0	$4.9
1991	*	*	111	14	$14.9	$9.6
1992	3	9	96	0	$24.6	$5.4
1993	3	0	64	2	$11.3	$2.7
1994	*	*	66	22	$8.5	$5.8
1995	0	0	68	2	$8.9	$11.0
1996	4	0	75	29	$11.2	$3.3
1997	0	0	86	7	$18.7	$3.6
1998	4	0	70	14	$25.2	$3.9

** All grill fire deaths in these years had fuel or power unknown.*

NOTE: Damage has been rounded to the nearest hundred thousand dollars and has not been adjusted for inflation.

Source: National estimates based on NFIRS and NFPA survey.

GAS- AND CHARCOAL-FUELED barbecue grills have become staples of the U.S. lifestyle. According to the Barbecue Industry Association, three out of four households in this country own a barbecue grill. Unfortunately, their misuse can have devastating, sometimes fatal, results.

According to *U.S. Home Cooking Fire Patterns and Trends*, a report prepared by NFPA's Fire Analysis and Research Division, gas and charcoal grills cause an annual average of 1,500 structure fires and 4,800 outdoor fires in or on residential properties. Although gas-fueled barbecue grills have been involved in four times as many outdoor fires as structure fires in recent years, nearly all deaths and property damage occur in fires that start in, or spread to, the structure. By contrast, the majority of fires involving charcoal-fueled barbecue grills and nearly all associated fire deaths and property damage occur in fires that start in, or spread to, the structure.

Fires involving gas-fueled grills increased two-and-a-half times between 1980 and 1998, primarily because the use of gas-fueled grills increased substantially. In fact, the number of households that own gas grills nearly tripled between 1982 to 1993, up 193 percent from 9.4 million to 27.5 million.*

Fires involving charcoal-fueled grills, on the other hand, declined slightly for outdoor fires and sharply for structure fires from 1980 to 1998. Between 1993 and 1997, charcoal-fueled grills were also responsible for an average of 20 non-fire carbon monoxide poisoning deaths per year, a death toll much higher than the fire death toll for this type of grill.

As with other types of cooking devices, the leading causes of structure fires involving charcoal-fueled grills are unattended cooking and placing combustibles too close to heat. In structure fires, the items first ignited are most commonly the exterior trim and wall coverings, while plants, grass, or brush are the most common items first ignited in outdoor fires.

Interestingly enough, the leading cause of fires involving gas-fueled grills isn't unattended cooking, which was cited as the cause of just 11.7 percent of structure fires and 2.8 percent of outdoor fires involving such grills. Rather, the leading cause of gas-grill fires is part failure, leaks, or breaks, which accounted for 37.1 percent of structure fires and 60.5 percent of outdoor fires. Consistent with these statistics are those for the two leading items first ignited: Fuel and accelerants or some other gas or liquid in or from a pipe or container, which collectively accounted for 40.6 percent of structure fires and 68.4 percent of outdoor fires involving gas grills. Other leading items first ignited include cooking materials and exterior wall coverings.

* *Statistical Abstract of the United States 1986 and 1997*, Washington, D.C.; *U.S. Bureau of the Census, 1985 and 1997*, Tables 1316 and 1207, respectively.

ILLUSTRATION: ANNIE BISSETT

RESIDENTIAL

Fireworks starts house fire

MICHIGAN

A family using legal fireworks on the rear deck of their single-family home to celebrate Independence Day may have inadvertently ignited the deck, sunroom, and rear of their house. However, a number of people in the neighborhood were using illegal fireworks at the same time, so it remains unclear which fireworks actually started the fire.

The two-story, wood-framed house was 35 feet (11 meters) long and 45 feet (14 meters) wide with a wood-truss roof and aluminum and brick siding. There were no fire sprinklers, but smoke alarms had been installed on both floors.

The family used the fireworks between 10 and 11 p.m. Hours later, a resident was awoken by the sound of scratching at the back of the house and went to investigate. When she discovered the fire, she called 911 and roused the other four residents, all of whom escaped.

Firefighters arrived four minutes after the 4:22 a.m. call and found smoke and flames coming from the back of the house and the roof of the attached garage. They stretched a hose line to the second floor, where the smoke, which was light on the first floor, became thicker as fire spread through the attic. When the firefighters opened the ceiling, they encountered heavy fire.

The incident commander evacuated the building when the fire crews failed to extinguish the blaze and used a ladder pipe to knock the fire down. Firefighters then reentered the house and extinguished hot spots.

Independence Day fireworks was responsible for this fire on the back deck of a single-family home in Michigan. The house (inset) was heavily damaged, but no one was injured.

PHOTOGRAPH: AP/WIDE WORLD

Investigators believe the fire started when lit fireworks ignited the wooden deck and spread up the decorative wooden lattice into the attic above the sunroom, garage, and family room.

The house, valued at $186,000, had $100,000 in damage, and its contents, valued at $90,000, suffered a $45,000 loss. Radiant heat did $5,000 damage to an adjacent home. There were no injuries.

Candle ignites decorative linen over bed

FLORIDA

When a candle ignited bedding in a condominium on the top floor of an 11-story building, the occupants had the presence of mind to close the front door when they left the unit, thus limiting smoke damage to the condominium.

The unsprinklered, 85-unit concrete structure measured 195 feet (59 meters) by 50 feet (15 meters). Standpipe system and portable fire extinguishers were located throughout the building, and there were smoke alarms and manual pull stations in the common areas. Because the fire was confined to the unit of origin, however, smoke didn't reach the common areas so the internal fire alarm system didn't sound.

The fire began when a lit candle on a bedside table tipped over and ignited the bed's decorative linen canopy. The burning linen fell onto the bed, igniting the bedding and the mattress, then spread to other combustibles in the room. The residents tried to extinguish the fire themselves, but the flames spread so quickly they called 911 at 12:44 a.m. and left the unit.

When they encountered arriving firefighters in the lobby, the unit's residents told the crews where the fire was and what was burning. An engine and rescue company attached hose lines to the standpipe on the fire floor and entered the condo to extinguish the fire, conduct a primary search, and ventilate the unit. Firefighters also evacuated the building's top four floors.

Although the condo's occupants closed the unit's front

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door, they left the bedroom door open, allowing heat and smoke to damage the rest of the unit. Structural damage was estimated at $10,000 and damage to the unit's contents was estimated at $50,000. No one was injured.

MANUFACTURING

Exterior light fixture is suspect in blaze

NEW HAMPSHIRE

An undetected fire burning in concealed areas heavily involved a building in fire before the fire department arrived. Alerted by a passerby who activated a fire alarm street box at 10:04 p.m., the fire department arrived within four minutes as fire and heavy black smoke was seen coming from attic windows.

The one-and-one-half-story building was constructed of wood framing with an asphalt roof and wooden exterior siding, and measured 90 feet (27 meters) in length and 40 feet (12 meters) in width. The occupants manufactured ornamental pewter objects and had a retail sales area. There were no fire detection systems or fire sprinklers and the building was closed for the night.

Firefighters established a water supply and attempted an interior attack, however the fire had gained so much headway that command ordered the companies into defensive positions and called for two additional alarms. Five fire departments sent apparatus to the scene, as the fire was declared under control at 1:26 a.m.

Investigators determined the point of origin to be near an exterior light fixture on an outside wall near the attic space. The motion-sensor light and associated wiring were removed for further analysis, but are suspected in igniting the fire that spread within the attic space filled with records, boxes, and packing materials. There were no reports of dollar loss, however the building sustained heavy damage. There were no injuries.

MERCANTILE

Quick fire department response stops arson fire

MASSACHUSETTS

The fire department's rapid response prevented an intentionally set fire from spreading into several businesses that occupied a former shoe factory.

The balloon-framed, L-shaped building was four stories high and constructed of heavy timbers. It had no fire detection systems, although a wet-pipe fire sprinkler system provided full coverage.

A neighbor called 911 at 4:29 a.m. to report a dumpster fire at the building, and arriving firefighters found the dumpster fully involved and flames spreading up the exterior of the building. Using a 1 3/4-inch hose line, one crew started to knock the fire down, while a ladder crew entered the building, encountering moderate smoke on the two lower floors. The crew used a thermal imaging camera and determined that portions of a wall near the floor and around windows were holding heat. They opened these areas up and discovered charring and a smoldering fire.

Investigators determined that someone ignited trash piled against the wall of the building and that the resulting fire quickly spread up the structure's wooden siding to the dumpster. They also determined that the fire sprinkler system didn't activate because the fire's heat didn't build up in the structure.

Damage to the building, valued at $1.3 million, was estimated at $20,000. Damage to its contents, valued at $5 million, was estimated at $10,000. There were no injuries.

Someone ignited trash outside this former shoe factory in Massachusetts, resulting in a fire that did minor property damage.

PHOTOGRAPH: AP/WIDE WORLD

ASSEMBLY

Fire sprinkler douses flames from holiday display

PENNSYLVANIA

Malfunctioning electrical components in the base of an artificial Christmas tree in a country club's second-floor ballroom ignited the room's bar, but a fire sprinkler doused the flames and triggered a waterflow alarm before the fire spread.

The three-story, wood-framed building, which was 150 feet (46 meters) long and 75 feet (23 meters) wide, was constructed of heavy timber, with concrete and stone walls. A wet-pipe fire sprinkler system had been installed throughout the building, and a central station alarm company monitored the waterflow alarm. The building had no smoke alarms or detection equipment.

Firefighters received the waterflow alarm around 8:40 p.m., followed by a 911 call. Arriving on scene within eight minutes, firefighters found heavy black smoke throughout the building, from which approximately 25 people had already evacuated. Upon investigation, firefighters discovered that a single fire sprinkler had extinguished the blaze.

Employees of a local store had spent the afternoon setting up a promotional display of holiday decorations, plugged into extension cords. They finished between 4 and 5 p.m. and went home, leaving the room vacant until 8 p.m. when the club manager checked the room. He found that several of the displays had been left on and unplugged the extension cords and power strips in the ballroom. About 20 minutes later, an employee reported smelling

Sprinklers controlled this fire, started by a carelessly discarded cigarette, as it spread up the exterior siding of a nursing facility.

smoke on the first floor, but the manager couldn't locate the source until he returned to the ballroom, which was filled with heavy, black smoke. He immediately began evacuating guests and staff.

Investigators believe that a malfunction in the electrical components in the base of the tree started the fire, which consumed parts of the plastic stand and two-thirds of the tree, and damaged part of the carpet before it was extinguished. They found two extension cords plugged into the tree and an outlet under the plastic ballroom bar, one powering a traditional string of lights and feeding a converter that ran a small motor used to move a colored disk and a small fan. A halogen light at the base of the tree illuminated the tree's fiber optic strands.

The building and its contents were valued at $6.4 million. No structural damage was reported, but damage to the contents was estimated at $450,000. There were no injuries.

HEALTH CARE

Fire sprinklers control fire started by cigarette

CONNECTICUT

A cigarette discarded outside the entrance to a limited-care nursing facility ignited wood chips in a garden border. The fire spread to a wooden fence and up the building's siding to the roof, where three fire sprinklers controlled it while occupants were evacuated.

The one-story, wood-framed facility was 247 feet long (75 meters) and 174 feet (53 meters) and built on a concrete slab. Its walls were covered with vinyl siding, and its wood-truss roof was covered with asphalt shingles. A wet-pipe fire sprinkler system provided full coverage, as did a smoke and fire detection system. The 60-bed facility was fully operational at the time of the fire.

A single engine company responded to a report of a brush fire on the property at 3:09 p.m. When they arrived, firefighters saw heavy, brown smoke coming from the roof of the building and immediately requested a full response assignment followed by a second alarm.

The fire melted the vinyl soffit vents and spread into the attic, where three fire sprinklers activated, controlling the blaze until firefighters could open the roof and complete extinguishment.

The building, valued at $3,274,700, suffered damage estimated at $150,000. Its contents, valued at $400,000, suffered $37,000 in damage. There were no injuries.

One dead in board-and-care facility

MISSOURI

A fire that started on the exterior of a three-story, wood-framed board-and-care facility spread to the roof, where it quickly consumed the wooden roof trusses. Fire sprinklers kept the fire from spreading in some locations but couldn't prevent the partial collapse of the roof and ceilings.

The facility's fire sprinkler system was installed in compliance with NFPA 13R, *Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, which doesn't require protection of concealed spaces, such as attics. A fire detection system protected the entire facility. A central station alarm company monitored both systems.

A passerby noticed the fire and called 911 at 11:10 p.m. A battalion chief requested a second alarm on the way to the scene after seeing smoke and fire from several streets away.

Firefighters arrived within four minutes of the call to find flames covering the entire north wall of the structure. As one crew began to attack the fire, others began search and rescue operations and established a water supply. A third and fourth alarm were struck, bringing additional resources to the scene. By this time, however, the fire had fully engulfed the attic, and portions of the ceiling were collapsing. When it became obvious that attack lines on the upper floors weren't making headway, the incident commander pulled crews back to lower floors and ordered the building evacuated.

Once the fire began to subside, firefighters reentered the building to conduct a secondary search when a check of the residents showed some were missing. They found three more occupants, whom they sent to the hospital, and discovered the body of an 86-year-old woman in a third-floor bedroom.

The incident commander declared a mass casualty incident to treat and transfer the facility's residents. In addition to the victim, six occupants, ranging in age from 75 to 94, were taken to the hospital suffering from smoke inhalation injuries. Two firefighters, ages 23 and 31, suffered heat-related injuries. Damage to the building was estimated at $3.4 million.

PHOTOGRAPH: GRAND ISLAND CITY FIRE DEPT.

EXTRA!

REVENUES IN 2002, the second year of NFPA's traditional three-year business cycle, were $77 million, slightly lower than expected. However, this shortfall was offset by expense savings, resulting in an operating surplus of $2.5 million before investment losses and pension adjustment.

NFPA Treasurer's Report

There was a net reduction of $11.9 million in NFPA's net assets caused by the downturn in the stock market, which reduced the Association's investments, in addition to a pension liability adjustment. Capital expenditures for the year were approximately $3 million. Major expenditures included the cost of a new information and order fulfillment system. There was also the repayment of $1 million of the long-term real estate loan. Accordingly, cash and cash equivalents decreased by approximately $3 million.

An analysis of NFPA's revenue and excerpts from the Association's audited financial statements for the years ending December 31, 2001 and 2002 follow.

The NFPA Treasurer's Report is issued to Association members as required by the Articles of the Association, Section 6.11, Paragraph 2, as adopted through amendment to the Articles in November 2000.

Statements of Financial Position

$'000's

	2002	2001
Assets		
Cash and cash equivalents	9,502	12,552
Inventory, accounts receivable, and other assets	21,687	19,171
Investments	50,327	60,329
Property and equipment	40,055	40,986
Total assets	121,571	133,038
Liabilities and net assets		
Accounts payable and other liabilities	16,730	16,256
Deferred revenues	12,168	11,110
Long-term loan	19,219	20,344
Total liabilities	48,117	47,710
Total net assets	73,454	85,328
Total liabilities and net assets	121,571	133,038

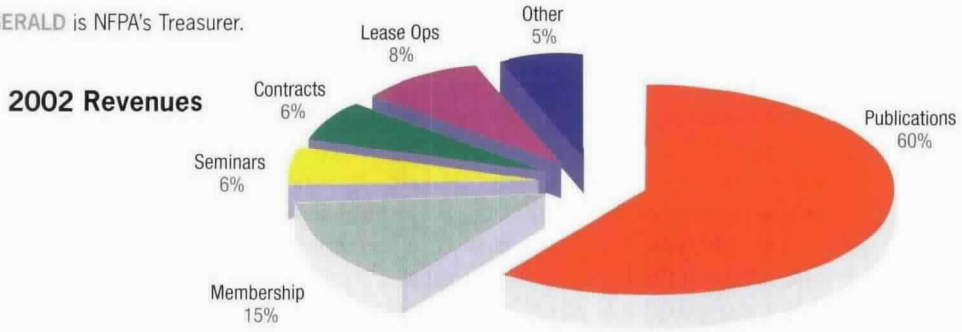
Statements of Activities

Revenue		
Publications	46,007	52,866
Membership	11,290	12,232
Other	19,877	17,488
Total revenue	77,174	82,586
Expenses and investment losses	(89,048)	(72,802)
Change in net assets	(11,874)	9,784
Net assets as of beginning of year	85,328	75,544
Net assets as of end of year	73,454	85,328

Statements of Cash Flows

Cash flows from operating activities	1,329	10,607
Cash flows from investing activities	(3,254)	(13,126)
Cash flows from financing activities	(1,125)	(1,031)
Net decrease in cash and cash equivalents	(3,050)	(3,550)
Cash and cash equivalents as of beginning of year	12,552	16,102
Cash and cash equivalents as of end of year	9,502	12,552

PAUL M. FITZGERALD is NFPA's Treasurer.



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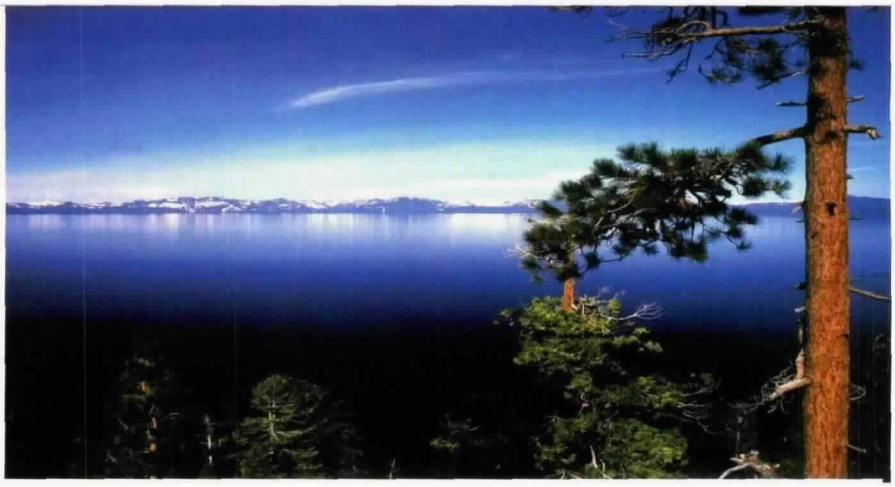
MEETINGS



Lake Tahoe

Fall Education Conference heads to Reno

IN RESPONSE TO RECENT domestic and international events, this year's NFPA Fall Education Conference, to be held November 15 to 19 at the Reno Hilton in Reno, Nevada, will have a special focus on "Homeland Security: Preparedness and Response."

Topics will include planning for effective response to emergencies and terrorist threats in public and private locations; analysis of emergency management programs incorporating homeland security concerns; and managing a chemical, biological, or nuclear incident affecting the commercial transportation industry. Also on the agenda are reviews of emergency response protocols involving rail transportation systems, including derailments, station emergencies, and acts of terrorism; of "best practices" for responding to security threats with local and regional resources; and of public emergency operations planning using an all-hazards approach, focusing on terrorist threats.

The impact of threats to healthcare providers and their readiness to respond to emergencies will also be discussed, and legal issues in preparing and implementing emergency action plans will be analyzed.

There will also be a variety of education sessions from which to choose, covering such topics as casino fire protection, new tools for public educators, hospital emergency incident command systems, and balancing all-hazards emergency operations planning with terrorism planning.

Before the conference, on Friday, November 14, and Saturday, November 15, several two-day pre-conference seminars will be held. These seminars cover NFPA 5000™, *Building Construction and Safety Code*™; NFPA 1, *Uniform Fire Code*™; NFPA 99, *Health Care Facilities*; and NFPA 921, *Fire and Explosion Investigation.*

Register for a seminar and save 25 percent on seminar fees. Seminars are priced separately from the main conference, and pre-registration is required.

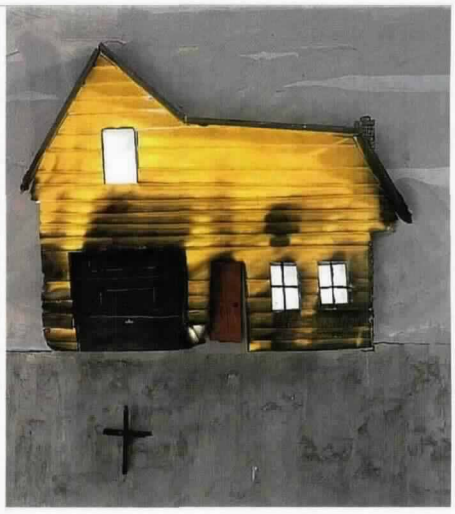
For those preparing for the Certified Fire Protection Specialist exam, we're offering a two-day primer, on Friday and Saturday, to increase your chances of success.

As usual, the Fall Education Conference will include a general session and technical committee report session at which the membership will vote on proposed NFPA codes, standards, and recommended practices. Among the documents reporting are NFPA 921, *Fire and Explosion Investigation;* NFPA 85, *Boiler and Combustion Systems Hazards Code,* and NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs.* Also being voted on are NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*; NFPA 2001, *Clean Agent Fire Extinguishing Systems*; NFPA 58, *Liquefied Petroleum Gas Code*; NFPA 59, *Utility LP-Gas Plant Code*; and NFPA 1670, *Operations and Training for Technical Rescue Incidents.*

Besides a first-class educational experience, you'll have a fun, relaxing, carefree, and exciting time in Reno while attending the conference. For details about Reno and why the Reno Hilton is the place to play and the place to stay, visit www.nfpa.org/meetings.

Call (800) 648-5080 or (775) 789-2000 to register at the Reno Hilton. To secure the conference hotel room rate ($102 single/double) when making your reservations, you must use reference code "FIRE'03". Please be sure to let the reservation agent know if you're eligible to receive the government rate of $89.

For details on the Fall Education Conference and how to register, visit www.nfpa.org/meetings or call (617) 984-7310. You can bet we're going to have a great time. See you in Reno!



Can we afford to let a man's home be his castle?

WHILE TRYING TO EXPLAIN why codes are enforced in residential properties, I've heard owners say, "A man's home is his castle. Why can't I just build it the way I want it?" Perhaps the best answer lies in statistics.

As with most statistics, fire loss statistics provide us with both good news and bad. First, the good news: The number of fires across the nation continues to drop.

Over the last 20 years, fires have decreased by about 36 percent, and the number of civilian deaths caused by fire has decreased by approximately 53 percent.

The bad news is that our home, the place we spend most of our time, continues to lead the way in the number of civilian deaths.

During 1999, 3,570 civilians died in fires in the United States, and 81 percent of those people died in a home. It comes as no surprise that 71 percent of all structure fires occurred in homes.

NFPA 5000™, *Building Construction and Safety Code*™, defines a residential occupancy as one that provides sleeping accommodations for purposes other than health care or detention and correction. Thus, residential occupancies include one- and two-family dwellings, lodging or rooming houses, hotels and dormitories, apartment buildings, and residential board-and-care facilities. NFPA 5000 also details the minimum construction requirements for each of these occupancies in Chapters 22 through 26.

In one- and two-family dwellings, the code provides a variety of regulations governing, among other things, the number and types of means of escape or egress. For example, Sections 22.2.2.1 and 22.2.2.2 state that each bedroom and living area must have at least one primary and one secondary means of escape, unless a door from the bedroom opens directly to the outside or the dwelling has an automatic sprinkler system throughout.

The primary means of escape may be a door, stairway, or ramp that provides an unobstructed path of travel out of the dwelling at or to grade level. The secondary means of escape, which is independent of, and remote from, the primary means of escape, may lead through an adjacent, unlockable space. It may also be a door or window that opens directly to the outside as long as it provides at least 5.7 square feet (0.5 square meters) of clear, openable area. The opening must be at least 20 inches (51 centimeters) wide and 24 inches (61 centimeters) high. However, this provision may only be used when the window is located within 20 feet (6 meters) of grade.

Section 22.2.4 stipulates the minimum widths and heights for doors in residential occupancies. Locking devices on doors within a means of escape cannot impede or prohibit egress, and they must be easily opened without a key.

Stairs that serve as the primary means of escape from dwellings must conform to the same standards as stairs in commercial occupancies. The maximum riser height is 7 inches (18 centimeters), and the minimum tread depth is 11 inches (28 centimeters). Stairs that serve as a secondary means of escape may comply with the fire escape requirements of Table 7.2.8.4.1 of NFPA 101®, *Life Safety Code®*, which allows risers to be as many as 9 inches (21 centimeters) high and the tread at least 9 inches (21 centimeters) deep.

As for fire protection features, Section 22.3.4.1 of NFPA 5000 requires smoke alarms in all bedrooms, outside each separate bedroom, and on each level of the dwelling, including the basement. Provisions for these alarm systems are found in Section 55.2.

NFPA 5000 doesn't specifically require automatic sprinkler systems for residential occupancies, but it does allow their use as an alternative to other code requirements as long as they're installed in accordance with Section 55.3.1.1. This section requires that any automatic sprinkler system installed meet the requirements of NFPA 13, *Installation of Sprinkler Systems*; NFPA 13R, *Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*; or NFPA 13D, *Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.*

>>page 76

ILLUSTRATION: DAVE WHEELER

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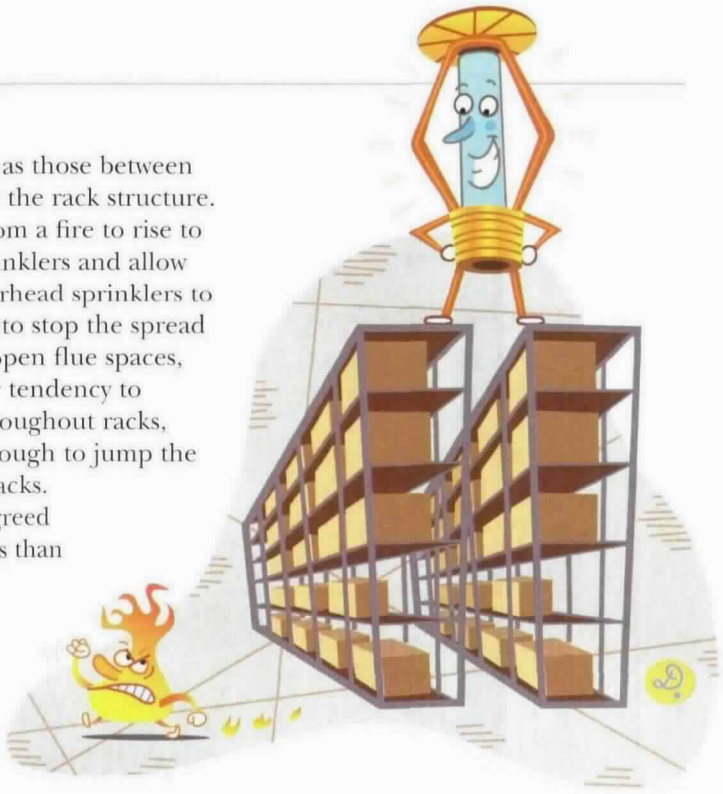

Researching cost-effective protection arrangements for solid shelf rack storage

THE FIRE PROTECTION RESEARCH Foundation is currently looking into a new project, tentatively named the Solid Shelf Rack Storage Protection Research Project, to develop possible rack configurations and cost-effective protection arrangements as an alternative to the current criteria in NFPA 13, *Installation of Sprinkler Systems.*

Why now? Because the 2002 edition of NFPA 13 more definitively spells out the protection criteria for racks with solid shelves, thanks to a task group that reviewed all available test data relating to sprinkler performance with solid shelves.

Racks with solid shelving are different from traditional shelf storage, in which the shelves, by definition, are limited to a depth of 30 inches (0.76 meters). Shelves are usually spaced 2 feet (0.6 meters) apart vertically and back-to-back shelves are generally separated by a vertical barrier. Storage racks are typically about 4 feet (1.2 meters) deep, and, in a typical double-row configuration, present a considerable challenge to sprinklers, especially when the normally open racks are covered with some form of shelving.

The first thing the task group did was define what a solid shelf is. Group members agreed that the area of a solid shelf is bounded by the perimeter aisle or flue space on all four sides. Flues are either longitudinal or transverse. In typical double-row rack storage, the longitudinal flue space is the long, narrow area between the racks, and the transverse flue spaces are those between pallet loads as well as those between the bays formed by the rack structure. Flues allow heat from a fire to rise to activate ceiling sprinklers and allow water from the overhead sprinklers to penetrate the rack to stop the spread of a fire. Without open flue spaces, fires have a greater tendency to spread laterally throughout racks, becoming large enough to jump the aisles to adjacent racks.

The task group agreed that solid shelves less than 20 square feet (1.86 square meters) between flue spaces are not a concern, since this is basically the size of a standard pallet. Task group members also agreed that racks with solid shelves made of wire mesh, slats, or other materials more than 50 percent open can be considered open racks, provided flue spaces are maintained. This means that racks surfaced with such materials that extend to the limits of the longitudinal and transverse flues can be considered open racks, even if the shelves' surface is bigger than 20 square feet.

The sprinkler protection criteria for rack storage dates back to the 1971 edition of NFPA 231C, *Rack Storage of Materials*, which was merged into NFPA 13 in the 1999 edition. NFPA 231C was based on an extensive series of full-scale fire tests, some of which revealed the poorer performance of ceiling sprinklers in racks using solid shelves, even shelves 27 square feet (2.5 square meters) in area. In those early editions, NFPA 231C always required that "sprinklers be installed both at the ceiling and beneath each shelf in double- or multiple-row racks with solid shelves that obstruct both longitudinal and transverse flue spaces." Another section of the standard traditionally allowed one to eliminate the longitudinal flue for double-row racks without solid shelves up to 25 feet (7.6 meters) high. However, it was never clear what really constituted solid shelves or what was to be done if there were longitudinal flues but no transverse flues.

The new criteria, based on the areas of solid shelves, distinguish between solid shelves 20 to 64 square feet (1.86 to 5.95 square meters) and those larger than 64 square feet. For the larger shelves, the requirement for sprinklers below each shelf has been retained. For the intermediate-sized shelves, sprinklers are required

>>page 76

ILLUSTRATION: JACK DESROCHER

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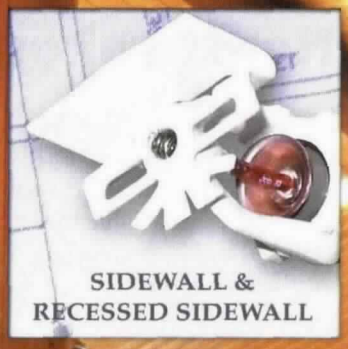

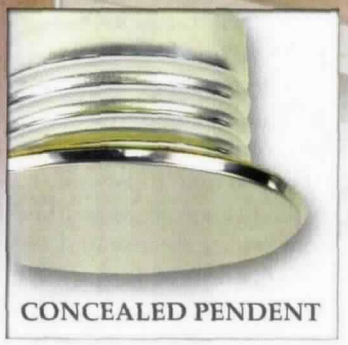

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No fire should ever be considered routine

AMONG THE MOST common types of structural fires are those that occur in residential occupancies, which include one- and two-family dwellings, apartment buildings, hotels, motels, dormitories, board and care homes, and lodging and rooming houses. In 2001, 76 percent of all structure fires were residential fires, mostly in one- and two-family dwellings. If we exclude the events of September 11, 29 percent of firefighter fireground fatalities and 71 percent of civilian fire deaths that occurred in 2001 were in residential occupancies, many again in one- and two-family homes.

Why do so many firefighters die in residential fires in the United States? Although NFPA statistics show that fires in other occupancies, excluding health care and educational properties, are two, three, four, even five times more likely to cause a firefighter fatality, there are far more fires in residential properties than there are in other occupancies.

Also contributing to the firefighter fatality rate may be the fact that firefighters tend to feel less threatened when working in a small one- or two-family house, which can lead to freelancing rather than working in the prescribed teams. Even the incident commander may feel there's less risk in a small building, where it's easy to find alternate exits and it takes less time to get out.

Pre-incident plans and fire inspections reduce the risk to occupants and firefighters as well as providing the incident commander with intelligence regarding the building. Few communities pre-incident plan or regularly inspect one- and two-family dwellings. Even fewer communities require that such buildings be sprinklered.

Command organization

During size-up at any structural fire, including one at a one- or two-family home, the incident commander must consider the building's occupancy to determine the risk it poses to firefighters and occupants. It's essential that the commander maintain a good command organization, devise a strategic plan based on a risk-versus-benefit analysis, provide a rapid intervention team, establish accountability, and enforce the use of proper protective clothing and equipment, just as he or she would during a fire in any other structure.

An engine and truck company coordinate a rescue.

In the absence of pre-incident plans, fire officers confronted with a fire in a one- or two-family house must base their size-up on general patterns. However, they must also recognize that there may be unknown hazards since general patterns may not apply in every incident.

For example, the most hazardous time for occupants is when they're asleep, generally late at night or early in the morning, so most incident commanders assume people are at home during these times. But there are many exceptions. The occupants might work odd hours, or they might be away on vacation. Signs that someone is home, such as lights on or a car in the driveway, may indicate that the building is occupied, but many homeowners put their lights on timers for security reasons and a car in the driveway could be a second car.

Another generalization has to do with extinguishment. Most fires in one- and two-family dwellings will be within the capabilities of a single $1^{3}/_{4}$-inch fire stream. Providing a back-up line is a fundamental tactic that further ensures extinguishment in these buildings.

If the standard pre-connected hose line flows 100 gallons (378 liters) per minute, the only building for which the pre-incident plan needs to include rate-of-flow calculations is one whose rooms have a volume of 20,000 cubic feet (566 cubic meters). We reached this number by dividing the room's volume by 100 to get 200 gallons (757 liters) per minute. We advocate using volume divided by 100 (V/100) to calculate rate-of-flow in building compartments where the required flow exceeds the rate-of-flow of two standard pre-connected hose lines carried on the apparatus.

>>page 76

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JUSTASK

NFPA's Document Coordination Project

WITH THE HELP of more than 6,000 volunteers, NFPA writes more than 300 codes, standards, and recommended practices, and it's a challenge to ensure that all these documents continue to work in concert, complementing and building upon one another's provisions. Recognizing the importance of this coordination process, the NFPA Standards Council in April 2003 instituted a policy (#03-04-19) outlining the steps needed to maintain a fully coordinated set of codes and standards for the built environment.

To help technical committees coordinate their documents, the Standards Council appointed the Staff Scoping Support Team, who developed a set of commonly asked questions and distributed it to all technical committee members and posted it on www.nfpa.org. The following information is extracted from that document.

NFPA 5000, Section 1.3.2, appears to give NFPA 5000 ultimate authority over referenced codes and standards. If my document is referenced in NFPA 5000, do the provisions in NFPA 5000 govern my document?

Section 1.3.2 has recently been the source of much confusion and discussion among technical committee members. The integration of requirements from the wide range of NFPA documents into a model building code is a "new" concept in the NFPA system. Not surprisingly, there are some requirements in NFPA 5000 that deviate from those in the source NFPA documents. The Standards Council issued a decision (#02-80 (o)) to attempt to answer this question of "authority."

In its decision, the Standards Council ruled, in part, that "the special hazards technical committees will have primary responsibility for provisions in the Building Code on subjects in their respective areas." If this is true, how can Section 1.3.2 also be true?

Section 1.3.2 assumes that all NFPA documents already are, or soon will be, coordinated, eventually making Section 1.3.2 a moot point for NFPA codes and standards. However, NFPA 5000 also references codes and standards that aren't under NFPA control. Section 1.3.2 is intended to guide authorities having jurisdiction on handling potential conflicts.

Who's ultimately responsible for ensuring that NFPA documents are coordinated?

The success of this effort depends on the cooperation of all NFPA members, volunteers, and staff.

Are all NFPA documents part of this project?

Yes. Certain NFPA codes and standards will be coordinated first because they're either referenced in NFPA 5000 or contain provisions that directly affect topics covered in NFPA 5000.

Although my document isn't currently in cycle, do I still need to do any work in the context of this project?

Yes. NFPA 5000 is in the Annual 2005 revision cycle, with public proposals due October 17, 2003. Even if your document isn't in cycle, you have an opportunity to provide input to the related provisions of NFPA 5000. Then, as your document comes into cycle, you can pick up the modifications identified during the coordination with NFPA 5000.

How do we coordinate our documents with other NFPA documents?

The process of coordinating all NFPA documents that provide requirements for the built environment will be completed in three basic steps:

- Review and compare the requirements of your NFPA documents with those of NFPA 5000;
- Consider changing either your technical committee's scope or your document's scope to take into account any additional topics you may want to cover or delete from the scoping statements; and,
- Develop proposals for NFPA 5000 and your document to ensure coordination.

The remainder of the Commonly Asked Questions provides the tools necessary to accomplish these tasks, including specific guidance on developing the appropriate proposals for both your document and NFPA 5000.

This is your opportunity to participate in the first stages of the ongoing process that will ensure coordination of requirements and recommendations across the entire NFPA code set. Make sure that your committee's expertise is recognized and used in other NFPA codes and standards, particularly NFPA 5000. And remember, other committees may be knocking on your door recommending that you modify your document.

We have amazing resources available. Let's get out there and use them!

AMY SPENCER is a senior chemical engineer and BONNIE MANLEY is a senior structural engineer at NFPA.

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INCOMPLIANCE

Residential fire safety relies on education

ALMOST THREE-FOURTHS of the fire deaths in the United States occur in one- and two-family dwellings. Yet, the building codes and NFPA 101®, *Life Safety Code®*, have very few fire safety requirements for such homes. These codes do require smoke detectors on each level of the home and the newer codes also require smoke detectors in each sleeping room. The newer codes also require that the detectors be interconnected so that if one activates, all the detectors in the residence sound.

Codes pertaining to one- and two-family dwellings don't address the protection of vertical openings, a basic principle of fire safety, even though stairs may be open to several floors, and upper floors may have open balconies looking over floors below, allowing a fire to quickly spread between floors. Nor do the codes require fire- and smoke-resistant construction in corridors in one- and two-family dwellings as they do in other residential occupancies, such as hotels and non-sprinklered lodging and rooming houses. These features usually include self-closers on sleeping room doors.

Why is this?

Part of the reason goes back to old English law, of which property rights are a major tenet. We've all heard the saying "A man's home is his castle." Once a one- or two-family house is built and a certificate of occupancy issued, no re-inspection program is required. This applies to individual apartments, as well.

I don't believe most of us want the local fire marshal to come knocking on our door and announcing that he or she is there to inspect for fire hazards. Without enforced fire protection in the home to reduce fire deaths and injuries, the only other option is education.

Who will tell the weekend mechanic that using flammable liquids to clean parts in a garage next to a gas-fired water heater may result in a gas explosion? How will homeowners know that installing burglar bars without interior emergency releases may prevent their families from escaping from their burning houses? Who will tell children not to play with matches or lighters?

How will students living in dorms know that stringing extension cords together so they can move the portable heater to the other side of the room may cause the wire to overheat and start a fire? How will the apartment dweller know that using a charcoal grill on a wooden deck may cause the deck to ignite, or that bringing the charcoal grill inside may result in carbon monoxide poisoning? How will families learn that practicing their home escape plans is the only way to be confident they'll follow it in a real emergency?

The answer to all these questions and the hundreds of others about safe behaviors is education. We can and should support improvements in products, fixtures, and furnishings that will reduce fire losses in the home. And we must advocate for public acceptance of fixed protection so that people are as safe at home as they are in public places. But such advances take time and require that the public understand both the fire problem and the available solutions. The catalyst for change is education, and with our expertise as fire protection professionals and our commitment to fire protection, we can help provide the education that will help facilitate that change.

Until we take education seriously as a basic requirement of any fire protection program, we will continue to have unnecessary fire losses. The only effective way to change people's attitudes and behaviors is through education.

So let's be creative and see what fire safety education programs we can institute where we work and live.

EDITOR'S NOTE: Columnist **CHIP CARSON** is this year's recipient of NFPA's Standards Medal, the Standards Council's highest honor, awarded to those who have made outstanding contributions to fire safety by serving on the NFPA technical committees that develop codes and standards. Carson received the award at the NFPA World Safety Conference & Exposition™ in May.

ILLUSTRATION: DAVE EMBER

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INSIDE THE BELTWAY

Aging firefighting air fleet may lead to a decrease in missions in 2003

WILL THE AGING firefighting air fleet be ready this summer?

With wildfire season already upon us in some areas of the United States, the federal agencies responsible for fighting the flames are preparing for what could be a very shaky aerial ride.

Last season's near-record 73,000 fires made for a very tough year for the U.S. Forest Service and Bureau of Land Management's (BLM) military-surplus fleet, which includes lead planes, air tankers, and helicopters. Three aircraft—a C-130 aircraft, a PB4Y-2, and an Aerospatiale SA 315B Lama helicopter—crashed, killing six crew members.

As a result, the Forest Service and BLM are sprinting to recertify all 44 of their large air tankers, including the P2s, P3s, and DC 4, 5, and 7s, as well as their remaining C-130s and PB4-Ys. All are 30 to 40 years old and have performed aerial functions they were never intended to perform. Eleven of 19 Beech Baron 58-P lead planes have already been retired because of safety concerns.

The shaky status of the federal firefighting aerial fleet was underlined in a December 2002 Blue Ribbon Panel report, which the Forest Service and the BLM requested. Written by a panel co-chaired by Jim Hall, former chairman of the National Transportation Safety Board, and Texas State Forester Jim Hull, the report paints a dismal picture of the two agencies' aerial safety, saying "the federal government is asking employees involved in aerial firefighting to take unnecessary risks."

The unsettled condition of the aerial firefighting fleet raises two questions, one immediate, the other long-term. Is the fleet ready for the 2003 fire season? And are the agencies—and Congress—turning away from past practices that led to a safety record the report characterized as "unacceptable?"

It appears that neither agency met the requirements of NFPA 295, *Wildfire Control*, Section B-2.1.6, which warns that "aircraft selection for wildfire suppression and related uses involves certain problems. The performance characteristics must be such that safe and efficient operations can be conducted over typical terrain and at necessary elevations. The aircraft integrity should be such that atmospheric conditions will not present a structural problem."

On that score, the Blue Ribbon Panel's report noted that "all aircraft in the current air tanker fleet are being operated outside their original design intent with little or no formal evaluation in the low-level firefighting environment."

Larry Hamilton, director of fire and aviation in the BLM, doesn't dispute the report's conclusion.

"We've never had the funding we needed," he explains. Post-report, the Forest Service and the BLM contracted with Sandia National Laboratory to develop an inspection protocol through which all the creaky air tankers are being run. It's unknown how many of the 44 will be able to fly in 2003. Those that do take to the skies will fly curtailed missions, Hamilton says, serving as initial attack planes on smaller fires. Their loads will be decreased by about 15 percent to reduce stress on their airframes, and they'll be fitted with new instrumentation panels so their drops into fire zones won't be as steep or as fast as they have been. For initial attack, as opposed to prolonged firefighting, the two agencies plan to replace the air tankers that are mothballed with single-engine air tankers, which are essentially glorified crop dusters.

To fight the big fires, the agencies will depend on Hueys and other helicopters, the water capacities of which range from about 300 gallons (1,136 liters) to 1,000 gallons (3,785 liters). This is a steep drop-off from the 2,500-gallon (9,463-liter) capacity of the air tankers, but Hamilton feels that the smaller tankers will do a better job on big fires because "they can lay water down faster, and their water source can be placed much closer."

>>page 76

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BUZZWORDS

National Fire Alarm Code® is updated for residential fire alarm systems

FROM 1994 THROUGH 1998, half of all U.S. home fire deaths resulted from fires that occurred between 10 p.m. and 6 a.m. And from 1989 through 1998, fires in which a smoke alarm was present and operated caused only one-fifth of home fire deaths. Together, these statistics reveal that our chances of dying in a fire increase during the time we are most vulnerable and that smoke alarms save lives.

This isn't new information to those of us in fire protection. However, it may be to the average homeowner. Fortunately, NFPA 72®, *National Fire Alarm Code*®, provides updated guidance on detection to both code users and occupants of residential occupancies, be they single- or multi-family homes.

Of particular use to alarm installers—whom most homeowners consider to be fire alarm experts—is Chapter 11, "Single- and Multiple-Station Alarms and Household Fire Alarm Systems," which was rewritten for the 2002 edition to help people better understand when and where smoke alarms should be installed. When an installer calls on a homeowner to discuss a new installation, he or she should carry a copy of Chapter 11 to review with the homeowner.

With Chapter 11 as a resource, installers can explain that the purpose of fire-warning equipment in residential occupancies is to provide the minimum protection required with a reliable means of notifying occupants of a fire and of the need to escape to safety immediately. This is done by installing approved single- and multiple-station smoke alarms outside each sleeping area, in each bedroom, and on each level of the dwelling, including the basement.

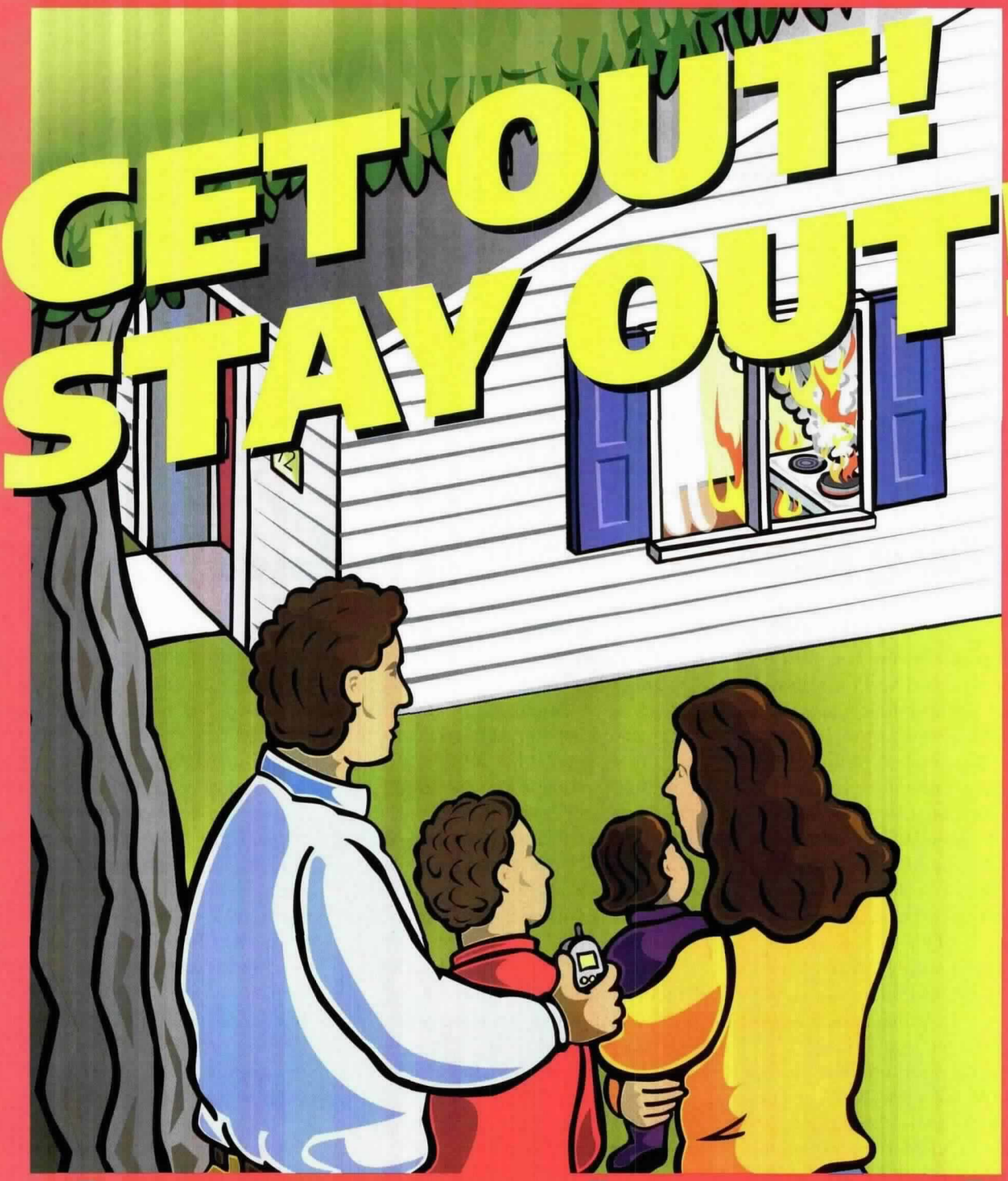
Of course, Chapter 11 isn't limited to one- and two-family dwellings. It also details the location and spacing of smoke alarms in the bedrooms of lodging and rooming houses; in every unit of an apartment building; in the sleeping rooms and living areas of hotels and dormitories; in day-care homes; and in residential board-and-care facilities.

The testing requirements for those occupancies can now be found in Chapter 10, "Inspection, Testing, and Maintenance," which notes that detectors and single-station smoke alarms in occupancies other than one- and two-family dwellings must be tested in place, just as they are in one- and two-family homes. These tests may be conducted using smoke, a listed aerosol that's been approved by the alarm manufacturer, or any other manufacturer-approved method that ensures smoke entry into the sensing chamber.

Residential occupancies remain a high priority for life safety, and continued education of the public by everyone in the fire alarm industry, including installers, is as important as "getting the job."

ILLUSTRATION: RICHARD GOLDBERG

WHEN FIRE STRIKES:



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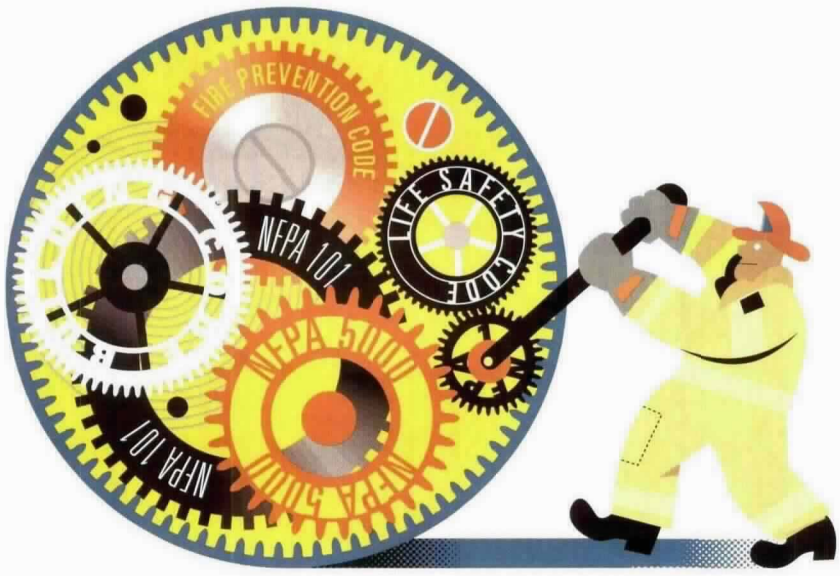


IN AN EFFORT to streamline the volunteer process, NFPA has changed the revision cycle of one of its biggest documents.

NFPA could never do what it does without the hundreds of volunteers worldwide who devote themselves to, among other things, committee work. Being an NFPA committee member involves numerous meetings to process proposals and comments and to draft revised text. Depending on the document, these meetings can involve a significant amount of travel and time away from jobs, so anything that helps lighten the load is always appreciated.

Recently, members of the Technical Correlating Committee for NFPA 5000™, *Building Construction and Safety Code*™, proposed something that should do just that. They suggested putting NFPA 5000 on the same revision cycle as NFPA 1, *Uniform Fire Code*™; and NFPA 101®, *Life Safety Code*®, in a move that would affect hundreds of volunteers, as well as NFPA staff. In January, the Standards Council agreed to the change.

The main reason for the change is that NFPA 5000 and NFPA 101 share many of the same committees. In fact, all the NFPA 101 committees also participate in the NFPA 5000 revision process since both documents follow an occupancy-based format, meaning they're organized by building use. Considering that there are 15 *Life Safety Code* committees, this overlap isn't insignificant.

The logistics

The current editions of NFPA 101 and NFPA 1 were adopted by the NFPA membership at the 2002 Fall Education Conference. Originally, the two documents were scheduled to go before the members again at the 2005 Fall Meeting, but the Council's decision will move the voting on them forward to the 2005 World Safety Conference and Exposition™ (WSCE) to join NFPA 5000. The 2002 edition of NFPA 5000 was adopted at the 2002 WSCE in Minneapolis.

The schedule for all three documents now looks like this:

- The proposal closing date is October 17, 2003.
- The Report on Proposals (ROP) will mail on July 30, 2004.
- The comment closing date is October 8, 2004.
- The Report on Comments (ROC) will mail on April 1, 2005.

The documents will then be up before the membership for vote at the 2005 WSCE, to be held from May 22 to May 26.

The decision

When a committee wants to change its document's revision cycle, it must first get the Standards Council's permission. According to Casey Grant, Standards Council secretary, the Council runs the request by NFPA senior management if the document in question is "one of the big ones [in terms of use and importance]."

The Council looks to NFPA managers to assess the impact such a change would have on staff workloads, NFPA revenue, and attendance at the WSCE or Fall Education conference, which could also have an impact on revenue. In the case at hand, the benefits of changing the revision cycle outweighed any potential negatives, and the Standards Council granted the request.

NFPA has issued a revised meeting schedule for NFPA 5000 and NFPA 101, setting the date of the first set of ROP committee meetings from December 2 to 12 this year. The second wave of ROP meetings will be held from February 2 to 6, 2004. All but one committee will meet in Phoenix, Arizona, both weeks. The rest of the schedule, some of which is still being determined, can be found at www.nfpa.org.

ILLUSTRATION: ROB DUNLAVEY

Home security when you're away from home

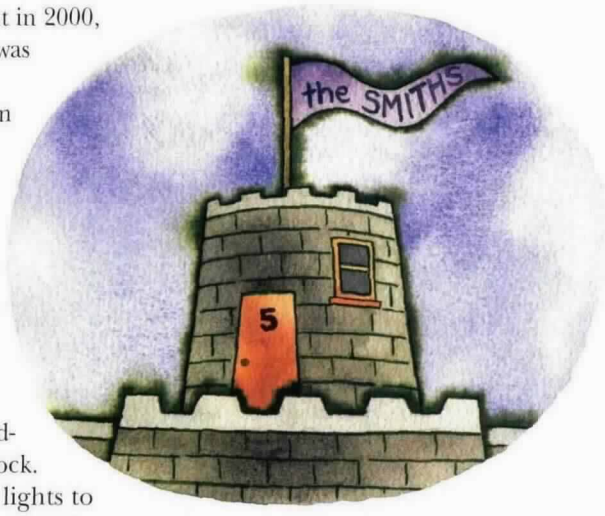
FOR SEVERAL YEARS, I've used this space to celebrate and explore the complex and important work being done at the community level to ensure greater safety for our citizens, whether it's from fire or other serious threats. First responders have always taken up "high real estate" space in my columns, and for good reason.

I know from more than 20 years of membership, volunteer work, and employment at NFPA that it's our nation's first responders who truly are the first line of both offense and defense for community safety. It's gratifying to know that their job is deeply valued locally; statistics consistently reinforce just how trusted they are.

As president of the Home Safety Council, the only national nonprofit organization solely committed to creating safer homes, I'm fortunate to be continuing much of the work I did at NFPA and working with many of the same individuals, agencies, and associations. That means I'm still reaching out to community partners, including first responders, to deliver high-quality safety information. And I'll continue to reach out to you, my fellow NFPA members, with the hope of inspiring you to broader safety plateaus.

Because it's summer, and to whet your appetite for a different diet of safety information from me in future "Outreach" columns, I thought I'd share something I've recently learned that I think is very important. According to the FBI's 2000 Uniform Crime Reporting Program, the greatest number of burglaries occurs in the vacation months of July and August.

At a time when many readers will be readying for summer family vacations, I want to share some simple home security tips that may not have occurred to you. Surprisingly, some 60 percent of residential burglaries occur during the daytime. Although residential burglaries were down by nearly 4 percent in 2000, the average loss per incident was more than $1,300.



Here are some steps you can easily take to protect your home while you're away:

Make sure external door and window locks work and replace or install any that are in disrepair or missing. Ideally, doors should have deadbolt locks, and you should put a bar or wooden dowel in the track of glass sliders to supplement the door lock.

Buy timers so you can set lights to come on in different rooms at different times. Consider installing motion-detection lights in your yard.

Arrange to have your newspaper delivery suspended and have mail held at the post office or picked up daily by someone you trust.

Make your home look lived in. Line up relatives or friends to watch your house, feed and care for your pets, and mow your lawn. Ask a trusted neighbor to park one of his or her cars in your driveway while you're away.

Check outside lighting and replace burned out or dim light bulbs. Reposition automatic security lights so they shine on key areas, such as doorways, driveways, and windows, including those in the backyard.

Look at your house from outside. What would you do to get in if you were a burglar? Trim overgrown hedges that could provide cover for an intruder. Remove spare keys you may have hidden outside.

Changing your answering machine greeting to indicate that you are out of town is an open invitation to burglars. Leave a generic greeting and call in regularly for messages.

Before you drive away, double-check to be sure doors and windows are locked and light timers are set. Make sure you've provided relatives or friends with your contact information so you can be reached in an emergency.

And I can't resist offering these last two tips that I know will resonate with you: Choose hotels and motels with automatic fire detection and suppression equipment in every guestroom, and test your smoke alarms when you get home in case the batteries have gone dead in your absence.

I hope this information helps you have a more restful vacation. And even if you have no immediate plans for "R and R," the advice is just as good for business travelers.

Bon voyage!

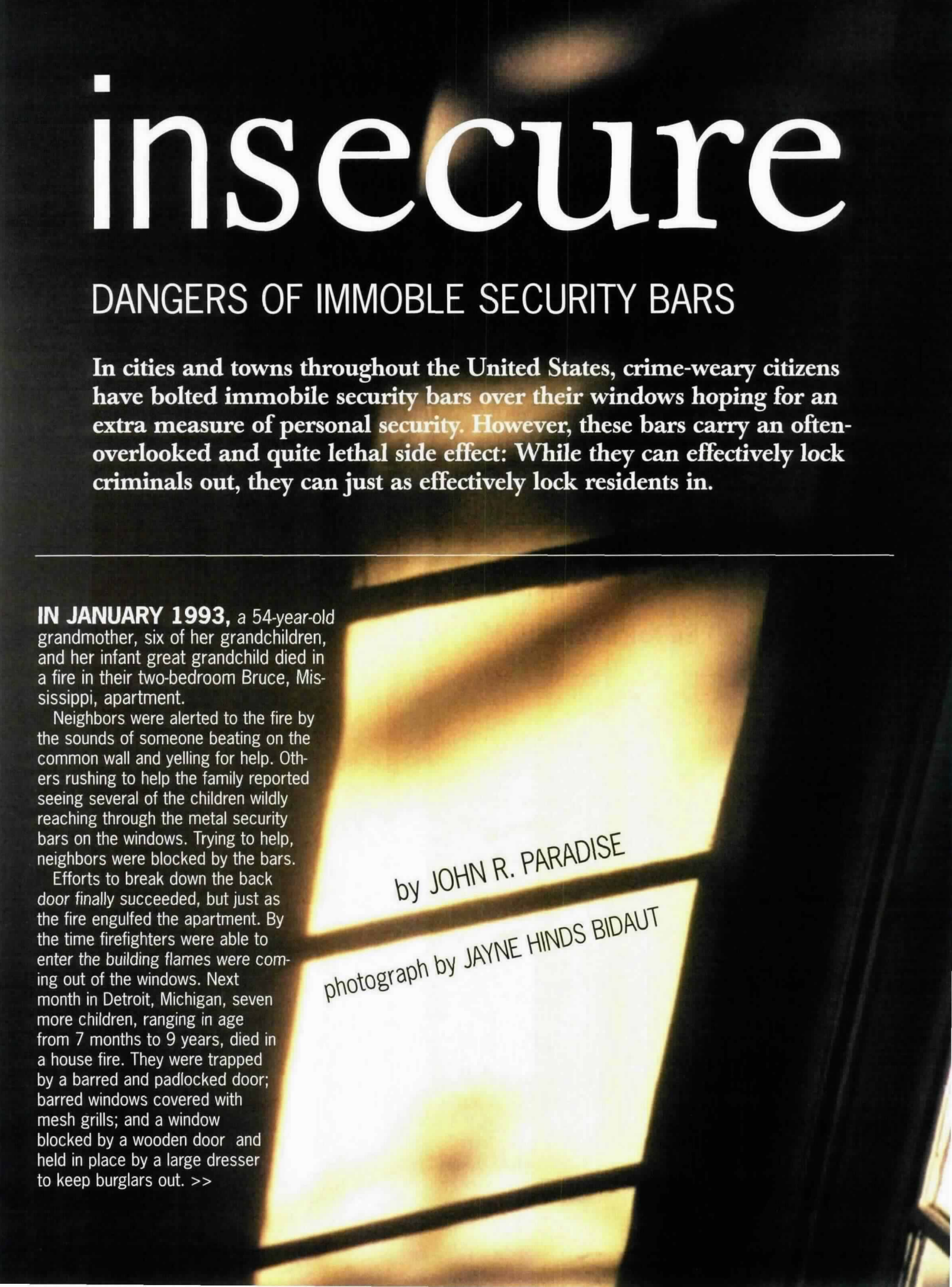
ILLUSTRATION: CYNDY PATRICK

PHOTOGRAPH: IMAGES.COM

insecure

DANGERS OF IMMOBLE SECURITY BARS

In cities and towns throughout the United States, crime-weary citizens have bolted immobile security bars over their windows hoping for an extra measure of personal security. However, these bars carry an often-overlooked and quite lethal side effect: While they can effectively lock criminals out, they can just as effectively lock residents in.



by JOHN R. PARADISE

photograph by JAYNE HINDS BIDAUT

IN JANUARY 1993, a 54-year-old grandmother, six of her grandchildren, and her infant great grandchild died in a fire in their two-bedroom Bruce, Mississippi, apartment.

Neighbors were alerted to the fire by the sounds of someone beating on the common wall and yelling for help. Others rushing to help the family reported seeing several of the children wildly reaching through the metal security bars on the windows. Trying to help, neighbors were blocked by the bars.

Efforts to break down the back door finally succeeded, but just as the fire engulfed the apartment. By the time firefighters were able to enter the building flames were coming out of the windows. Next month in Detroit, Michigan, seven more children, ranging in age from 7 months to 9 years, died in a house fire. They were trapped by a barred and padlocked door; barred windows covered with mesh grills; and a window blocked by a wooden door and held in place by a large dresser to keep burglars out. >>

And a strikingly similar tragedy befell two sisters, one of their daughters, a cousin, and five children aged 2 to 10 years. All died in an East Palo Alto, California, blaze in April 1997. Firefighters' efforts to reach the nine victims were hampered by the bars on their home's windows.

Metal security bars also delayed firefighters' attempts to rescue a mother and her 6-year-old daughter, who were trapped in their burning Jackson, Mississippi, home in January 1999. The woman and her daughter died, but two other children managed to escape through a barred bedroom window. How? According to published reports, the security bars in the bedroom were equipped with an emergency release mechanism that allowed the children to push them open from the inside.

"People are taking steps they think are making them safer in their homes, but what they're really doing is the exact opposite. They're putting themselves more at risk," says Sharon Gamache, executive director of NFPA's Center for High-Risk Outreach. "What happens if the exit doors are blocked by fire? How are they going to get out if there are bars on the windows? The answer is. they're not."

According to NFPA analysis of data from the National Fire Incident Reporting System (NFIRS) and an NFPA survey, an estimated 19 people died per year and another 26 per year have been injured in home fires between 1986 and 1999 when their escape was blocked by what has been termed for reporting purposes "illegal gates and locks."

Experts attribute many of these deaths to security bars, says Dr. John R. Hall, Jr., assistant vice president of Fire Analysis and Research at NFPA.

The problem is most acute in poorer neighborhoods, Gamache says.

"Statistics show that these neighborhoods tend to have both a higher incidence of crime and a higher incidence of fire," she says. "There are a lot of contributing factors at work here. But if you take the heightened concern about crime in these areas, combine it with an increased chance for fire, and throw in the security bars, you end up with people dying needlessly."

An earlier study by Alison Miller, a former NFPA analyst, found that these same poorer neighborhoods can have makeshift security arrangements that are just as dangerous as security bars. Windows nailed shut or blocked by heavy furniture may keep criminals out, and do so inexpensively, but they can also trap any occupant cut off from normal exits.

In 1993, the very same year as the tragic fires in Bruce and Detroit, NFPA organized the Home Security and Fire Safety Task Force. Its charge: To address the dangers of security bars head-on by promoting alternatives to immovable window bars, encouraging the efforts of local and state lawmakers to protect residents in their districts from being trapped by such devices, and educating the public about the inherent dangers tied to these products.

James McMullen, a now-retired California state fire marshal who was the founding chairman of the Home Security and Fire Safety Task Force, says the group was assembled soon after fire officials throughout the country began noticing an alarming rise in the number of fire-related deaths in home fires.

"In California, we spotted this increase in the early 1990s. This caught our attention because we had been seeing the numbers dropping steadily for several years. Suddenly, they were going back up," McMullen says.

At the same time, fire officials in California saw an increase in security bar installations in their communities, he says.

"It didn't take long to spot the connection," says McMullen. "Many of the deaths that we were seeing were in homes equipped with these bars. Whole families were dying. We knew that if it was happening in California, it had to be happening in other states." Out of this realization, he says, the task force was born.

IN ITS EFFORT TO REACH THE GENERAL PUBLIC WITH MESSAGES ABOUT THE RISKS ASSOCIATED WITH SECURITY BARS, THE TASK FORCE AND THE CENTER FOR HIGH-RISK OUTREACH DEVELOPED THE SAFE AND SECURE PROGRAM.

Engineering solutions

The task force has worked to address the security bar problem, Gamache says, by encouraging the use of bars that can be opened from the inside by pulling a simple handle, pushing a button, stepping on a pedal, or kicking a lever.

"These new bars keep criminals out, but with one pull of a lever, they also allow people to use the window as a means of escape in an emergency," she says.

"We've worked closely with Underwriters Laboratories to come up with guidelines for acceptable designs of release mechanisms," she says. "The most important aspect of their design is that everyone, even children, must be able to operate them easily."

While Underwriters Laboratories

hasn't certified a particular design, it has issued a 47-page overview and comparison of the many variations that are now commercially available.

"This bulletin is something cities and towns can use when judging the designs that will be acceptable in their communities," Gamache says.

Legislative initiatives

The task force also encourages and supports local and statewide efforts to regulate the use of security bars.

California, Mississippi, and Texas recently enacted legislation focused specifically on these devices.

"The Mississippi laws were drafted in direct response to the Bruce fire," Gamache says.

Of the three states, Gamache points to California as the model she hopes other states follow.

"California really tried to get to the heart of the issue," she says. "They made the most sweeping changes."

McMullen, who was a fire service member in the California for 30 years, was still the state's fire marshal when the laws were adopted. He also worked closely with the officials in Texas who were drafting similar laws.

"We tried to do several things with our legislation," he says of California. "First of all, we wanted to make it illegal to fit every window of a home with bars that didn't open. With our first bit of legislation, we required at least one window in every sleeping room be equipped with a release mechanism that has been listed or approved by a nationally recognized research lab, like Underwriters Laboratories."

The state also approved a law giving municipalities authority to enact local ordinances requiring these bars to have a safety lock on the outside that firefighters can use to open them.

"It's a Knox Box setup," McMullen says. "Firefighters use a special key to open the bars if they have to get inside. As we've seen in some of the past fires, bars not only trap victims inside the houses, they also keep the firefighters out."

California lawmakers also set a minimum size for windows equipped with these safety locks.

"They have to be big enough for firefighters to get through with full gear," McMullen says. "What good is it if you can open the bars but you don't fit inside?"

Finally, the state required that all bar installation kits sold to do-it-yourselfers be clearly labeled to reference the California laws pertaining to these devices.

McMullen says these state laws focus on new construction, as well as existing buildings.

"We wanted to address these problems in all of the buildings, not just the new ones," he says.

Education outreach

In its effort to reach the general public with messages about the risks associated with security bars, the task force and the Center for High-Risk Outreach developed the Safe and Secure program.

This program provides communities with instructions and literature to help officials understand and teach security bar safety along with other basic home fire safety lessons.

"We included the messages about having working smoke detectors and practicing fire drills in the program because they are all important parts of home fire safety," Gamache says. "Even

Although there were security bars on the doors and windows of this Texas home, they didn't impede the escape of five residents.

if the homeowners don't take all the messages to heart, maybe they'll take one or two. Any little bit helps."

The information, which is meant for distribution through local authorities such as the building, fire, and police departments, can be downloaded directly from the NFPA Web site at www.nfpa.org. Once on the home page, visitors should click first on the blue "Public Education" tab at the top of the screen, then select "Center for High-Risk Outreach" in the blue box at the left of the next screen. From here, visitors can view a brief instructor's guide and the Safe and Secure brochure in both English and Spanish.

"This is all valuable information that communities can put to good use," says Fort Lauderdale, Florida, Fire Marshal Steve Kastner. "Public education is such a key component to saving lives."

Kastner notes that this program was adapted successfully in his city during a crackdown on safety code violations involving security bars.

"Every building code across the country requires two means of egress from bedrooms," he explains. "This minimum requirement is also clearly stated in NFPA 101®, *Life Safety Code*®. If a bedroom only has one door, one of those means of egress has to be a window. What we were seeing were bars across all of these windows. There was no second egress. It was a clear violation that was putting people in danger."

To begin addressing the problem, officials conducted a drive-by survey of the homes throughout the 35-square-mile (9,065-hectare), 152,000-resident city, Kastner says.

"Our inspectors created a list of all the houses with security bars," he says. "From this list, we got a good sense of the scope of the problem." At the same time, officials visited neighborhood groups and civic organizations to explain the dangers associated with the bars.

Next, city inspectors went to the homes found to be in violation and gave owners a deadline for complying with the codes. They also provided them with information about what had to be done and, during the same visit, gave them the forms they needed to apply for a grant through the town to help pay for the work.

"We're asking them to replace their old bars with ones that open. Depending on the size of the windows, it could run them about $200 each," Kastner says. "We're talking about mostly low-income neighborhoods. This was a lot to ask. We knew we had to give them some way to pay for the work, as long as they were income-qualified."

The money, part of a state Community Block Grant, wasn't paid directly to the residents.

"We paid a contractor that the city had approved prior to the start of the program," Kastner says. "This way, we were sure the money was being spent correctly and the person doing the work was doing it right."

NFPA's Gamache calls Fort Lauderdale's work, "an outstanding example of public outreach and education."

"In one visit with the homeowner, they explained the problem, told them what they had to do, how to do it, and even gave them a way to pay for it," she says. "This program has everything going for it."

What's next for the task force? Asked about the most important aspect of the group's future efforts, Ernest Grant, who serves as the group's current chairman, offers a two-word answer: more publicity.

"A large part of preventing future injuries and deaths is getting the message out," he says. "If lawmakers, firefighters, and the public know about the dangers, then the problem can be addressed properly. The trouble is so many communities have yet to hear the message."

That's where the general media, and publications such as the *NFPA Journal*®, serve a vital role, Grant says.

"Articles like this one get people thinking, get people talking," he says. "Maybe some fire departments were aware of the problem but didn't know where to begin. Now they know our task force exists. They know that we're here, willing to offer technical support and guidance. They also now know that state money can be used to help pay for replacing some of these bars."

Grant, a certified burn nurse and manager of the University of North Carolina Hospitals' burn prevention program, says many of the fire-related injuries his unit handles each week were the result of incidents that could have or should have been prevented.

"I see burn victims who never thought they were at risk for injuries like this," he says. "They never really considered ways to make their homes safer. They never thought about blocked windows or blocked doors. I see firsthand evidence every day of this lack of knowledge that the task force and groups like NFPA are working so hard to overcome."

PHOTOGRAPH: NFPA

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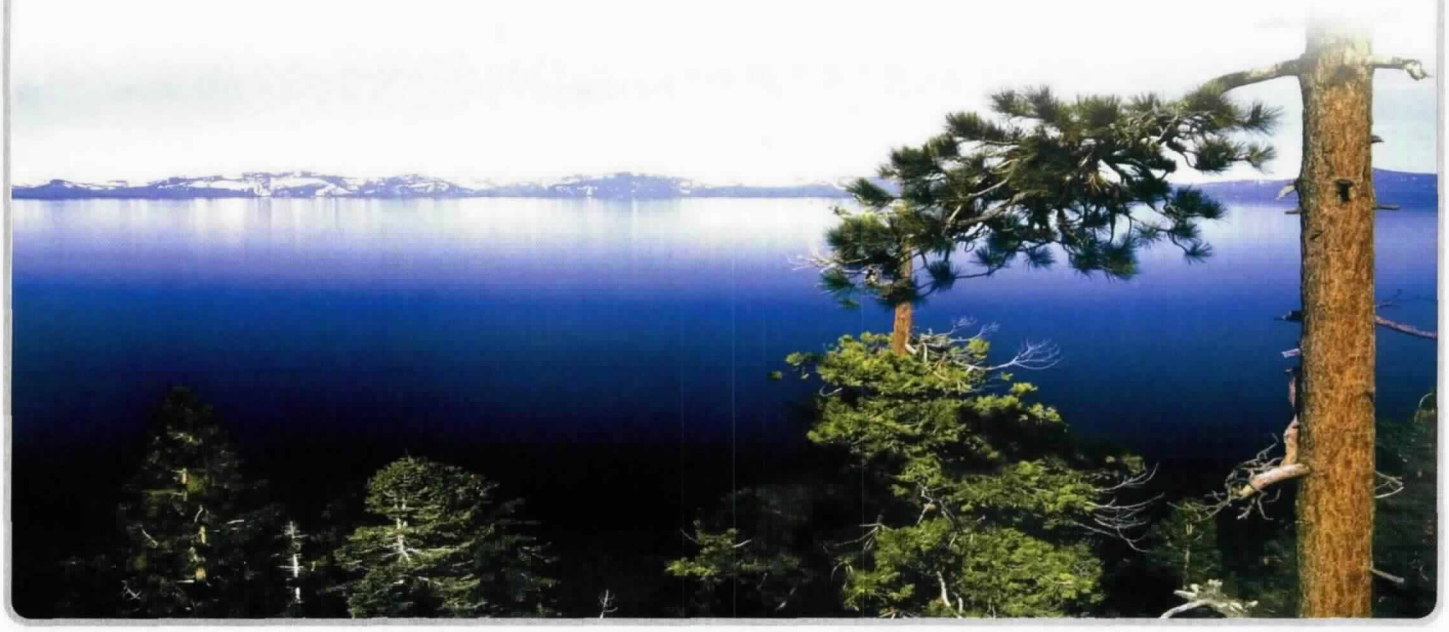

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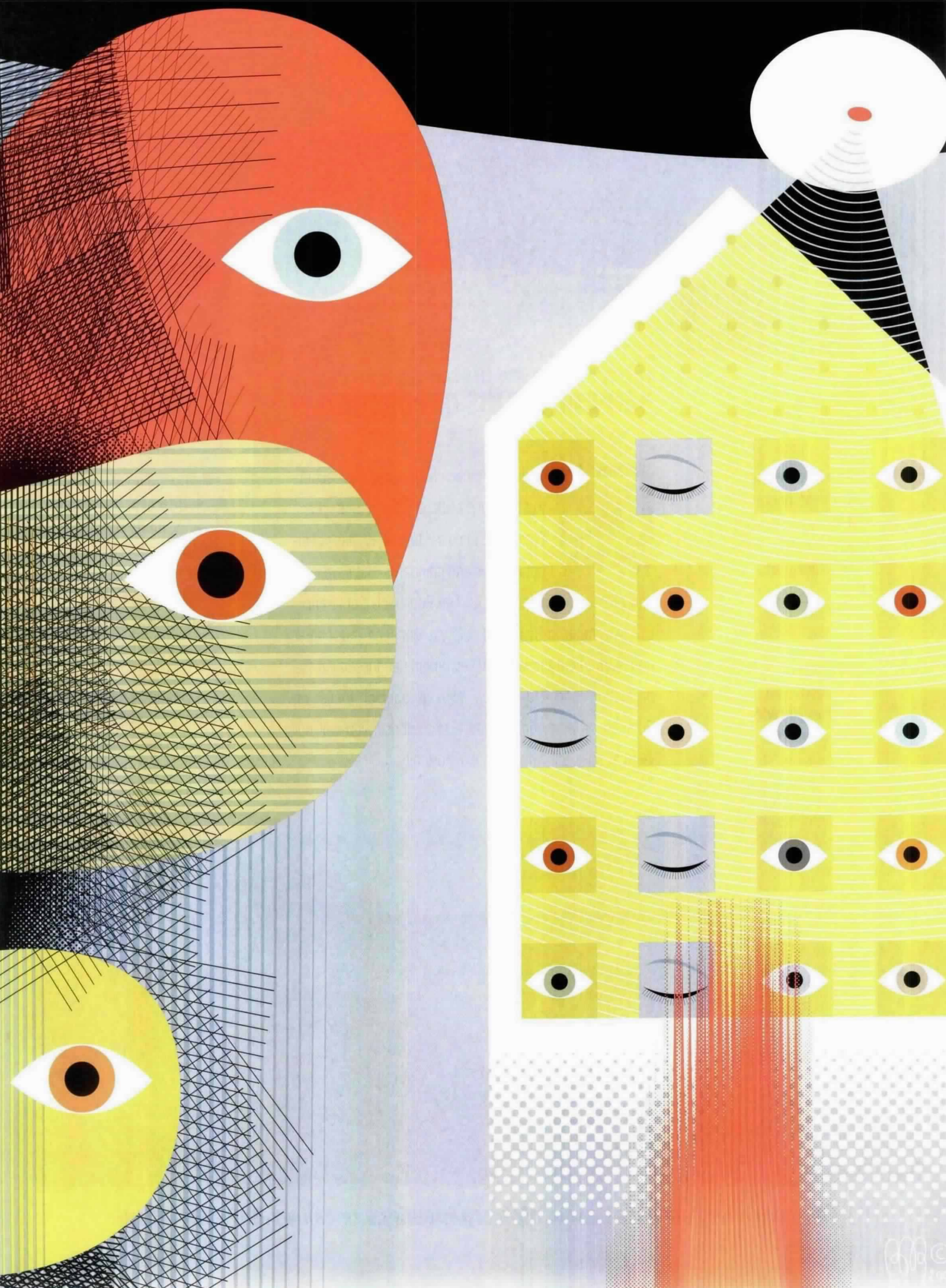
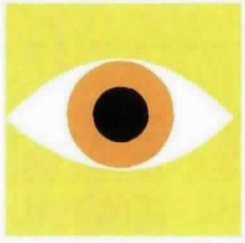


SOUND ASLEEP



LAST JANUARY, THE U.S. CONSUMER PRODUCT SAFETY COMMISSION LAUNCHED A TWO-YEAR STUDY TO INVESTIGATE SMOKE-ALARM WAKING EFFECTIVENESS AMONG CHILDREN AND THE ELDERLY, AND THE FIRE PROTECTION RESEARCH FOUNDATION IS SERIOUSLY CONSIDERING CONDUCTING A STUDY OF THE ISSUE OF CHILDREN NOT BEING AWAKENED, ACCORDING TO FOUNDATION

MARCI DOUGLAS STILL CRIES WHEN SHE WATCHES THE VIDEOTAPE.

"I can't help it," she says. "It's so intense to watch. If it had been a real fire..." Her voice trails off. If she thinks about the "if," she'll start to cry again. If it had been a real fire, her son would be dead.

The video to which Douglas refers is a 2001 news feature story depicting sleeping children's responses to smoke alarms that WCCO-TV in Minneapolis produced with the help of the Bloomington, Minnesota, Fire Department. Marci's son Mitchell, then 10 years old, was one of four children WCCO tested to see how they would react to a smoke alarm in the night.

Their responses are frightening. One boy ran through the smoke rather than use a secondary exit. A little girl woke but didn't recognize the sound of the alarm. A third child didn't wake to the alarm and, when prodded by his mother to escape, simply froze.

However, watching Mitchell is what brings tears to his mother's eyes.

"I didn't think much about it before the test," Douglas says. "Mitchell is a smart boy. I thought he'd hop right out of bed. I thought there was a chance he might run right out the bedroom door and into the smoke, but it never occurred to me he wouldn't wake up."

He didn't. Not for almost 15 minutes. >>

by SHELLY REESE ▮ illustration by ROB DUNLAVEY

SINCE WCCO CONDUCTED its news story, similar news stories have aired across the country, in places like Columbus, Ohio; Des Moines, Iowa; Milwaukee, Wisconsin; and Jackson, Mississippi. While these news stories lack the controls and specifications required for research, they have made one point clear: Children can sleep through smoke alarms.

According to published reports, researchers have long known that children sleep differently from adults and that their sleep is especially sound in the hours soon after they first fall asleep. The younger the child, the longer the deep-sleep phase is likely to last.

How that relates to smoke-alarm waking effectiveness has only recently been widely recognized, however, the many television news stories have raised interest in the existing formal studies. Because children 5 and under and adults 65 and older–for whom smoke-alarm waking effectiveness might also be an issue–are twice as likely as the general population to die in a home fire, the research has commanded the attention of everyone interested in fire safety in the home.

BECAUSE CHILDREN FIVE AND UNDER AND ADULTS 65 AND OLDER—FOR WHOM SMOKE-ALARM WAKING EFFECTIVENESS MIGHT ALSO BE AN ISSUE—ARE TWICE AS LIKELY AS THE GENERAL POPULATION TO DIE IN A HOME FIRE, THE RESEARCH HAS COMMANDED THE ATTENTION OF EVERYONE INTERESTED IN FIRE SAFETY IN THE HOME.

Studies launched

Last January, the U.S. Consumer Product Safety Commission launched a two-year study to investigate smoke-alarm waking effectiveness among children and the elderly, and the Fire Protection Research Foundation is seriously considering conducting a study of the issue of children not being awakened, according to Foundation President Rick Mulhaupt. To bring NFPA members up to speed on the issue, NFPA also invited Dr. Dorothy Bruck of Australia, the recognized world leader in research on the topic, to speak at its World Safety Conference and Exposition™ in Dallas this past May.

In addition, Underwriters Laboratories (UL) made the subject the centerpiece of its March 7, 2003 smoke alarm Standard Technical Panel meeting in Northbrook, Illinois, establishing two working groups to study the topic in detail.

The first group, composed of pediatric sleep experts, safety engineers, government officials, and manufacturers, was charged with gathering information and proposing future research designed to better understand the physiological and technical aspects of the issue. Such research might help lead to changes in the way smoke alarms operate and how they are installed and used. The second group, composed of UL staff, fire prevention and education specialists, and manufacturers, is developing information to effectively inform the public of smoke alarm and fire safety issues.

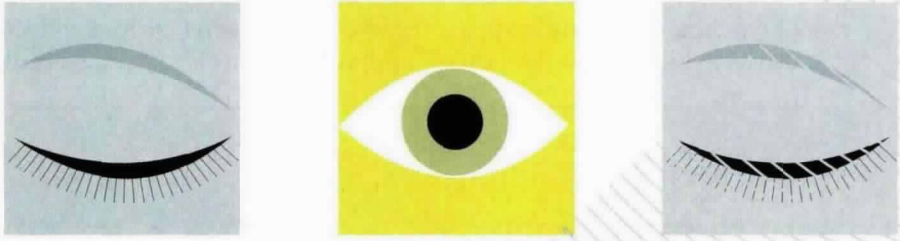
Such research and discussion are welcome, says Dr. Rita Fahy, NFPA's manager of fire databases and systems, who spoke on the topic at the Fire Suppression and Detection Research Application Symposium in Orlando, Florida last January, because the data available to date "raise more questions than answers."

Studies raise concerns

While less emotionally charged than the televised images of children sleeping through alarms, scientific studies published on the topic are perhaps more alarming because they confirm that this problem is neither a fluke nor an artifact of unrealistic test conditions.

Bruck, a psychologist at Victoria University in Australia, was the first to identify the problem. In her 1999 study published in the Fire Safety Journal, Bruck tested 20 children in Australia between the ages of 6 and 17 to determine their response to a 60-decibel alarm sounding at pillow level. She conducted her test twice and found 17 of the children slept through one or both tests. Two of the three who woke were 16 and 17 years old, among the older children in the sample. Indeed, for the children 15 and under, the reliable waking rate was only 5.6 percent. In contrast, Bruck found all of the parents woke when the alarms sounded.

In subsequent research, Bruck found that raising the sound level at the children's head made only a limited difference at best. In a presentation to the fourth Asia-Oceania Symposium on Fire Science and Technology in 2000, Bruck and fellow researcher Angela Bliss reported their findings from a study of 28 children between the ages of 6 and 15. In two tests, the children were exposed to an 89-decibel alarm; half slept through one or both tests. Among the 6 to 10year olds, that percentage climbed to 71 percent. When children did wake, they were groggy for several minutes, a factor that might well have impaired their ability to make life-saving decisions in a true emergency. Put simply, louder, closer alarms were unlikely to solve the problem.



While adults and some fire protection experts may be surprised by those numbers, kids themselves might not be.

Derrick Ethridge, fire prevention officer for the Loyalist Township Emergency Services in Ontario, Canada, decided to study the issue when children in the schools he visits told him they didn't think they'd hear an alarm if it went off.

"They kept telling me, 'I don't think I'd hear it,' or 'I sleep with my door closed,' or 'I don't think I'd wake up,' " he recalls. "I suspected there was a problem just on the basis of what the kids were telling me, and I wanted to find out if that was true."

With the help of Professor Alistair MacLean of the Queens University Sleep Lab, the Canadian Hearing Society, the Limestone and Algonquin school boards, and the parents of 222 Loyalist Township sixth graders, Ethridge decided to conduct a test. Parents were asked to activate the smoke alarms outside their sleeping children's bedrooms between 9 and 11 p.m. on two separate nights in April 2002 and time how long it took the children to awaken. Tests were conducted once with the door closed and once with it open. The children knew they'd be tested but didn't know when.

The team found 31 percent of the children didn't wake up at all when the smoke alarm was activated, and 53 percent didn't react within the first minute. Ethridge later conducted random audibility tests in 22 of the homes. Testing once with the bedroom door open and again with it closed, he found sound levels in some cases dipped as low as 64 decibels.

"Some parents wrote back, 'I took the damn smoke alarm off the ceiling, put it over my kid's head and he didn't move.' Or they said the alarm rang until the batteries went dead, and the child never woke up," he says. "They were definitely concerned."

As disconcerting as research such as Bruck's and Ethridge's may be, it must be considered in light of overwhelming data demonstrating smoke alarms' proven benefit. Since the early 1970s, when smoke alarms made their way into homes, residential fire deaths have been cut in half. Homes with smoke alarms–whether or not known to be operational–have a death rate 40 to 50 percent lower than the rate for homes without alarms, says Dr. Fahy.

Today, the overwhelming majority of fatalities take place in homes that aren't equipped with alarms or in homes where the equipment is broken, dismantled, or missing a battery. Half of the people killed in home fires each year die in the 5 percent of homes that don't have smoke alarms. Of the fatalities that do take place in homes equipped with alarms, half occur in one-third of the cases in which the smoke alarm doesn't sound.

More research needed

The fact that children are sleeping through alarms must be studied against this backdrop, Fahy says, and the magnitude of the problem can't be diagnosed without additional research.

"Of all home fire deaths, we're talking about a subset of the 25 percent that occur in homes with operable alarms," she says, "and we need to know more about those cases."

For example, how are people alerted when nighttime fires occur? Are alarms waking parents who then shuffle their children out of the house? If so, are the alarms accomplishing their aim by alerting parents and enabling the family to put its escape plan into action?

While the media focus has been on children sleeping through alarms, what about older residents who are most likely to have hearing loss and are more likely to live alone or with other seniors? Would different types of alarms, such as voice notification or a lower frequency, achieve better results? Would interconnecting alarms as is already required for new construction by NFPA 101®, *Life Safety Code*®, make a substantial difference?

Without at least some of that information, it's impossible to draw actionable conclusions from existing studies, demonstrations, and news reports, Fahy says.

John Drengenberg, UL's manager of Consumer Affairs and moderator for the March panel discussion on the topic, voiced the same sentiment.

"Based on what we heard from pediatric sleep experts and fire prevention officials, there might not be a

single answer to this complicated issue," he says.

Practice still the best solution

While officials study the issue and try to ascertain how best to address it, NFPA President Jim Shannon emphasizes that parents shouldn't let their concern about the issue distract them from the larger issue of fire safety.

"If parents conclude from the demonstrations that they don't need some alarm protection, they'll be dead wrong," he says. "The fact is, smoke alarms do work. What remains to be seen is if we can make the technology better and use it more effectively."

Alarm Code is scheduled for publication in 2006. Changes may be forthcoming, if research identifies areas where significant and meaningful improvements could be made.

As Shannon notes, however, the effectiveness of smoke alarms has as much to do with practices in the home as it does with codes and standards.

"As safety groups, including NFPA, explore the issue, there's still very good reason to remain confident about the role of smoke alarms in home fire safety systems," he says. "In the near term, the lesson parents should take away from these news broadcasts is that they won't know how their children will react to the smoke alarm until they've tested their response to it. Home fire drills are essential."

eral weeks later, all four children awoke and carried out the drill to the letter.

Encouraging families to prepare

Judy Comoletti, assistant vice president of NFPA's Public Education Division, not only emphasizes the importance of developing and rehearsing home escape plans, but suggests that parents activate their smoke alarms and conduct their drills at night, so they can better gauge the reaction of everyone in the household. Children and the elderly aren't the only ones at risk of sleeping through an alarm, she notes. Sleep-deprived college students, shift workers, teenagers, the hearing impaired, and anyone taking sedating medication, alcohol or drug-impaired individuals, might conceivably be affected, as well.

"Every family should know who will–and won't–wake up at the sound of the alarm so they can accommodate any special needs," she says. If someone is hard to rouse, Comoletti suggests installing additional hardwired, interconnected alarms in every bedroom. If this doesn't work, she encourages families to design an escape plan that assigns an adult who awakens easily to rouse the sound sleepers.

"We all think we know our kids so well, and we think we know how they will react to A, B or C," says Douglas. "We think they're so smart they'll know just what to do. However, the reality is you don't know at all until it happens. You have to practice. It's like helping your kid prepare for a spelling test. You have to drill them."

WE THINK THEY'RE SO SMART THEY'LL KNOW JUST WHAT TO DO. YOU HAVE TO PRACTICE. IT'S LIKE HELPING YOUR KID PREPARE FOR A SPELLING TEST. YOU HAVE TO DRILL THEM.

PHOTOGRAPH: CORBIS

Lee Richardson, NFPA staff liaison for NFPA 72®, *The National Fire Alarm Code®*, advises not to "throw the baby out with the bathwater."

"People shouldn't get tunnel vision," he says. Instead, they need to focus on maintaining and testing their smoke alarms and practicing their home escape plans.

NFPA 72 contains requirements for the type of sound pattern an alarm emits and how loud it needs to be throughout the home and especially in sleeping areas. Although the location of smoke alarms in homes in any U.S. community is determined by local building codes, NFPA 72 includes location requirements typical of those usually found in these codes.

While recent news coverage has raised awareness, NFPA's technical committees aren't yet considering changing the codes, Richardson says. The next edition of the National

Evidence indicates that familiarization with the sound of the alarm and practicing escape drills holds promise. Bruck cites research indicating that adult subjects who were primed to respond awakened 90 percent of the time. Those who weren't woke only 25 percent of the time.

Although it wasn't a research project, families who participated in the WCCO broadcast had a similar experience. After the four children failed the initial test, their parents talked to them about fire safety. They also laid out home escape plans and practiced them. Marci Douglas discussed fire safety with Mitchell, then activated the smoke alarm with a broom handle so her kids would recognize its sound during an emergency.

When WCCO repeated the drill sev-

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NFPA 1981, NFPA 1991, NFPA 1992, NFPA 1994

by ALAN S. BROWN

GEARING UP for new threats

FIRST RESPONDERS ARE TRAINING TO PREPARE FOR POSSIBLE TERRORIST THREATS

FROM HIS SUBURBAN VIRGINIA OFFICE at the Fairfax County Fire and Rescue Department, Deputy Chief Glenn Benarick can't see the Central Intelligence Agency (CIA) complex on the other side of the county, but he knows it's there. His department has answered fire and hazardous materials calls at the CIA's Langley headquarters in the past and recently conducted joint incident management training with the agency to prepare for a possible terrorist attack.

The CIA is just one of several government complexes in Fairfax County outside Washington, D.C. If a major terrorist chemical, biological, radiological, or nuclear (CBRN) attack were to occur in or around the nation's capital, Fairfax Fire and Rescue would respond to the incident—which puts the department's 1,400 members on the front lines of the terror-related threats facing first responders in the United States.

Like other large fire departments, Fairfax has rushed to adjust to its changing role. Unlike many departments, however, the county's haz-mat teams have equipment designed for CBRN use and know how to use it.

"We've done what we've needed to do as far as training, and we have truckloads of supplies, which isn't the case everywhere around the country," Benarick, who also chairs NFPA's Technical Committee on Fire Service Occupational Safety and Health.

Fairfax's haz-mat responders will approach a scene encapsulated in garments that form a barrier against industrial or military chemical vapors, and they'll carry their own air supplies in the form of self-contained breathing apparatus (SCBA) that incorporate personal alert safety system (PASS) alarms.

Even in a department as prepared as Fairfax County's, though, CBRN protection for first responders is a work in progress. Most planning and products focus on chemical attacks rather than biological or radioactive threats and gaps remain in the availability of needed equipment.

Benarick questions how well his teams' SCBA units will stand up to chemical warfare agents. The county bought the SCBA two years ago, before the National Institute of Occupational Safety and Health (NIOSH) began certifying SCBAs for CBRN protection. If it wants NIOSH-certified units now, Fairfax County may have to shell out another half million dollars or more, a tough sell in cash-strapped states and municipalities. >>

PHOTOGRAPH: AP/WIDE WORLD


IS THEIR EQUIPMENT BEHIND THE CURVE?

"We weren't planning to do anything for about six years," says Benarick. "Some departments keep them for 10 years because they're so expensive."

In the meantime, Fairfax is waiting to see if its vendors develop upgrade kits to bring its SCBAs into compliance with NIOSH standards.

Unknown dangers

The SCBA are just part of Benarick's concerns. The real problem, he says, is that the first responders to any CBRN incident are likely to be engine and ladder companies, and they'll show up in basic turnout gear.

"If you're dispatched to a haz-mat event, you typically have some idea of what you're going into and what chemicals may have been released," he explains. "With weapons of mass destruction, first responders may not realize what they're dealing with until they try to mitigate the incident. In some cases, that may be too late for them."

How the responders are deployed will depend on their level of protection.

Rescue squads and advanced life saving units will bring with them splash-protective suits that comply with the requirements of NFPA 1992, *Liquid Splash-Protective Clothing for Hazardous Materials Emergencies*. These are called Level B suits when used with SCBA units and Level C suits when used with air-purifying respirators (APRs) or powered air-purifying respirators (PAPRs), after the designations for their Environmental Protection Agency (EPA) equivalents.

NFPA 1992 ensembles are only certified against toxic industrial chemicals, not chemical agents or CBRN, says Daryl Louder, Fairfax Battalion Chief and haz-mat response team leader. They will provide adequate protection in the "warm zone" on the fringe of the "hot zone," the area immediately surrounding the incident. Chemical agents don't remain airborne for long, he explains, so by the time they reach the warm zone, they've settled on surfaces and behave like liquids.

"We're pretty comfortable in that environment, depending on concentration," he says.

He expects responders clothed in NFPA 1992 garments to remove victims from the edge of the hot zone to field decontamination units. There, ALS technicians in protective clothing will scrub off chemical agents, then move victims to hospitals without contaminating doctors, nurses, and facilities. Beyond the warm zone will be supporting responders wearing NFPA 1992 ensembles with PAPRs.

In the hot zone, the haz-mat team will search for survivors and begin remediation wearing haz-mat suits that meet the requirements of NFPA 1991, *Vapor-Protective Ensembles for Hazardous Materials Emergencies*, chemical/biological option. NFPA 1991 ensures protection against vapor penetration by chemical agents and toxic industrial chemicals. Fairfax has 66 of these ensembles, sometimes called Level A units after their EPA equivalents, 36 on the street and 30 in reserve. Although Fairfax's SCBAs aren't certified for chemical or biological use, they meet NIOSH requirements for hazardous materials and provide reasonable protection.

Responders wearing NFPA 1991 ensembles and SCBAs will do about 20 to 25 minutes of actual work in the hot zone per shift, says Louder, and the haz-mat team will work one or two shifts at an incident. Because the NFPA 1991 protective ensembles are designed to keep vapor out, they also keep sweat and heat in, so just walking into the hot zone from the staging area will tire responders. One-hour SCBA and the need for extensive decontamination will also limit their work periods.

"WITH WEAPONS OF MASS DESTRUCTION, FIRST RESPONDERS MAY NOT REALIZE WHAT THEY'RE DEALING WITH UNTIL THEY TRY TO MITIGATE THE INCIDENT. IN SOME CASES, THAT MAY BE TOO LATE FOR THEM."

"Physiologically, we could send them back in after a short break, but we'd have to have frequent breaks," says Louder.

This lack of responder productivity, though always a given with haz-mat teams, is troubling. In neighborhood-sized events, those lost work hours could prove vital.

"Longer work periods enable incident commanders to get situations under control faster," says Bryan Heirston, an Oklahoma City, Oklahoma, Fire Department assistant chief and chair of NFPA's Technical Committee on Hazardous Materials Protective Clothing and Equipment. "We need better suit designs that increase responder productivity while ensuring the safety and health of the wearer."

NFPA 1994, *Protective Ensembles for Chemical/Biological Terrorism Incidents,* was supposed to provide requirements for that type of garment. The standard covers all emergency responders with three levels of protection against chemical warfare and toxic industrial materials. A Class 1 vapor-resistant ensemble provides vapor protection and is intended for high vapor concentrations or unknown exposures. Class 2 ensembles provide low-level vapor resistance and liquid splash resistance. And Class 3 ensembles would resist incidental droplets for responders on the periphery of the event.

Work on NFPA 1994 officially began in 1998, and the standard was published in August 2001, a month before 9/11. Yet nearly two years later, only a handful of Class 1 ensembles have been certified. At least one Class 3 ensemble has been approved, and Class 2 ensembles are in the testing process.

Most people trace NFPA 1994 back to March 20, 1995, when the Aum Shinrikyo cult released sarin nerve gas on a Tokyo subway in the first known terrorist attack with a chemical warfare agent. Then came the destruction of the Alfred P. Murrah Federal Building in Oklahoma City.

"Oklahoma City changed people's perception," says Stephen N. Foley, NFPA senior fire service specialist. "A lot of folks thought it would never happen to them, that terrorism could only happen in a big city. The initial focus had been on equipping the 120 largest cities and training responders to recognize signs of chemical warfare. Since Oklahoma City, NFPA has addressed response capabilities in a broader way."

NFPA had several models to work with. The requirements in NFPA 1991 and NFPA 1992, written in the late 1980s, were based on those of the EPA's vapor-tight Level A and liquid-tight Level B suits used in hazardous chemical response and remediation. Unlike the EPA, which merely described the assembly of protective equipment, NFPA set performance requirements.

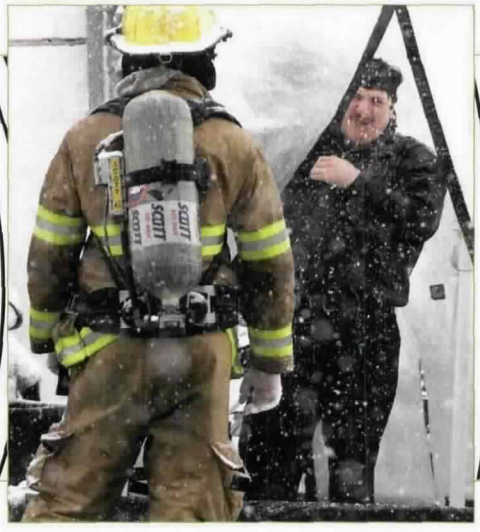
For anyone who has ever sweated it out in an encapsulated suit, breathable garments sound like a better alternative. However, they have one big flaw, says Jeffrey O. Stull, president of International Personal Protection in Austin, Texas.

"While chemical warfare agents are more toxic than any other chemical substances, they are also relatively easy to protect against. They're all large molecules and can't permeate a garment easily. But with toxic industrial chemicals (TICs), like ammonia, chlorine, and phosgene, the molecules are small and will go right through," explains Stull, a member of NFPA's hazardous materials protective equipment committee.

Therefore, NFPA decided to develop the new CBRN option for its encapsulated NFPA 1991 ensemble, which already protects against industrial hazardous materials. The option ensures that the ensemble will prevent penetration of five chemical warfare agents–lewisite, sarin, V-agent, distilled mustard, and cyanogen chloride–as well as selected TICs.

"We originally developed the chem/bio option as a stop-gap measure while writing NFPA 1994, which was designed to deal specially with the chem/bio threat," Heirston recounts. "Then we did a risk assessment analysis and realized that a terrorist might target toxic industrial materials, which are widely available. So we decided to keep the NFPA 1991 chem/bio option, which protects against industrial and military threats. That's become our super suit, our Cadillac."

Nonetheless, many standards writers are dissatisfied with the results.



A Cranston, Rhode Island chemical manufacturing plant explosion in February, 2003 brought together Cranston firefighters and Hazardous Materials crew. Firefighters help a Hazardous Materials crew member out of his suit, assist a Hazardous Materials crew member out of a decontamination tent, and wait to assist an employee of the plant after he is decontaminated by a Hazardous Materials crew member (right).

PHOTOGRAPH: AP/WIDE WORLD

Though designed to protect the wearer against chemical agents terrorists are most likely to use, including dimethyl sulfate, ammonia, chlorine, phosgene, and hydrogen cyanide, they don't cover all 21 industrial chemicals tested under NFPA 1991. Nor does NFPA 1994 demand the levels of flame and abrasion resistance required by NFPA 1991.

Many of those who originally wrote NFPA 1994 saw it as a way to protect emergency services personnel who are likely to respond to a chemical/biological attack. Those working the hot zone, where the agent and its concentration are unknown, would wear Class 1 ensembles. Those in the hot or warm zone, where gas concentrations are lower and

splashed liquids present a serious threat, would wear Class 2 ensembles. Responders on the perimeter would use a Class 3 ensemble to protect against incidental droplet contact.

"What we ended up with were the same garments we always had," says Heirston. "They're encapsulating suits that look like NFPA 1991 and NFPA 1992 ensembles. The manufacturers are cross-certifying existing garments.

"That wasn't what I envisioned," he continues. "While I expected Class 1 would have the look and ergonomics of a traditional haz-mat suit, I thought the other levels would reduce heat stress and improve maneuverability."

Stull also wants to see changes. Haz-mat teams, he notes, are trained to use vapor-protective ensembles effectively.

"A chem/bio event will draw a wider array of first responders to the front line, including fire, law enforcement, EMS, and other personnel," he says. "With that in mind, my criticism of the industry is that it tests its products against chemical agents and then presumes they can be used by Joe First Responder. That won't necessarily be true. We need more innovation in how we approach design."

Not enough products

As of April 1, 2003, only DuPont Personal Protection's Tychem CPF3 (models 3T463 and 3T464) had been certified as an NFPA 1994 Class 1 ensemble. Several other companies are testing garments, but none have yet received Class 1, 2, or 3 certification.

In fact, says Stull, there is virtually no interest in developing Class 2 ensembles.

"The NFPA 1994 criteria push Class 2 so close to Class 1, manufacturers don't know where that fits in," he explains.

The offering is equally slim for the NFPA 1991 chem/bio option. Certified products include DuPont's Commander, Responder, and Reflector (aluminized overcoat) models and Trelleborg Protective Products' HPS and VPS suits, all with a variety of SCBA pass-through options. In addition, OnGuard Industries has certified its haz-mat boot to the standard.

In May 2002, Interspiro USA received NIOSH certification for three CBRN-approved SCBAs, the Spiromatic 9030, 6630, and 4530, followed by Scott Health & Safety in February 2003. In March, Scott announced it would begin the certification process for CBRN upgrade kits for NFPA-compliant SCBA units. And in May, MSA received NIOSH CBRN certification for its NFPA 1981, 2002 edition-compliant SCBA.

There are several reasons for the chem/bio product drought, starting with the nature of the certification process itself. Chemical warfare agents are highly controlled. Until recently, only the U.S. Army's SBCCOM laboratory ran live tests, and its charter extended only to military equipment. Since 9/11, other chemical warfare agent testing facilities have opened, and SBCCOM has freed up time and equipment to test responder equipment. Yet delays remain.

Because companies testing products for certification to NFPA standards couldn't use highly restricted chemical warfare agents, they were flying blind when they submitted products for live testing. Nor could they learn from their mistakes: labs routinely destroyed contaminated garments, so they were unavailable for post-test analysis. Fortunately, NIOSH and SBCCOM revised their procedures in March 2003 to enable companies to test respirator materials, surfaces, and designs before submitting samples.

Still, testing is expensive. Manufacturers estimate it costs $40,000 to $50,000 to test an SCBA unit and significantly more for an APR. Pat Gleason, director of the Safety Equipment Institute, an equipment-testing group, estimates that certifying an NFPA 1994 Class 3 ensemble costs about $90,000 and certifying a Class 1 or 2 ensemble costs $150,000. Rob West, security and emergency services manager for Texas Instruments Inc., estimates that it costs more than $100,000 to certify a NFPA 1991 ensemble with the chem/bio option.

That adds up to big bucks. Fairfax Fire and Rescue's single-use disposable DuPont TK or Trellborg VP1 NFPA 1991 ensembles cost between $1,400 and $1,900 each, and NFPA 1994 Class 1 garments cost about the same. That's why so few are on the streets, says John M. Eversole, retired chief of Chicago Fire Department Special Operations and a leading authority on haz-mat response.

"This is a suit you put on one time and discard for $1,400," he says "How many do you own?"

There are, of course, big differences between NFPA and EPA requirements for haz-mat suits. NFPA standards demands proof of performance, while the EPA requires only that products conform to written specifications.

Stull charges that, without performance standards, inappropriate products can slip through. As an example, he points to haz-mat coveralls with elasticized openings around the face and sleeves that are positioned by some distributors for chem/bio use.

"That's not going to provide any integrity against permeation," he says. "Therefore, they provide some duct tape or equivalent to secure it. Their cloth zipper provides no barrier protection, so there's more duct tape. Their seams may or may not be sewn properly. So what good will they do?"

Change

NFPA's technical committees have been looking for new ways to encourage less expensive, more innovative designs that provide every responder with chemical/biological protection while improving productivity. The goal, say committee members, is to create protection standards that are effective and widely adopted by responders around the country.

With its chemical/biological option, NFPA 1991 appears to be such a standard. It provides the highest possible level of protection against fire and industrial chemicals, and can protect wearers from chemical warfare agents if the chemical/biological option is selected.

The technical committee has also been working for changes to NFPA 1994 that encourage development of a broader range of ensembles. This starts with rethinking how NFPA 1994 classifies threats. Instead of using terms such as hot, warm, and cold zones, for example, a revised standard might focus on spe-

cific exposure threats, says Heirston.

These changes were inspired in part by the anthrax-laden letters distributed in 2001.

"It was obvious during the anthrax incidents that we had focused too much on the chemical aspects of terrorism," says Stull. "If we'd known it was anthrax we were facing, we wouldn't have worn encapsulated suits. There are better, more comfortable ways to deal with that threat, but our classifications didn't accommodate them."

Testing 1, 2, 3

NFPA is also working to revise its test methods to open the door to new designs.

As a user of protective ensembles, Texas Instruments' West would like to see existing test methods evaluated for their practicality and real-life applicability.

"Take abrasion testing, where we rub sandpaper on a seam," he says. "If it doesn't pass after 100 times but passes after 92 times, is that an appropriate amount of protection?"

Eversole is concerned that setting standards too high not only adds to cost, making them less available to those who need them, but may make the suits less usable.

"When the guys in the suits are doing 40 jobs per month, they're going to ask why they're putting on something that adds heat and weight," he says.

The technical committees may also change the requirements so as to make APRs and PAPRs part of an NFPA-compliant response mix.

"In chem/bio, the fire service has been one way about SCBAs: 'That's it, no exceptions, we only look at SCBAs,'" says Eversole. "Now we're in a new world where we're not looking at a single building but more of a neighborhood situation. We're looking at respirators again because we need something lighter with more operating time in these situations."

NIOSH has already published a CBRN standard for APRs and is working on one for PAPRs.

In addition, the technical committees are considering reworking the standards to require that all SCBAs conform to NIOSH's CBRN standard.

"Most manufacturers tell us that the modifications they have to make to meet CBRN standards are relatively minor," says Ray Reed, a captain in the Dallas, Texas, Fire Department, and chair of NFPA's respiratory protection equipment committee. "If it's not a significant number of modifications and doesn't affect the comfort of SCBA, we may consider it."

Future directions

By rethinking threats and altering test methods, standard-makers hope to encourage manufacturers to break out of the encapsulated suit/respirator mold. They might even develop suits firefighters are comfortable wearing.

One possible direction is the introduction of semi-permeable materials, such as those used in sportswear and raincoats that let air out but keep moisture from getting in. They not only keep wearers dry, but they help to prevent heat buildup. A suit that lets out air and water vapor while blocking the larger molecules of chemicals used in warfare is already being developed by the U.S. Army's National Protection Center, says technical program manager Bill Haskell. Haskell admits that toxic industrial chemicals are new to his group, but he says much of the research that's already been done to protect soldiers from chemical and biological warfare is applicable to responder protection.

"Our ultimate dream is to leverage military technology and incorporate it into the next generation of firefighting structural gear," says Haskell. "You would have one ensemble that gives you protection against CBRN, extreme weather, and flashover without added weight or heat stress. It would be something responders could wear all the time, instead of carrying separately."

Haskell, who is field-testing prototypes, says such a responder garment could be on the market in as little as six years.

Broader standards coverage

Some NFPA members hope to broaden the reach of CBRN standards by advocating them for inclusion in the regulations and standards set by the Occupational Safety and Health Administration (OSHA) and other government organizations. This has happened before, when OSHA mandated that all structural firefighting gear meet NFPA 1971, *Protective Ensemble for Structural Fire Fighting*.

"Before OSHA [adopted NFPA 1971], there was a lot of substandard firefighting gear out there," says Heirston. "Many departments just couldn't justify the expense of protecting their people with state-of-the-art bunker gear until OSHA required it."

This time, the push may also come from the federal Interagency Board for Equipment Standardization and Interoperability (IAB). Composed of federal, state, and local organizations, including NFPA, IAB was formed to ensure that emergency responders have standardized interoperable equipment to cope with weapons of mass destruction.

"Until now, the big dispensers of grant money, like FEMA, the Department of Justice, and the Department of Health and Human Services, haven't had specific requirements for equipment," says Stull. "The hope is that they will reference equipment that's on the list, which will be expanded to include products in the marketplace that meet those requirements."

Stull and others expect the flood of homeland security dollars to dramatically increase the number of CBRN-compliant products available.

CBRN protection remains very much a work in progress, and requirements are likely to keep changing as responders grapple with both new threats and new ways to meet them.

Until the sarin attack on the Tokyo subway, chemical terrorism didn't really appear on the first responder's radar, but response organizations rose to the occasion, adapting haz-mat ensembles for use against chemical weapons. Then they were blindsided by the anthrax scare, which highlighted the need for more effective bioterrorism ensembles. Today, those needs are being addressed, in part through revisions to NFPA 1994. However, work is still needed to prepare for so-called "dusty weapons," "dirty" bombs, and other potential radiological weapons.

ON-DUTY DEATHS
FIREFIGHTER FATALITIES 2002

Each year, NFPA collects data on all firefighter fatalities in the U.S. that resulted from injuries or illnesses that occurred while the victims were on-duty. The victims were local career and volunteer firefighters, seasonal and full-time state and federal agency employees with fire suppression responsibilities, prison inmates serving on firefighting crews, military personnel performing assigned fire suppression activities, civilian firefighters working at military installations, and members of industrial fire brigades.

by RITA FAHY AND PAUL LEBLANC

IN 2002, 97 ON-DUTY FIREFIGHTER DEATHS occurred in the U.S. This compares to the 440 firefighter fatalities that occurred in 2001 (340 at the World Trade Center on September 11 and 100 elsewhere in the U.S.).[1] Figure 1 shows firefighter deaths for the years 1977 through 2002, excluding the deaths at the World Trade Center. In 2002, there were 9 multiple-fatality incidents; the most severe of which was a motor vehicle crash that killed 5 firefighters responding to a wildland fire. There were also 5 three-fatality and 3 two-fatality incidents.

Type of duty

Figure 2 shows the distribution of the 97 deaths by type of duty. The largest proportion of deaths (47 percent) occurred on the fire ground. Another 19 deaths occurred while responding to or returning from alarms. Although it may surprise some, fire ground deaths accounted for fewer than half of the total on-duty deaths in 8 of the last 10 years (in 2001, aside from the deaths at the World Trade Center). In the past decade, it has been typical for another 1/5 to 1/4 to occur while responding to or returning from alarms, and 2002 was no exception.

Of the 46 fire ground deaths, 14 were due to internal trauma, 13 to heart attacks, 10 to asphyxiation, 5 to crushing injuries, and 2 to burns. One firefighter was shot to death and another suffered an aneurysm. >>

Ashland firefighters, from right, Dave Rutledge, Bill Davisson, and Randy Jackenheimer salute May 23, 2003, during the annual Firefighter's Memorial Service at Ashland Cemetery in Ashland, Ohio.

AP/WIDE WORLD

FIGURE 1
On-Duty Firefighter Deaths, 1977 - 2002

FIGURE 2
Firefighter Deaths by Type of Duty - 2002

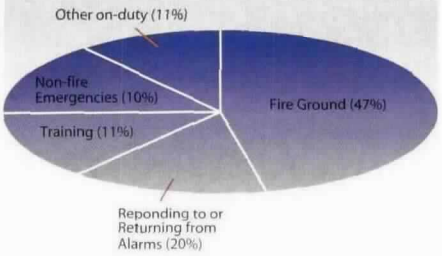
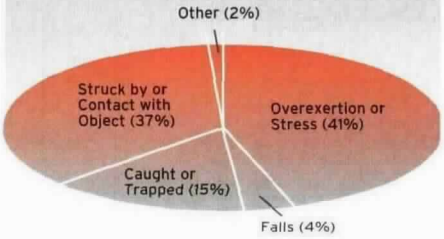


FIGURE 3
Firefighter Deaths by Cause of Injury - 2002



Responding to or returning from alarms accounted for 1/5 of the deaths in 2002. Eight of the 19 deaths were due to heart attacks. Ten were due to collisions or rollovers and a vehicle struck a firefighter while he was responding to the station by bicycle.

Eleven deaths occurred during training activities. Two firefighters suffered fatal heart attacks and 2 suffered strokes. Two died of smoke inhalation at a live fire training exercise and a firefighter died of heat stroke. One drowned during dive training and another was killed when a train struck his tanker while he was returning from a training exercise. Another firefighter was struck and killed by a drunk driver while packing equipment after a roadside training exercise. And a firefighter was killed by fire apparatus that slipped into gear and struck him.

Eleven firefighter deaths occurred during the performance of non-emergency-related on-duty activities. Seven of the 11 firefighters died while engaged in normal administrative or station activities – all as the result of heart attacks. Another firefighter suffered a fatal heart attack while cleaning up after a tornado and another firefighter was killed in the crash of a fire department tanker while returning from routine maintenance. Another firefighter was killed in a motor vehicle crash while on his way to a meeting and a firefighter died when an errant shell struck him at a Fourth of July fireworks display.

Ten deaths occurred at non-fire emergencies. Five of the 10 firefighters suffered fatal heart attacks at the scenes of medical calls or motor vehicle crashes. Another firefighter suffered an aneurysm at a medical call and vehicles struck 2 while operating at a motor vehicle crash or fire. A firefighter suffered a heart attack while directing traffic at a water main break and a firefighter was asphyxiated while attempting to rescue someone from an underground tank.

Cause and nature of fatal injury or illness

Figures 3 and 4 summarize the deaths by cause and nature of fatal injury or illness. The term "cause" refers to the "action, lack of action, or circumstances that resulted directly in the fatal injury."[2] The term "nature" refers to "the medical process by which death occurred and is often referred to as "cause of death" on death certificates and in autopsy reports.[2]

Stress and overexertion is still the leading cause of fatal injury, as it is almost every year. Of the 40 stress-related deaths in 2002, 37 resulted in heart attacks and 3 resulted in strokes or aneurysms. Heart attack is typically the leading nature of injury and usually accounts for close to half of the total deaths, but in the last 25 years, heart attack deaths have dropped by more than 1/3. Of the 37 heart attack victims in 2002, 7 had a history of heart problems – usually prior heart attacks or bypass surgery – and medical documentation showed that another 6 had severe arteriosclerotic heart disease, 3 were hypertensive and 1 was diabetic. In the past 25 years, medical documentation has been available for 703 of the 1,333 heart attack victims. Of those 703 victims, 48.9 percent had prior heart attacks or bypass surgery and another 30.9 percent had severe arteriosclerotic heart disease. Another 12.7 percent had hypertension or diabetes.

The second leading cause of injury was struck by an object or contact with an object (37 percent). These 36 deaths included 22 killed in motor-vehicle crashes and 7 struck by motor vehicles. Three firefighters were killed when walls collapsed while they were operating outside structure fires. A falling tree struck 1 firefighter and an errant rocket struck another at a public fireworks display. A person jumping from a burning structure killed 1 firefighter and an arsonist shot 1 firefighter to death.

The next leading cause of injury was caught or trapped, resulting in 15 deaths. Eight firefighters were killed inside structural collapses. Four firefighters became lost inside fire-involved structures and ran out of air. Flashover caught 2 firefighters during live fire training and 1 firefighter became trapped underwater and drowned.

Four firefighters were fatally injured when they fell or jumped. One firefighter fell through the floor, and another through the roof, at structure fires. One firefighter fell from a brush firefighting unit and was fatally burned and 1 firefighter jumped from his bulldozer when it began to slide down a hill, but the vehicle ran him over.

In the remaining incidents, fumes overcame and suffocated 1 firefighter while he tried to rescue a man from a molasses tank and 1 firefighter died of heat stroke after exercising.

GRAPHICS: CHRIS McCUSKER

FIGURE 4
Firefighter Deaths by Nature of Injury - 2000

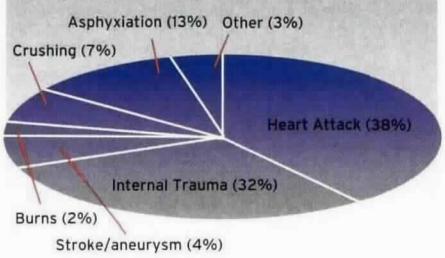


FIGURE 5
On-Duty Firefighter Deaths by Age and Cause of Death - 2002

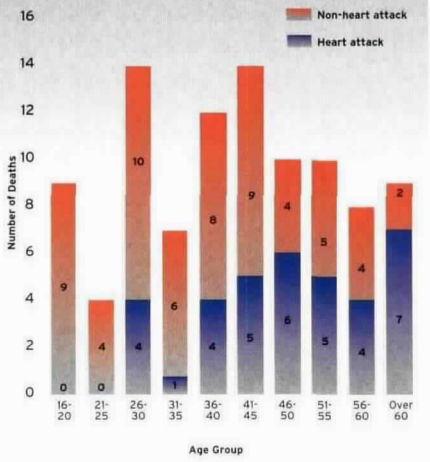
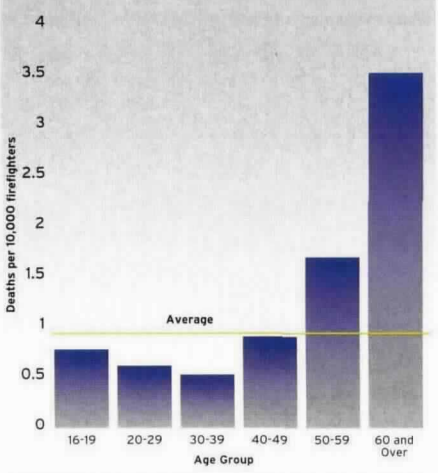


FIGURE 6
On-Duty Deaths Rates per 10,000 Firefighters - 1998-2002*



* excluding the 340 firefighter deaths at the World Trade Center in 2001

Ages of firefighters

The firefighters who died in 2002 ranged in age from 14 to 76, with a median age of 42. (The 14-year-old was a junior firefighter responding to the station on his bike when a vehicle struck him.) Figures 5 and 6 show the distributions of firefighter deaths and death rates by age.

Heart attacks account for a higher proportion of the deaths among older firefighters, as might be expected. Sixty percent of the firefighters over age 50 who died in 2002 died of heart attacks.

The death rates shown in Figure 6 were calculated using firefighter fatality data for the 5-year period from 1998 through 2002 and estimates of the number of firefighters in each age group from the NFPA's 2000 profile of fire departments (the mid-year in the range).[3] The lowest death rates are for firefighters in their 30s. The rate for firefighters in their 50s is almost double the average and for firefighters age 60 and over, it is almost 4 times the average. Firefighters over age 50 account for two-fifths of all firefighter deaths over the 5-year period but less than 1/6 of all firefighters.

STRESS AND OVEREXERTION IS STILL THE LEADING CAUSE OF FATAL INJURY, AS IT IS ALMOST EVERY YEAR.

Fire-ground deaths

Figure 7 shows the distribution of the 46 fire ground deaths by fixed property use. The largest proportion of deaths occurred in residential structures (46 percent), with 20 in one- and two-family dwellings and 1 in an apartment building. There were 15 deaths in wildland fires and at a controlled burn, 7 deaths at 4 fires in stores or repair businesses, 1 death at a vehicle fire, 1 death at an idle property and 1 death at a building undergoing renovations.

To put the hazards of firefighting in various types of structures into perspective, we examined the number of fire ground deaths per 100,000 structure fires by property use using estimates of fire experience from NFPA's fire loss studies from 1997 through 2001 and updated firefighter fatality data for the corresponding years. The results are shown in Figure 8. Although more firefighter deaths occur in residential structures than in any other type of structure, fires in non-residential structures are generally more hazardous to firefighters, on average. There were 8.9 deaths per 100,000 nonresidential structure fires from 1997 through 2001, compared to 4.0 per 100,000 residential structure fires.

Motor vehicle crashes

In 2002, 22 firefighters died in 13 vehicle crashes. Ten of the 22 were responding to incidents when the crashes occurred. In 2002, only 3 victims were driving their personal vehicles when the crashes occurred; all were speeding at the time and 2 weren't wearing seatbelts. The remaining 7 firefighters killed while responding to fires were killed in 3 crashes in fire department vehicles that were on their way to wildland fires – 5 of them in single crash.

Nine firefighters were killed in 4 crashes while operating at wildland fires. Three of these crashes involved aircraft and 1 involved a fire department vehicle. The remaining 3 crashes involved fire department vehicles during non-emergency activities.

Of the 16 deaths in road vehicles mentioned above, 8 victims weren't wearing seatbelts (6 were ejected) and 7 were wearing seatbelts (4 were ejected). No information on seatbelt use was available for 1, but he also was ejected in the crash. Excessive speed was cited as a factor in 4 of the 10 crashes, and 1 driver was intoxicated.

Other findings

Twelve firefighters died in incendiary and suspicious fires – 6 while responding to 2 wildland fires, 3 at structure fires, 2 at wildland fires, and 1 while responding

FIGURE 7
Firefighter Deaths by Fixed Property Use - 2002

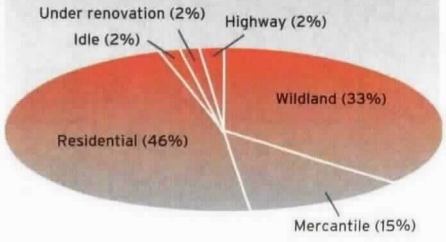
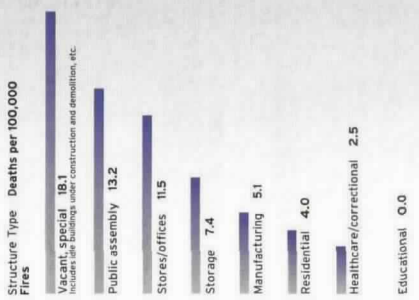
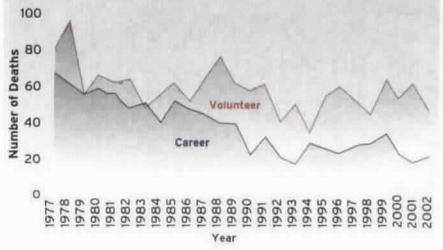


FIGURE 8
On-Duty Fireground Deaths per 100,000 Structure Fires - 1997-2001*



* excluding the 340 firefighter deaths at the World Trade Center in 2001

FIGURE 9
Firefighter Deaths - Local Career vs. Local Volunteer - 1977 - 2002



to a structure fire. From 1993 through 2002, 92 firefighters (9.4 percent of all on-duty deaths) died in connection with incendiary and suspicious fires. The share of these deaths annually has been dropping fairly steadily since 1985, which is, in part, a reflection of the decline in incendiary and suspicious fires over the same period.

No firefighters died because of false alarms in 2002. In the past 10 years, 25 firefighter deaths have resulted from false calls, whether malicious or alarm malfunctions.

Of the 97 firefighters who died while on duty in 2002, 80 were local, municipal career, and volunteer firefighters; 12 were contractors to federal agencies; 3 were federal land management agency employees; 1 was a state forestry agency employee, and 1 was a member of an industrial fire brigade.

The distribution of deaths of career and volunteer firefighters from local, municipal fire departments is shown in Figure 9. A comparison of the fatality experience of career and volunteer firefighters in 2002 is shown in Table 1.

Conclusions

In 2001, the U.S. fire service experienced its most catastrophic year, in terms of on-duty firefighter fatalities. In 2002, the death toll fell back to the level experienced over the past decade. At 97, the total number of on-duty deaths was slightly below the most recent five-year average of approximately 100 deaths per year.

In 2002, many areas across the U.S. experienced one of the worst wildland fire seasons in recent years, and unfortunately, as a result, it was a particularly bad year for wildland firefighter fatalities. Twenty-two firefighters died while working at or responding to wildland fires or at a controlled burn. Three of the 5 largest loss-of-life incidents involved wildland firefighter fatalities.

There were a few positive findings in 2002. No career firefighters died while responding to or returning from emergencies, and there were fewer than the average number of deaths involving volunteer firefighters responding in personal vehicles. One year doesn't indicate a trend, but it's a positive finding that we hope will continue.

But many of the same problems continue to exist, particularly the large number of firefighters who died of heart attacks. Again in 2002, heart attack was the leading cause of on-duty firefighter deaths, and we continue to find that most victims for whom medical documentation was available had pre-existing health problems.

The frequency of these fatalities and other fire ground and training deaths can be reduced by adopting and adhering to a comprehensive safety and health program designed using NFPA 1500, *Fire Department Occupational Safety and Health Program*, and its companion standards, and NFPA 1403, *Live Fire Training Evolutions*. Revised NFPA 1582, *Comprehensive Medical Programs for Fire Departments*, lists the medical conditions that could preclude a candidate from becoming a firefighter, or an individual from serving effectively and safely as a suppression firefighter. Attention to fitness and health throughout every firefighter's years of service is essential to operating safely. NFPA 1583, *Health-Related Fitness Programs for Fire Fighters*, provides a guideline for departments to follow.

References

1. The NFPA's files for firefighter on-duty fatal injuries are updated continually for all years.
2. These categories are based on the 1981 edition of NFPA 901, *Uniform Coding for Fire Protection.*
3. Michael J. Karter, Jr., "U.S. Fire Department Profile Through 2000," NFPA Fire Analysis and Research Division, Quincy, Massachusetts, December 2001, unpublished. The analysis shown here assumes that the number of firefighters adequately estimates exposure and that the age distribution of career and volunteer firefighters is similar.

Credits

A study made possible by the cooperation and assistance of the United States fire service, the Public Safety Officers' Benefits Program of the Department of Justice, the United States Fire Administration, the National Institute for Occupational Safety and Health, the Forest Service of the U.S. Department of Agriculture, and the Bureau of Indian Affairs and the Bureau of Land Management of the U.S. Department of the Interior. The authors would also like to thank Stephen N. Foley and Carl E. Peterson of the Public Fire Protection Division for their assistance on the study.

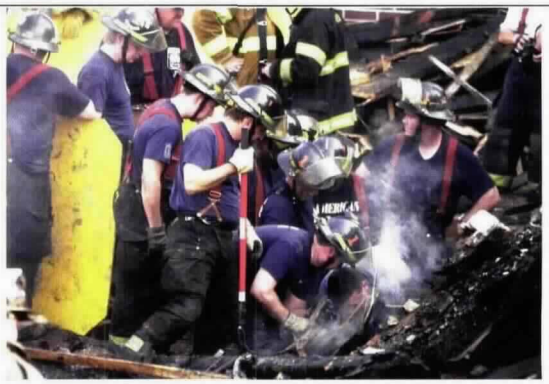
TABLE 1

Comparison of On-Duty Deaths Between Career and Volunteer Firefighters, 2002

	CAREER FIREFIGHTERS		VOLUNTEER FIREFIGHTERS	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
TYPE OF DUTY				
Operating at fire ground	14	46.7	21	42.0
Responding to or returning from alarm	0	0.0	14	28.0
Training	7	23.3	3	6.0
Operating at non-fire emergencies	2	6.7	8	16.0
Other on-duty	7	23.3	4	8.0
Totals	*30*	*100.0*	*50*	*100.0*
CAUSE OF FATAL INJURY				
Stress	13	43.3	26	52.0
Struck by or contact with object	6	20.0	14	28.0
Caught or trapped	8	26.7	7	14.0
Fell	1	3.3	2	4.0
Other	2	6.7	1	2.0
Totals	*30*	*100.0*	*50*	*100.0*
NATURE OF FATAL INJURY				
Heart attack	12	40.0	25	50.0
Internal trauma	4	13.3	12	24.0
Asphyxiation	7	23.3	6	12.0
Burns	2	6.7	4	8.0
Drowning	0	0.0	2	4.0
Crushing	1	3.3	0	0.0
Gunshot	1	3.3	0	0.0
Other	3	10.0	1	2.0
Totals	*30*	*100.0*	*50*	*100.0*
RANK				
Firefighter	22	73.3	35	70.0
Company officer	5	16.7	6	12.0
Chief officer	3	10.0	9	18.0
Totals	*30*	*100.0*	*50*	*100.0*
AGES OF FIREFIGHTERS - All deaths				
20 and under	1	3.3	3	6.0
21 to 25	1	3.3	3	6.0
26 to 30	3	8.3	9	18.0
31 to 35	3	4.2	4	8.0
36 to 40	5	10.0	6	12.0
41 to 45	6	10.0	5	10.0
46 to 50	5	16.7	5	10.0
51 to 55	2	6.7	5	10.0
56 to 60	2	6.7	3	6.0
Over 60	2	6.7	7	14.0
Totals	*30*	*100.0*	*50*	*100.0*

	CAREER FIREFIGHTERS		VOLUNTEER FIREFIGHTERS	
	Number of Deaths	Percent of Deaths	Number of Deaths	Percent of Deaths
AGES OF FIREFIGHTERS - Deaths from heart attacks only				
26 to 30	2	16.7	2	8.0
31 to 35	0	0.0	1	4.0
36 to 40	1	8.3	3	12.0
41 to 45	2	16.7	3	12.0
46 to 50	3	25.0	3	12.0
51 to 55	1	8.3	4	16.0
56 to 60	2	16.7	3	12.0
over 60	1	8.3	6	24.0
Totals	*12*	*100.0*	*25*	*100.0*
FIRE GROUND DEATHS BY FIXED PROPERTY USE				
Dwellings and apartments	9	64.3	12	57.1
Stores	4	28.6	3	14.3
Vacant	0	0.0	4	19.0
Public assembly	1	7.1	1	4.8
Road/highway	0	0.0	1	4.8
Wildland	0	0.0	1	5.3
Storage	0	0.0	1	5.3
Totals	*10*	*100.0*	*19*	*100.0*
YEARS OF SERVICE				
5 or less	6	20.0	15	30.0
6 to 10	5	16.7	8	16.0
11 to 15	6	20.0	4	8.0
16 to 20	4	13.3	4	8.0
21 to 25	3	10.0	2	4.0
26 to 30	3	10.0	4	8.0
over 30	3	10.0	10	20.0
Not reported	0	0.0	3	6.0
Totals	*30*	*100.0*	*50*	*100.0*
ATTRIBUTES OF FIRE GROUND DEATHS				
Incendiary and suspicious fires	3		1	
Search and rescue operations	3		2	
MOTOR VEHICLE CRASHES	1		7	
FALSE ALARMS	0		0	

FIRE 2002 FIGHTER FATALITIES INCIDENTS



Firefighters search for the remains of a fallen comrade during a blaze in New Jersey July 4, 2002. The fire killed at least two children and three firefighters.

STRUCK BY

On January 10 at 2:26 a.m., a woman called 911 to report a fire in the stairway of her building. The building, a four-story, 50-unit apartment house of ordinary construction with a full basement, wasn't equipped with sprinklers.

On arrival, fire companies observed trapped occupants threatening to jump from the upper stories. A second alarm was immediately sounded. An officer and two firefighters, dressed in full-protective clothing and staffing the first due aerial ladder company on the second alarm, positioned the apparatus at the rear of the building according to standard operating procedures. Two trapped occupants on the top story were observed hanging out the window preparing to jump. Overhead power lines prevented the ladder company from using the aerial ladder and they were unable to raise the 50-foot (15-meter) ground ladder so they grabbed a 35-foot (10-meter) ground ladder and raised it toward the trapped occupants.

As they struggled to place the fully extended ladder, a female occupant jumped and struck the top of the ladder, which was 3 feet (0.9 meters) short of the sill of the fourth story window. She fell and landed at the firefighters' feet. A male occupant jumped immediately after and simultaneously struck a parked van and the firefighter who was bracing the ladder.

The 39-year-old firefighter was knocked to the ground but eventually managed to get to his feet. He continued to rescue additional occupants over the ground ladder and participated in other firefighting activities during the remainder of the fire. At the station after the fire, he complained of severe head, neck and back pain throughout the night but refused treatment until after his work shift when he went to a medical facility near his home where he was treated and released.

Over the next couple of weeks, he continued to have severe headaches. On January 26, he was admitted to the hospital where he lapsed into a coma and died on February 7, never regaining consciousness. The cause of his death was listed as a ruptured aneurysm.

The fire investigation unit determined the fire had been set. A liquid accelerant was poured on the front central stairway from the fourth to the first story landings and ignited. The fire gained entry to the fourth story through an open fire door. Two civilians died as a result of the fire and 10 were injured. Property damage was estimated at $500,000.

FIREWORKS

On July 5 at 11 p.m., 11 members of the fire department were participating in a centennial fireworks show for a nearby town. They were providing a supervised fireworks display, using 3-, 4- and 5-inch (7-, 10-, and 12-centimeter) mortars. Before the display, the fire chief conducted a training session on safety requirements and proper fireworks discharge procedures. The chief assigned the firefighters to their individual duties and the firefighters familiarized themselves with their work areas and proper placement of the shells into the mortars.

The 44-year-old firefighter was loading a 5-inch (12-centimeter) shell when a shell struck him and knocked him to the ground. A witness reported that the firefighter had been down on one knee loading the first of his 2 mortars before the mishap. Firefighters in the area saw him get up and run from the discharge site with sparks streaming down the left side of his body. It appeared he was trying to brush something from his clothing. He ran approximately 20 feet (6 meters) before a shell apparently under his arm exploded knocking him to the ground. A bright blue flash accompanied the explosion.

Firefighters and EMS personnel ran to the injured firefighter and rendered first aid. He was transported to the hospital where he was pronounced dead a short time later. The cause of death was listed as blunt force injuries and thermal burns.

BURNS

On August 1, a call was received at 2 p.m. for a pasture fire. A 48-year-old firefighter responded directly to the fire from his place of business. When he arrived at the scene, he was assigned to ride in the back of a pickup truck and operate a hose fed from a portable water tank. He wasn't wearing any protective clothing.

At some point, the firefighter fell from the back of the truck into the path of the fire, losing his eyeglasses. The driver of the truck was initially unaware that the firefighter had fallen and when he realized that the firefighter was no longer on the truck, he attempted to find him but couldn't, due to the smoke and flames.

Evidence indicates that the firefighter attempted to take refuge at the bottom of a brush covered dry creek bed, 200 feet (61 meters) from where he fell. He then made his way 374 feet (114 meters) along a fence line where firefighters found him. He was removed to a safe location where first aid was administered. He was medivaced to a hospital and then transferred to a burn center.

The firefighter sustained burns to 80 percent of his body surface area and died five days later.

A 71-year-old man was charged with setting the fire that caused the firefighter's death.

DROWNING

June 14 was the last day of a 21-day diving school sponsored by a fire department and held at a privately owned pond. Students at the diving school represented

PHOTOGRAPH: AP WIDE WORLD

four fire departments in the area.

At 12:30 p.m., a two-man diving team was performing a simulated salvage recovery operation in 60 feet (18 meters) of water with zero visibility. Their mission was to search a 5- to 10-foot (1.5- to 3-meter) circular area from a preset descent/ascent line that was marked with a buoy and weighted down by a 3-pound (1-kilogram) weight. The objective was to locate a concrete construction block and retrieve it. The block had 2 plastic milk containers attached that were to be cut free and float to the surface to let the instructor know that the divers had found the block. The divers were then supposed to attach a piece of rope that each had brought with him to a 5-gallon (19-liter) bucket that one of them had brought. They were to invert the bucket, fill it with air, and float the bucket with the block attached to the surface. The instructor would later pull the bucket with the attached block into the boat.

One diver tried to let another know that he was in trouble. He reached out and touched him but due to the zero visibility, the other diver couldn't see what was happening. The diver in trouble released his weight belt, which landed on the other diver. The other diver, believing that indicated that the diver in trouble had surfaced, surfaced himself. Not seeing any air bubbles or the other diver, he summoned the instructor for help. The body of the diver was found 2 hours later tangled up in the rope. An autopsy was performed and the cause of death was listed as a drowning with barotrauma.

AIR TANKER CRASH

At noon on June 15, a wildland fire was discovered that eventually involved 22,750 acres (9,206 hectares) and took more than 10 days to contain.

Two days into the suppression operation, a pilot, co-pilot, and engineer died when their four-engine, air tanker crashed. The plane was a C-130A that was manufactured in 1957 and was used by the military until 1988 when it entered service with the U.S. Forestry Service. The airplane's records indicated that it had more than 20,000 flight hours.

Witnesses reported that the aircraft was making what appeared to be a normal retardant delivery run. During the delivery, the wings snapped upward and separated from the fuselage near the wing roots. The fuselage and wings crashed into a grassy field. Subsequent fires ignited in the area of the separated wings.

The crew died from traumatic injuries.

STRUCK BY

Eight days after being hired as a "casual-hire employee," a 51-year-old firefighter died while fighting a forest fire on July 2.

After working on one forest fire for several days, he was reassigned to another fire on July 1. After receiving a briefing on current conditions, he was assigned the job of using a chainsaw to cut down trees that were in danger of falling.

At 1 p.m., crews were ordered to a safety zone due to strong winds. Personnel reported hearing trees falling during the windstorm. After the winds died down, the crews were briefed on potential safety hazards and the plan of action for the afternoon. The objective was to clear hazardous trees along a trail.

The firefighter was cutting down a tree when two other crew members some distance away saw a treetop in the firefighter's vicinity begin to move, acquire momentum, and fall. They rushed to his location and found him pinned under the tree. His chainsaw, still running, was found in the back cut of the tree that he had been cutting.

The firefighter died shortly after the tree that hit him was removed. An autopsy was conducted and the cause of death was listed as craniocerebral trauma.

TRAPPED

On May 3 at 9 p.m., firefighters responded to a 2-story commercial building of ordinary construction for a report of smoke showing. On arrival, firefighters in full protective clothing entered the building to conduct a primary search and initiate ventilation operations coordinated with a suppression effort on the first story. They gained entrance to the building through two doors at the front of the building. The door on the right led to the first story and the door on the left to a stairway to the second story. Other companies were assigned to back up the companies that entered the building.

Fire was found on the first story, water was applied and firefighters believed that the fire was knocked down. Ventilation operations revealed, however, that the fire was still burning in the concealed space above the ceiling. An officer who had reached the rear of the building opened an overhead garage door to aid in the ventilation. As he turned around, he observed the fire flare up and travel across the ceiling towards him. He attempted to exit through the garage door but was prevented by a locked security gate across the garage door opening. Conditions quickly deteriorated at that time. He called for help over his department radio and was rescued by companies outside the building.

The incident commander ordered an evacuation of the building for an accountability roll call. During the evacuation, a firefighter on the second story found another firefighter on the floor, unresponsive. He attempted to radio for help but due to the amount of radio traffic was unable to. He tried to drag the firefighter to the stairwell but was unsuccessful. He began to run out of air and left the building. He reported the situation to a battalion chief and a search party was formed.

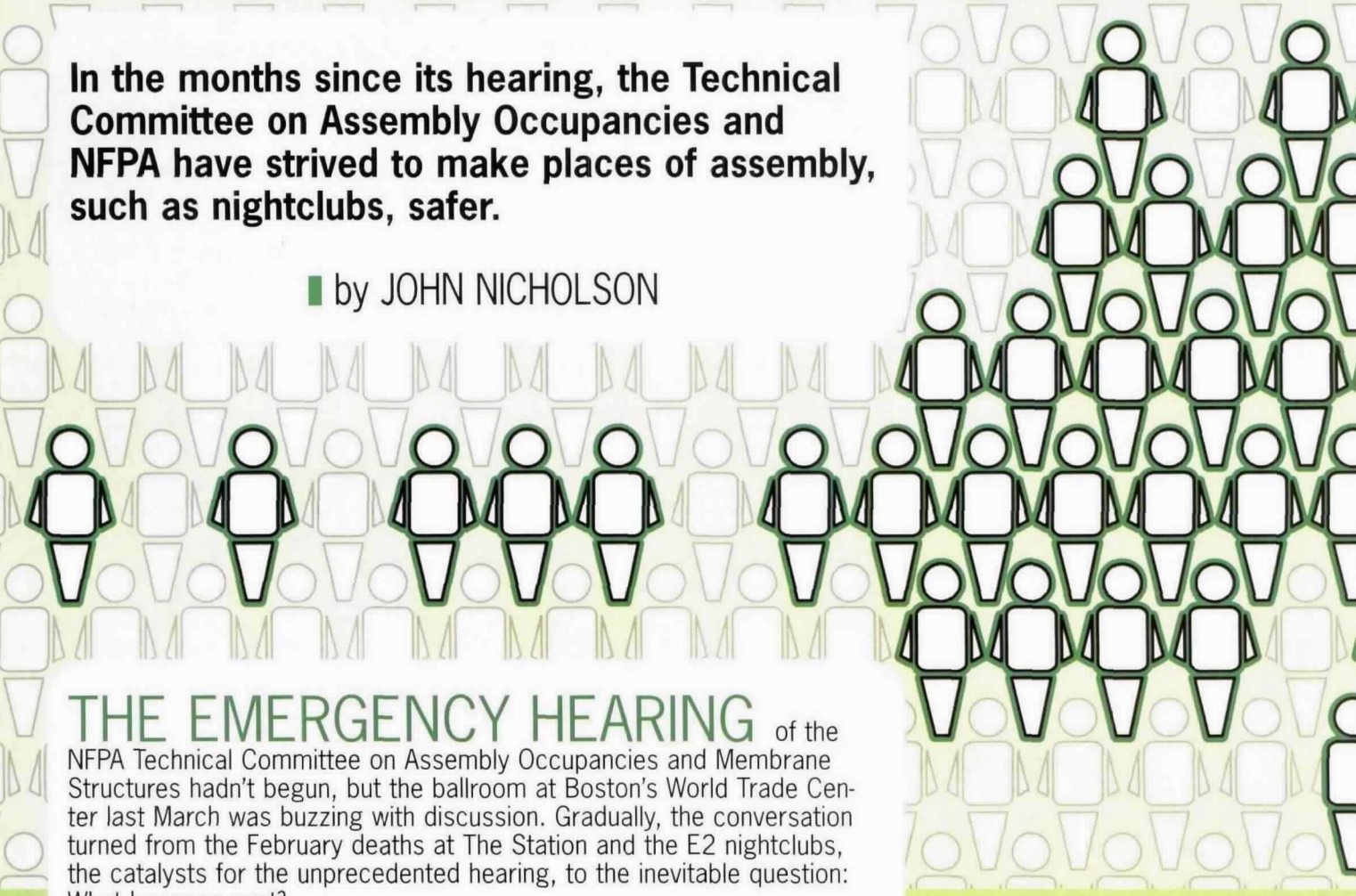
The search party went to the second story where they found and removed the firefighter. After they exited the building, another accountability roll call was taken and another firefighter was reported missing. A second search party was formed and they reentered the second story. Just as the search party advanced a 1 3/4-inch hose to the second story, a PASS device was heard sounding in the rear of the building. By this time fire conditions had deteriorated greatly. The second missing firefighter was found and removed through a window to the roof of an adjoining single story building. He was then brought to the lower level in a stokes basket.

The fire progressed to four alarms before it was declared extinguished. Both firefighters were immediately transported to a local hospital where they were pronounced dead. It was determined the firefighter who was removed first was missing for 20 minutes and the second firefighter was missing for 29 minutes.

The cause of death for the two firefighters was listed as smoke inhalation.

In the months since its hearing, the Technical Committee on Assembly Occupancies and NFPA have strived to make places of assembly, such as nightclubs, safer.

by JOHN NICHOLSON



THE EMERGENCY HEARING of the NFPA Technical Committee on Assembly Occupancies and Membrane Structures hadn't begun, but the ballroom at Boston's World Trade Center last March was buzzing with discussion. Gradually, the conversation turned from the February deaths at The Station and the E2 nightclubs, the catalysts for the unprecedented hearing, to the inevitable question: What happens next?

Should changes to NFPA 5000™, *Building Construction and Safety Code*™ or NFPA 101®, *Life Safety Code*®, be drafted now, or do we wait until the code undergoes scheduled revision that will culminate in mid-2005 in the 2006 edition? Can NFPA's process for emergency code amendments, known as Tentative Interim Amendments (TIAs), effectively transform public comments into meaningful code changes? Would the NFPA Standards Council issue significant changes to the current edition of the *Life Safety Code*? >>

safer assembly

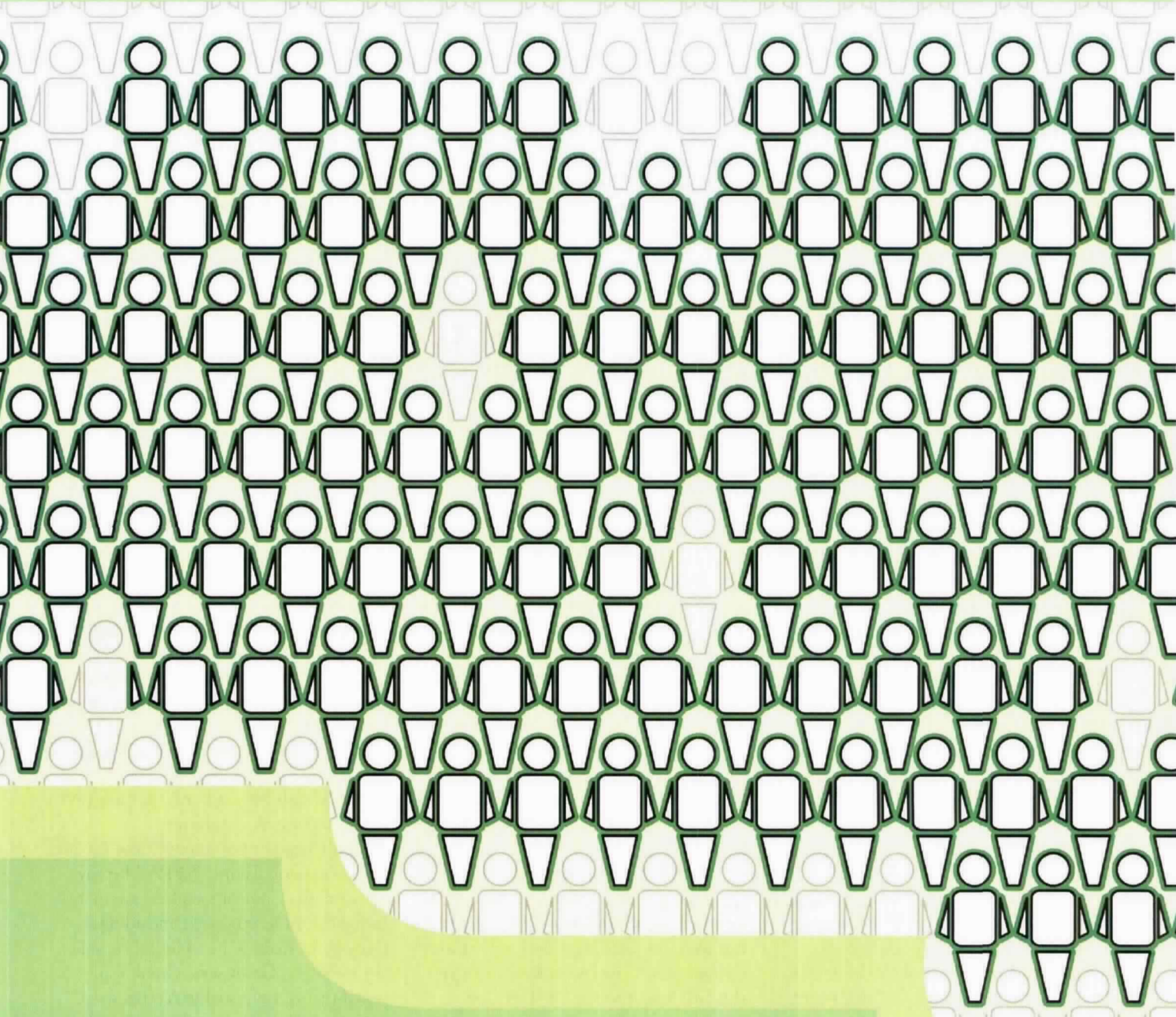


ILLUSTRATION: COMSTOCK

Based on the actions of the technical committee to date, the answer to several of the questions posed at the March hearing is a resounding "Yes." Possible changes to the 2003 edition of the *Life Safety Code* are being processed to reflect enhanced safety requirements for assembly occupancies through the TIA process, and the changes will be considered before the regularly scheduled revision cycle.

In the four months since the hearing, the technical committee has completed balloting for its own TIAs and those submitted by others, among them the International Fire Marshals Association (IFMA). The TIAs have been recirculated for further public comment, and the Technical Correlating Committee for Life Safety has reviewed them for conflicts with other provisions of the *Life Safety Code* via a ballot.

The Technical Committee on Assembly Occupancies and Membrane Structures is now ready to review the proposed *Life Safety Code* amendments at a meeting at NFPA headquarters in Quincy on July 8 and 9. It will then send its final recommendation to the Standards Council, which meets the following week in Portland, Oregon.

The technical committee

The technical committee's preparation for its meeting in Quincy began almost immediately following the March hearing, when the committee appointed several task groups and began to review each proposed TIA, says Ron Coté, technical committee staff liaison.

According to Coté, it now appears that, based on the technical committee's TIAs and the balloting, some change to the code is likely. However, the Standards Council will determine the exact timeframe for the change.

"The technical committee could recommend that the Standards Council issue something that unifies all the recommendations made through the TIA process," Coté says.

If the Standards Council opts to issue the TIAs, the amendments would affect the 2003 edition of the *Life Safety Code*, and it would be up to local jurisdictions to adopt the TIA along with that edition of the code.

The TIAs reviewed include:

- Requiring fire sprinklers in all clubs with live entertainment and crowds of more than 300.
- Requiring a minimum of one trained crowd manager for every assembly occupancy.
- Prohibiting "festival seating," unless an approved life safety evaluation has been performed.
- Requiring sprinklers in clubs where crowds are fewer than 300.

Since the March hearing, IFMA has requested more changes, including mandating sprinklers in every nightclub, regardless of size; requiring club owners to inspect their exits every business day; and mandating better access to fire extinguishers.

A TIA from the technical committee prohibiting "festival seating," unless an approved life safety evaluation has been performed was proposed for NFPA 5000. In addition, IFMA proposed a TIA for NFPA 5000 that would better define "Special Assembly Building."

A TIA was also proposed for NFPA 1126, *Use of Pyrotechnics before a Proximate Audience.*

Not every TIA submitted will become part of the final committee recommendations. The TIA submittals are well intended, but they sometimes contain flaws that were noted during the balloting process. A TIA that requires a life safety evaluation before allowing festival seating could affect small gatherings, for example. A meeting in a church hall at which children sit on the floor could be seen as an assembly occupancy using festival seating, and a life safety evaluation could technically require the meeting to conform to the code, Coté says.

Furthermore, three-fourths of the technical committee members must agree on a TIA in its letter ballot before the committee can recommend it.

The Standards Council

The regularly scheduled July meeting of the Standards Council, which meets four times a year, will be its second since the March hearing. Like the Technical Committee on Assembly Occupancies, the Standards Council has actively followed code developments since March.

At its April meeting in Washington, D.C., the council appointed additional members to the Technical Committee on Assembly Occupancies to broaden the representation. According to Standards Council Secretary Casey Grant, the new members include representatives of IFMA, the National Fire Sprinkler Association, the American Fire Sprinkler Association, the Michigan Fire Inspectors Association, and the Florida Fire Marshals and Inspectors Association.

In addition, Grant provided the Standards Council with an overview of the March hearing and the progress of the technical committee.

"This was a very intense time for all fire professionals and NFPA," he says.

Standards Council members are monitoring the TIAs produced, including those generated by the technical committee members, Grant says. Grant also noted that it is unusual to receive so

THESE INCIDENTS WERE UNUSUAL, AND THE RESPONSE THEY ENGENDERED WAS UNUSUAL, TOO.

many TIAs related to a single event.

"We normally review one or two at each of our meetings," he says.

The Standards Council anticipates that the technical committee's report will be comprehensive, in light of all the work the committee has done.

"The Standards Council doesn't write the codes. That's the job of the technical committee. In this case, the technical committee is meeting to go over all its materials and will consider all the TIAs, then pull something together for the Standards Council," Grant says.

It's uncommon for a technical committee to meet to streamline its recommendations in this way before the Standards Council meets, Grant says. Normally, the Standards Council receives the TIAs, then asks the technical committee to study them and report back. However, these incidents were unusual, and the response they engendered was unusual, too.

Full details of the investigation into the causes of the nightclub fire are unavailable because of the confidential nature of the work. However, NFPA is vocal when it comes to espousing its codes and standards.

On two occasions, NFPA staff has testified before Rhode Island's Special Commission to Study All Aspects of Law Concerning Pyrotechnics and Fire Safety, created by the state's General Assembly in response to the fire. The commission listened to two months of testimony from fire and crowd-control experts, business owners, the public, and several survivors.

NFPA Vice-President of Regional Operations Gary Keith gave the panel an overview of what's been happening since NFPA's March hearing and advocated that Rhode Island adopt NFPA 1, *Uniform Fire Code*™, and the *Life Safety Code*.

NFPA is uniquely positioned to assist the state, Keith says, because our codes and standards set minimum safety thresholds for existing occupancies. Rhode Island officials are particularly interested in getting rid of the state's "grandfathering" process for existing buildings, since this type of exemption shields many older buildings from modern fire regulations, as it did The Station. Adoption of the existing building provisions in *Life Safety Code* in Rhode Island would help achieve this goal.

A proposed amendment to a bill before the Rhode Island legislature would replace the grandfather clause with the existing building's provisions of the *Life Safety Code*, as the state's Fire Safety Code Board of Appeal & Review has recommended. According to published reports, Rhode Island fire safety officials say NFPA codes and standards would provide a minimum baseline for safety and take into account the fact that many older buildings can't meet current fire codes and standards for new construction.

NFPA 1 UFC is also seen as an important tool for Rhode Island because the 2003 edition of NFPA 1 UFC incorporates provisions from the Western Fire Chiefs' Uniform Fire Code under the terms of a partnership agreement between NFPA and the Western Fire Chiefs.

NFPA 1 UFC was restructured to be more compatible with the regulatory adoption procedures, including administration and code enforcement, occupancies, processes, equipment, and hazardous materials provisions. Additional extracts and references from NFPA codes and standards essential to the code official were added, bringing the number of referenced NFPA codes and standards to more than 125.

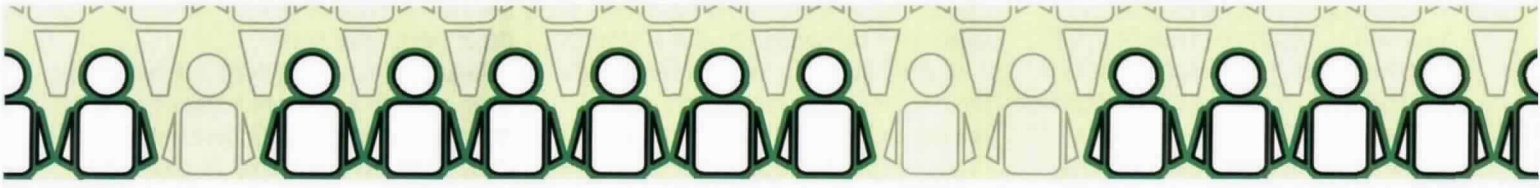
Although there's an increased interest in NFPA codes and standards on the national level because of the two tragedies, Keith says, it's too early to tell if the interest will lead to adoptions.

He says one thing's sure, though: There's a heightened awareness of fire safety nationwide.

"Changes are taking place throughout the country, particularly when it comes to inspections for compliance with existing codes," Keith says.

Elsewhere, the Connecticut House of Representatives passed a bill that would require sprinklers in most buildings in which indoor pyrotechnics are staged, increase the fire marshals' authority, and raise penalties on lawbreakers.

And in Massachusetts, the state legislature's public safety committee has recommended more mandatory sprinklers in places of assembly and a ban on most indoor pyrotechnics.



The TIA process that began at the March hearing isn't the normal code process, Grant says. Normally, code revisions for the current edition of the *Life Safety Code* and NFPA 5000 would have been considered in January 2004, the start of its the regular code revision cycle. However, the public outcry for change that followed the Rhode Island and Chicago nightclub tragedies focused attention on NFPA, and the Association rose to the challenge, first with the March hearing, then by encouraging fire safety professionals' and the public's involvement in the TIA process.

NFPA's advocacy role

The two tragedies, the West Warwick fire in particular, saw NFPA take on the familiar roles of information and investigative resources.

SECTIONNEWS

In This Issue

Stay Informed of Critical Issues in Your Industry! In these pages, you'll find news and information affecting your profession and your career.

Architects, Engineers, and Building Officials

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

HOT ISSUES

Three Fall Education Programs

The AEBO Board plans to sponsor three programs at NFPA's Fall Education Conference in Reno, Nevada, this November.

NFPA Adoptions: Where are we now and what have we learned? NFPA staff and building officials will present their experiences. Tentative speakers include building officials from Texas and Arizona; the National Park Service; and California.

Energy Update: NFPA 900. The Building Systems Technical Committee chair and NFPA staff will discuss the status of NFPA 900, *Building Energy Code*; ASHRAE 90.1; and ASHRAE 90.2.

Overview of IAPMO Codes. IAPMO staff will discuss how the development of the *Uniform Mechanical* and *Plumbing Codes* coordinates with those of NFPA 5000™, *Building Construction and Safety Code™*; NFPA 1, *Uniform Fire Code™*; and NFPA 101®, *Life Safety Code®*.

HOW TO REACH US: Allan Fraser, Executive Secretary, +1-617-984-7411, afraser@nfpa.org

Aviation

WEB SITE: http://www.nfpa.org/aviation
CHAIR: Dennis Kennedy, P.E., Ansul, Inc.

HOT ISSUES

Support for Revised NFPA 403 in Dallas

NFPA members adopted the revised NFPA 403, *ARFF Services at Airports*, at the World Safety Conference and Exposition™ (WSCE) in May. The NFPA Standards Council is expected to approve the standard in July, and the document will become effective in August. It will be available in September.

Although the Federal Aviation Administration has yet to adopt NFPA 403 into FAR Part 139 or an Advisory Circular, airports already use it to decide how many vehicles and how much extinguishing agent they need, and to help comply with OSHA criteria for firefighter safety.

WSCE Educational Tracks

Joe Wright and Bernie Valois kicked off the educational presentations with a discussion of large aircraft firefighting and a comparison of ARFF standards. Both drew interesting questions, some from Chief Panayiotis Samaras of the Athens, Greece, International Airport, which allowed attendees to compare their ARFF services to those in Athens.

Later, Captain Tom Phillips recounted his experiences as a pilot for a major carrier and as a firefighter, and Randy Tucker of the RJA Group provided an overview of air traffic control tower fire safety. We also heard from Tom Cortina, who put to bed some misconceptions about foam and the environment.

Special thanks to NFPA Aviation Section Chair Dennis Kennedy of Tyco Suppression Systems for putting the program together.

HOW TO REACH US: Mark Conroy, Executive Secretary, +1-617-984-7410, mconroy@nfpa.org

Education

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

HOT ISSUES

Is a Child Safety Program Worth It?

By EDWARD CLARK and SHAWN S. KELLEY

On July 22, 2002, Ann Reed and her 1-year-old daughter Kira were returning home to Arlington County, Virginia, from Washington, D.C. when their 1990 Ford Taurus was broadsided by a vehicle making an illegal left-hand turn. The car was totaled. Thanks to the efforts of Arlington County firefighters, however, Kira survived the crash with nothing more than a few bumps and bruises.

The Arlington County firefighters who saved Kira didn't extricate her from the mangled vehicle, provide emergency medical care, or take her to a hospital. Indeed, the firefighters most responsible for saving her life were nowhere near the scene of the accident. They'd spared Kira by teaching Reed how to install her child safety seat properly.

Having herself survived the accident with only minor injuries, Reed credits the Arlington County Fire Department's (ACFD) child passenger safety program with saving her daughter's life.

"I have no doubt that Kira would have been seriously injured or killed if I hadn't had her car seat checked by the fire department," said Reed.

Reed first turned to ACFD for help when she had a problem installing her daughter's infant seat. On December 9, 2001, when Kira was only 14 days old, Captain Curtis Stillwell helped Reed install it properly at Fire Station No. 7. On June 11, 2002, Reed attended an ACFD child passenger education session, where Captain Robert Pye adjusted Kira's infant seat. The crash took place a few weeks later.

While Kira's story is the first save documented by ACFD's program, others will no doubt emerge as the program moves forward. Since it's difficult to document saves unless a parent returns to tell the fire department about it, ACFD doesn't know how children benefit from the program. Data limitations aside, however, it's apparent that the child passenger safety program has had far-reaching effects. In FY 2002 alone, ACFD personnel inspected approximately 739 child safety seats.

The fire department also offers Child Passenger Safety Certification classes in the belief that a large pool of qualified technicians will make child

passenger safety programs even more effective. Anyone interested in obtaining certification as a child passenger safety technician should contact their local fire department or the American Automobile Association.

Some ask if ACFD's child passenger safety program is worth it. For an answer, try asking one of the thousands of families that have benefited from the program. Better yet, ask Ann and Kira Reed.

Kelley is assistant chief of the Arlington County Fire Department, where Clark is a firefighter/EMT.

HOW TO REACH US: Judy Comoletti, Executive Secretary, +1-617-984-7287, jcomoletti@nfpa.org

Electrical

WEB SITE: http://www.nfpa.org/electrical
CHAIR: Richard Loyd, R&N Associates

HOT ISSUES

Chair's Corner

By RICHARD E. LOYD

The Electrical Section program at the 2003 World Safety Conference and Exposition™ (WSCE) began on Sunday, with presentations on electrical safety and NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*, and NFPA 70, *National Electrical Code® (NEC)*.

On Monday, the Electrical Section Executive Board met to review section business and begin planning next year's WSCE in Salt Lake City. The 2005 *NEC* is up for adoption next May, so start making plans to stay through the voting on Thursday.

The section also offered educational programs on Monday, after which section members gathered for a reception sponsored by *necdigest*.

On Tuesday afternoon and Wednesday morning, the 19 *NEC* code-making panels reported on the proposals the panels acted on for the 2005 *NEC*. George Ockuly, first vice-chair of the NFPA Board of Directors; Jack Wells, past chair of the board; Jim Carpenter, executive director of the International Association of Electrical Inspectors and chair of the *NEC* Technical Correlating Committee; and Jim Pauley, NFPA Standards Council and *NEC* Technical Correlating Committee member, offered some great information.

Our thanks to Jeff Sargent, section executive secretary, and Paul Dobrowsky, first vice-chair, for coordinating the educational program and the social event. See you in Salt Lake City next May!

2003 Electrical Section Elections

On May 21, the section elected officers and executive and nominating committee members-at-large.

Officers 2003–2004
Chair
Richard E. Loyd, R & N Associates

First Vice-Chair
Paul Dobrowsky, Eastman Kodak Co.

Second Vice-Chair
H. Brooke Stauffer, National Electrical Contractors Association

Third Vice-Chair
James T. Pauley, Schneider, Electric/Square D. Company

Secretary
Michael I. Callanan, National Joint Apprenticeship & Training Committee

Executive Committee Members-at-Large 2003-2005
Robert Baird, Independent Electrical Contractors

William Hopple, Simplex Grinnell

David Kendall, Carlon Electrical Products/Lamson & Sessions

Nominating Committee Members-at-Large 2003-2004
James Daly, BICC General, West Nyack, New York

Michael Johnston, International Association of Electrical Inspectors, Richardson, Texas

Immediate Past Chair Art Black is chair of the nominating committee, and George Staniero of AFC Cable Systems is an executive committee member-at-large for a term ending in May 2004.

2005 *NEC* Comments Due October 31

The next major deadline in the 2005 *National Electric Code® (NEC)* cycle is the closing of the submission period for public comments on proposal actions. Comments must be at NFPA headquarters by 5 p.m. EST on October 31. Submit comments by mail, fax, or electronically at www.nfpa.org/Codes/ProposalsAndComments.asp.

Comments introducing material that's new in concept that wasn't available for public review will be reintroduced as proposals for the 2008 *NEC*. The *ROP* is available at www. *necdigest*.org or by calling (617) 984-7249.

A comment submission form for the 2005 *ROP* is included in the *ROP* or can be obtained by calling (617) 984-7249. PDF and Word versions are available at www.nfpa.org/PDF/NEC05Comment.

HOW TO REACH US: Jeff Sargent, Executive Secretary, +1-617-984-7442, jsargent@nfpa.org

Fire Science and Technology Educators

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

HOT ISSUES

Call for Poster Presentation, Forum Abstracts

The section is sponsoring a poster presentation for research projects in post-secondary 2004 education programs, to be held at the World Safety Conference and Exposition™ (WSCE). Posters are welcome from fire science, fire technology, and fire protection engineering

students in community colleges, technical schools, universities, and graduate schools. They will be displayed in the exhibit hall, and winners will be invited to demonstrate the subject of their posters.

The presentations will illustrate the quality of student research projects, and faculty members are encouraged to integrate this activity into their curricula next year.

Winners will be chosen from several categories. Prizes for the best projects, as evaluated by the Poster Committee, include the latest NFPA *Fire Protection Handbook* and registration at the WSCE.

Students interested in submitting an abstract should contact Patrick Kennedy, Poster Committee Chair, 7678 Old 301 Boulevard, Sarasota, Florida 34243; (941) 885-8010; fax (941) 351-5849; or pkennedy@kennedy-fire.com. Applications can also be downloaded from http://www.nfpa.org/firescience. Deadline for submission is February 15, 2004.

The section will also sponsor a forum on the state of the art of fire science, fire technology, and fire protection engineering education worldwide at the 2004 WSCE. Ron Hopkins and Robert M. Gagnon, P.E., will moderate.

A primary goal is to understand the way fire protection professionals are trained and how they enter the profession. Topics may include curriculum development, delivery methodology, new programs and courses, books, distance learning, and recruitment.

To register, contact Gagnon at (410) 442-1600 by September 1, 2003. You may also fax him at (410) 489-0140 or e-mail him at robtgagnon@aol.com.

Section-Sponsored Presentations

The section sponsored four presentations at the WSCE in Dallas. Richard Bennett discussed the professional development of fire officers, and Daniel Churchward, Kathryn and Patrick Kennedy, and Ron Hopkins addressed fire investigations. Kathleen Almand, John Frank, Dave Hooton, Ed Kaplan, Dave Lucht, Mark Schofield, and John Watts discussed distance learning, and James Nasby talked about electric fire pump starting.

The section also sponsored a presentation on performance-based fire alarm design by Robert M. Gagnon, P.E., describing Society of Fire Protection Engineers methodology that fire protection engineers apply to fire modeling, performance metrics, and performance thresholds when evaluating detection, notification, control, and supervision functions of fire detection and alarm systems. Other presentations were delivered by Robert T. Foraker, Hopkins, and Patrick Kennedy.

To propose future WSCE presentation topics, contact Frank Florence, executive secretary, at (617) 984-7480 or fflorence@nfpa.org.

Membership Is Up

As of May 2003, the section had 854 members, 61 percent more than in 2002. NFPA members interested in joining can apply at www.nfpa.org/firescience.

Bylaws Change

We've revised the section's bylaws to include student members. We can now consider applications from fire science and fire protection engineering students.

HOW TO REACH US: Frank Florence, Executive Secretary, +1-617-984-7480, fflorence@nfpa.org

Fire Service

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

HOT ISSUES

Executive Board Changes

The following are changes to the Fire Service Section Executive Board.

Vice Chair

Kirk H. Owen, Plano, Texas, Fire Department

Secretary

Peter A. McMahon, Town of Grand Island, New York

Directors

Michael A. Wieder, Fire Protection Publications, Oklahoma State University

Thomas J. Cuff, Firemen's Association of the State of New York

HOW TO REACH US: Stephen N. Foley, Executive Secretary, +1-617-984-7468, sfoley@nfpa.org

Health Care

WEB SITE: http://www.nfpa.org/healthcare
CHAIR: Richard Strub, Chattanooga, TN

HOT ISSUES

Chair's Corner...

By DICK STRUB

In this issue of *NFPA Journal*, you'll find several "Section News" articles by members of the section executive board, who will submit material in every other issue of *Journal*. This is the first example of the board's commitment to increased communication with the NFPA membership.

These articles will be directed primarily at NFPA members affiliated with the American Society for Healthcare Engineering and the American Health Care Association, although we'll address other subjects as appropriate. Alternating issues will feature updates by Mike Daniel, chair of the Codes and Standards Review Committee, and Tom Bulow, vice-chair.

To make this information exchange meaningful, I need your input. You can contact me at 2620 Winter Garden Drive, Chattanooga, Tennessee 37421; (423) 893-0760 or Rstrub4234@AOL.com.

Alcohol-Based Hand Sanitizers

By SUSAN MCLAUGHLIN, SBM CONSULTING

The health-care industry is trying on many fronts to reduce nosocomial, or hospital-acquired, infections, which are said to be responsible for thousands of deaths annually. In October 2002, the Centers for Disease Control and Prevention (CDC) published a revised *Guideline for Hand Hygiene in Health Care Settings*, supported by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in January 2003.

Because hand-washing is the most important means of infection control, the CDC's guideline supports the use of alcohol-based hand sanitizers as an effective tool in reducing nosocomial infections. They're quick and easy to use, and are less irritating than some soap.

If these sanitizers are to be used effectively, they must be conveniently located. Many have suggested mounting them in corridors outside patient rooms, but this practice has become controversial. The sanitizers are 60 percent alcohol and have a flash point of 75°F (24°C), calling into effect the requirements of NFPA 101®, *Life Safety Code®*, and NFPA 30, *Flammable and Combustible Liquids Code*.

According to these codes, projections of no more than 3.5 inches (9 centimeters) are allowed into the corridor of a health-care occupancy and not about 38 inches (97 centimeters) above the floor. While many dispensers can comply with the projection requirement, they'd be virtually useless within 38 inches of the floor.

Furthermore, flammable liquids and gases cannot be stored or handled anywhere they might compromise egress. JCAHO prohibits installing alcohol-based hand sanitizers in egress corridors or nursing stations open to egress corridors, suggesting instead that they be mounted just inside patient room doors and not immediately above a heat or ignition source, electrical outlet, or light switch. Installation suites is also permitted, but health-care organizations are advised to check with the state fire marshal for guidance on specific locations.

Current corridor installations are permitted on an interim basis only. The American Society for Healthcare Engineering (ASHE) recommends storing up to 10 gallons (38 liters) of sanitizer in a room that's one-hour fire resistance rated and larger amounts in non-flammable cabinets.

While this guidance meets the letter of the code and current accreditation requirements, there are questions as to whether these materials significantly contribute to fire spread. To determine the extent of the materials' contribution to flame spread, ASHE has undertaken a study, the outcome of which will be shared with all interested parties, including JCAHO. Depending on the results, current positions and recommendations may be modified, possibly to the extent of removing existing corridor installations.

Spontaneous Combustion in Nursing Facilities

By THOMAS GARDNER

Spontaneous combustion fires in nursing facility laundries, which typically involve kitchen rags and mop heads, often begin while the rags or mops are cleaned and dried, or shortly afterwards. According to investigators, the washers in which the rags and mop heads are cleaned, which range from commercial units to top loaders, may not do a thorough job.

There are several reasons. The first is inadequate hot water, always a problem in facilities in which the laundry shares the hot water supply with the rest of the facility. Many states require nursing facilities to lower their water temperature to avoid burning patients, but water must be hotter than 165°F (74°C) to break down the fatty acids contaminating grill rags.

A second problem is inadequate chemical action in the wash process, also rooted in patient care. To ensure that sheets and clothing don't irritate patients' skin, the pH of wash chemicals must have a pH of 7. But this isn't high enough to break down grease. And investigators found that facilities with alternative wash formulas specifically for heavily soiled rags or mop heads don't always use them.

Even if nursing facilities were allowed to use higher-alkaline products, certain equipment isn't made for such detergents. And there's the problem of cost. Adding additional product or another cycle to the cleaning process costs money.

While these problems contribute to the spontaneous fires, investigations reveal that the drying process, not the washing

process, is the crucial factor in creating an environment conducive to spontaneous fires. Subjecting rags and mop heads to short, hot drying cycles with no cool-down cycle increases the possibility of fire.

Another factor is high ambient temperatures. Most laundry rooms aren't air-conditioned, and when temperatures rise above 90°F (32°C), the problem escalates

To prevent spontaneous fires, experts recommend adding an extra break cycle or a presoak program. In the drying process, lower temperatures and longer cycles should be used, and a cool-down cycle added. Facilities should also consider outsourcing the laundry.

A final note: The federal government recently proposed a rule that would require mop heads to be heated to 176°F (80°C) for an hour for infection control. Although this rule is only proposed, we'd like section members to be aware of it.

NFPA 99 Seminar to Be Held in Reno

NFPA will offer a two-day pre-conference seminar on NFPA 99, *Health Care Facilities*, at the 2003 Fall Education Conference. Instructors Rich Bielen, P.E., executive secretary to the HCS, and David Mohile of Medical Engineering Services, Inc., chair of the Technical Committee on Piping Systems, will review the document.

The HCS will also sponsor its popular 4-hour codes and standards review at which the HCS Codes and Standards Review Committee will explain the positions the section proposes to take on documents up for adoption that affect the health-care industry. These codes are NFPA 53, *Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres*; NFPA 58, *Liquefied Petroleum Gas Code; NFPA 59, Utility LP-Gas Plant Code*; NFPA 82, *Incinerators and Waste and Linen Handling Systems and Equipment*; NFPA 101A, *Guide on Alternative Approaches to Life Safety*; NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs*; and NFPA 2001, *Clean Agent Fire Extinguishing Systems*.

Mohile will also present a 4-hour training session on Chapter 5, "Gas and Vacuum Systems," of NFPA 99. No one responsible for maintaining medical gas and vacuum systems should miss it.

HOW TO REACH US: Richard Bielen, Executive Secretary, +1-617-984-7279, rbielen@nfpa.org

Industrial Fire Protection

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

HOT ISSUES

Chair's Corner

By MIKE NEWMAN

Another World Safety Conference and Exposition™ (WSCE) has come and gone, and the Industrial Fire Protection Section had a full slate of activities. One highlight was the presentation of the 2002 Fire Prevention Week contest winner, Duke University, ably represented by Thomas Whalen, fire protection specialist with Duke's Fire Safety Division, and Cackie Joyner and Tara Romano, training coordinators for Duke's Office of Occupational and Environmental Safety.

I'd also like to recognize Alticor, Inc., Merck & Co., and MeadWestvaco, which received honorable mentions for their fine entries. The quality of entries continues to grow, and so much is being done with such a small investment.

Thanks to the industrial facilities that support these efforts each year. We know

how much work you expend on the campaign to make both home and work safe.

Entries for the 2003 contest are due by December 1. The theme for FPW 2003 is "When Fire Strikes—GET OUT, STAY OUT!" For more information, go to the IFPS page on the NFPA Web site.

At the WSCE, we also conducted the annual business meeting and held board elections. This election was unusual in that Incoming Chair Tony Aguilera couldn't move up. His job's changed, so he had to resign his position on the board, making me chair for another year. Our thanks to Tony for his service. We wish you well in your new job.

Elected to the board for one-year terms were Mike Snyder of Dow Corning as vice-chair, Tom Gray of Zurich Insurance as secretary, and Stephen Daily of Anheuser-Busch as past chair. Terry Marski of The Tribune Company, Dave Philip of Nestle Purina, and Diane May of MeadWestvaco were elected directors for three-year terms.

We also chose the 2004 Nominating Committee, three of whom are elected and three of whom are board appointees. The elected members are Stephen Daily, chair; Brian Denk of the Iliana Chapter; and William Cary of the Niagara Frontier Chapter.

We Need Committee Alternates

IFPS is looking for section members to represent the section as alternates on 21 NFPA technical committees. Technical committee alternates may attend committee meetings and have the same rights as the principal member when the member is absent.

To become an alternate committee member, you must be a section member and show knowledge of, and competence in, the committee's work. You must participate actively, responding to correspondence and attending meetings, and keep the section board informed of committee activity and issues. You must also ensure that the industrial community's voice is heard at meetings.

For information, contact Vice-Chair Mike Snyder at mike.snyder@dowcorning.com

Speaker Sessions Hit Mark in Dallas

The IFPS sponsored four educational sessions during the 2003 WSCE. Drew Caldwell, vice-president of Aon Risk Services, discussed "Modeling of Natural Catastrophe and Terrorism Exposures," illustrating how computer models are used to predict building performance in response to catastrophic forces.

Jack Woycheese, senior engineer and director of International Business Development for Hughes Associates, Inc., outlined a fire protection plan for LNG/CNG fueling facilities. He outlined the credible risks as slow or fast leaks and examined the fire protection features required to protect against them. He also addressed the types of installations, associated siting issues, and applicable the codes and standards.

A panel representing an insurer, a broker, and an insured discussed property insurance post-9/11. Panel members George Wilburn of Aon Risk Services, DeWayne Gill of FM Global, and Mike Newman of Johnson & Johnson illustrated the changes in property risk control and insurance marketing strategies resulting from this event and described insurance retention and premiums in the aftermath of the loss.

Stephen Haines, P.E., of Sunoco, Inc., drew a large audience for his program on investigation of flammable gas and liquid fires, which focused on ignition scenarios, the behavior of vapors in open air, and identification of flash fire evidence. The session included testing data and photos.

Those of you unable to make the meeting may get copies of the presen-

tations from the section's staff liaison.

If you have ideas for programs for the 2004 WSCE in Salt Lake City, please submit them at www.nfpa.org. See you in Reno this fall!

HOW TO REACH US: Guy Colonna, Executive Secretary, NFPA, +1-617-984-7435, gcolonna@nfpa.org

International Fire Marshals Association

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

HOT ISSUES

IFMA Elects Executive Board

The following board members were elected at the section's business meeting on May 19:

President
John Bender, Maryland State Fire Marshal's Office

First Vice-President
Scott Adams, Park City, Utah

Second Vice-President
Jon Nisja, Minnesota State Fire Marshals Office

Secretary
Jimmy Hill, Los Angeles City, California

Directors (terms expire May 2005)
Don Goff, Hillsborough County, Florida

Bonnie Howe, Goodyear, Arizona

Farr Testifies at Meeting

IFMA President Ronald R. Farr testified at a meeting called by the Technical Committee on Assembly Occupancies and Membrane Structures to address issues related to the Chicago and Rhode Island nightclub incidents. In response to these events, IFMA submitted Tentative Interim Amendments to numerous codes and standards, and two IFMA members were recently appointed to the assembly occupancies technical committee.

Professional Development

The next Principles of Fire Protection Engineering course will be held from September 29 to October 2 in Baltimore, Maryland. Anyone interested in attending or sponsoring a program may contact Executive Secretary Steven F. Sawyer at (617) 984-7423 or ssawyer@nfpa.org.

Chapters Discuss Research Project

At the annual IFMA Chapter Presidents and Executive Board meeting on May 17, representatives of the 11 chapters began developing the framework of IFMA's Fire Prevention Research Project. IFMA is developing this project to obtain information fire marshals can use to support their staffing and budget requests. For information, visit www.nfpa.org.ifma.

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.

HOW TO REACH US: Steven Sawyer, Executive Secretary, +1-617-984-7423, ssawyer@nfpa.org

Lodging Industry

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

HOT ISSUES

2003-2004 NFPA Lodging Industry Section Executive Committee

Chair
Tom Daly, Hilton Hotel Corporation (term expires May 2004)

Vice-Chair Vacant

Secretary
Jeffrey L. Shearman, C.S.P., Zurich Insurance (term expires May 2004)

Immediate Past Chair
April L. Berkol, Starwood Hotels & Resorts Worldwide, Inc.

Directors
Terms expire May 2004:
Richard R. Anderson, Merck & Co., Inc.

Byron L. Briese, P.E., Rolf Jensen & Associates, Inc.

Raymond C. Ellis, Jr. C.H.E., C.H.T.P., University of Houston

Terms expire May 2005:
E. Sterling (Tod) Hanger, Jr., The Greenbrier

Jim Ray, Marriott International, Inc.

Executive Secretary (Non-voting)
Gregory E. Harrington, P. E., NFPA

HOW TO REACH US: Gregory Harrington, Executive Secretary, +1-617-984-7404, lodging@nfpa.org

Metropolitan Fire Chiefs

WEB SITE: http://www.nfpa.org/metro
CHAIR: Mario Trevino, Chief, San Francisco, California

HOT ISSUES

Technology Transfer Program

The Metro Fire Chiefs Section and the Federal Laboratory Consortium (FLC) have a long-standing partnership aimed at transferring to the fire service federally funded technologies. In May, both organizations renewed a two-year memorandum of understanding (MOU) to continue this work.

Both parties agreed to share relevant expertise through regularly scheduled Metro Section meetings and have planned three demonstrations at the section conference in Calgary, Alberta, from June 28 to July 3.

In one, Calgary firefighters working in a high-noise environment will demonstrate hands-free bone conduction communications using helmet- and head-mounted devices. In a second, FLC personnel from the Night Vision Electronics and Sensors Directorate at Fort Belvoir, Virginia, will use a helmet- or face-mask-mounted infrared focal plane array imaging system to see through dense smoke. Finally, the inventor of a prototype tracking system will carry a device through a building while fire personnel track him on a computer.

HOW TO REACH US: Russ Sanders, Executive Secretary, +1-502-894-0411, rsanders@nfap.org

Research

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

HOT ISSUES

Research Foundation Holds Symposium

Jack E. Snell, director of the Building and

Fire Research Laboratory of the National Institute of Standards and Technology (NIST), will be the keynote speaker at the eighth annual Fire Risk and Hazard Research Application Symposium, to be held July 9 through 11 at the BWI Airport Marriott in Baltimore, Maryland. The symposium, sponsored by NFPA's Fire Protection Research Foundation, is intended for fire protection engineers, fire prevention officers, code writers, and researchers.

Snell will discuss NIST's World Trade Center investigation and the National Construction Safety Team. Other presentations will cover "Environmental Impact of Fire—Regulatory Issues;" "Calculating the Impact of Large Fires on the Environment;" "Combustion Toxicity Assessment for Product Approval;" "Environmental Challenges and Materials Restrictions in Coated Wire and Cable;" and an "Update on the Activities of the New Fire and Transportation Vehicles Research Advisory Council." Speakers include Frederic B. Clarke III, Ph.D., of Benjamin/Clarke Associates Inc.; Thomas W. Fritz of Armstrong World Industries; Marcelo Hirschler, Ph.D., of GBH International; NIST's Kevin McGrattan; and Gordon L. Nelson, dean of the College of Science and Liberal Arts at Florida Institute of Technology.

For program information or to register, contact Eric Peterson at epeterson@nfpa.org or (617) 984-7281, or visit www.nfpa.org/foundation.

HOW TO REACH US: John Hall, Executive Secretary, +1-617-984-7460, jhall@nfpa.org

Wildland Fire Management

WEB SITE: http://www.nfpa.org/wildland
CHAIR: Bill Terry, USDA Forest Service

HOT ISSUES

Section Activities in Dallas

The section addressed several issues in four education sessions at the 2003 World Safety Congress and Exposition™.

Mike Long of the Florida Division of Forestry and Rich Schell of the California Department of Forestry and Fire Protection discussed the impact of the National Fire Plan, addressing its focus on cooperation between stakeholders and communities, its goals of fire prevention and mitigation, and its call for prescribed fire and the use of Firewise techniques.

Jerome Harvey of the Lead, South Dakota, Fire Department reviewed forest fires in the Black Hills from the 1800s through last year's Grizzly Gulch Fire. Lessons from the 1959 Deadwood Fire helped fire crews control the 2002 stand replacement fire, which destroyed more than 27 structures and 10,801 acres (4,371 hectares) of ponderosa pine.

Firewise Community Support Manager Michele Steinberg and Firewise/USA Coordinator Judith Leraas Cook reviewed the federal grant process and requirements for community recognition, and Ken Davis of the Federal Emergency Management Administration and James Thomason of the U.S. Fire Administration discussed how to obtain federal grants for fire suppression and mitigation during a major wildfire.

Look for more information on these presentations at www.nfpa.org/wildland.

HOW TO REACH US: Jim Smalley, Executive Secretary, +1-617-984-7483, jsmalley@nfpa.org

HEADS UP *FROM PAGE 24*

at maximum vertical intervals of 6 feet (1.83 meters), but not necessarily under every shelf. For intermediate-sized solid shelves spaced 2 feet apart vertically, a level of sprinklers is only required under every third shelf.

There are some exceptions. For example, slatted shelves are generally considered the same as solid shelves. However, a special section of NFPA 13 allows slatted-shelf storage arrangements involving specific types of ceiling-only sprinklers based on the sprinklers' effectiveness in full-scale fire tests.

The proposed research program may also lead to specific alternate arrangements by which sprinklers can provide adequate protection for storage on solid shelves. In the meantime, users of NFPA 13 have a better understanding of how to protect shelf storage in racks.

INSIDE THE BELTWAY *FROM PAGE 32*

However, Bill Broadwell, executive director of the Aerial Firefighting Industry Association, notes that the helicopters have range limitations. Duane Powers, a co-owner of Hawkins & Powers Aviation, Inc., a private contractor, provided 10 of the large air tankers used for aerial firefighting in 2002.

"It's a mistake to believe that helicopter water drops, or small splashes by single-engine crop dusters, will have the same effect as a full-scale large air tanker drop," Powers says. "While the federal agencies have been actively working to justify the currently reduced contracted resources as adequate, responsible wildland fire managers know this is not true, and they fear for results generated by this policy."

We may soon know who is right.

BUILDING TO CODE *FROM PAGE 22*

The issue of residential sprinklers in one- and two-family dwellings sparked one of the more contentious debates during the development of NFPA 5000. One of the arguments against requiring their installation suggests that their impact on overall fire losses would be minimal because most existing U.S. dwellings don't have automatic suppression systems and won't get them.

However, I'm not so sure I agree with this reasoning.

I'd suggest that a significant number of fires still occur in newly or recently constructed homes and that the impact on fire losses of automatic suppression systems might be greater than we think.

Between 1994 and 1998, 41 percent of the reported fires in homes occurred in properties protected by working smoke or fire alarms, according to NFPA's 2001 report, The U.S. Fire Problem Overview Report.

During that same period, home fire deaths dropped by 77 percent.

Maybe the time has come for all our castles to be equipped with an automatic fire suppression system.

STRUCTURAL OPS *FROM PAGE 26*

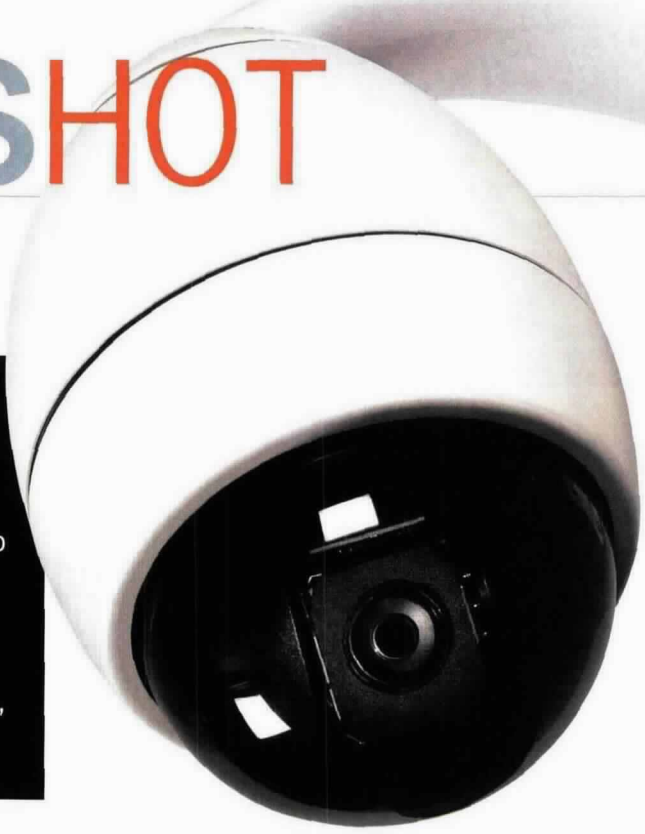
Very few one- or two-family homes have a room with a volume greater than 20,000 cubic feet. A standard 10- by 12- by 8-foot (3- by 4- by 2-meter) bedroom has a volume of 960 cubic feet (27 cubic meters), requiring a water flow of 10 gallons per minute (37.8 liters per minute). This isn't much of a challenge for a hose line flowing 100 gallons per minute (378 liters per minute).

In an upscale one-family dwelling, however, you might find an open layout plan, with cathedral ceilings, on the first floor. If this room were 1,000 square feet (93 square meters) and had a ceiling 20 feet high (6 meters high), it would have a volume of 20,000 cubic feet (566 cubic meters), although mathematically, there should be a reduction in the volume calculation because of the sloped cathedral ceiling.

Combined with an equivalent or larger back-up line, the standard preconnected hose line, which can usually dispense more than 100 gallons per minute, could handle a fire of this size. In fact, these lines could probably han-

>>page 79

WHAT'S HOT



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Bosch Security Systems introduces the MON171CL, the new, Philips-branded monitor features of the MON171CL include a picture-in-picture display, an analog VGA input, and two looping composite video inputs.
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DETECTOR
The high-performance Bosch VMD01 Video Motion Detector suppresses unwanted alarms and is suitable for a wide variety of uses, such airports and government buildings.
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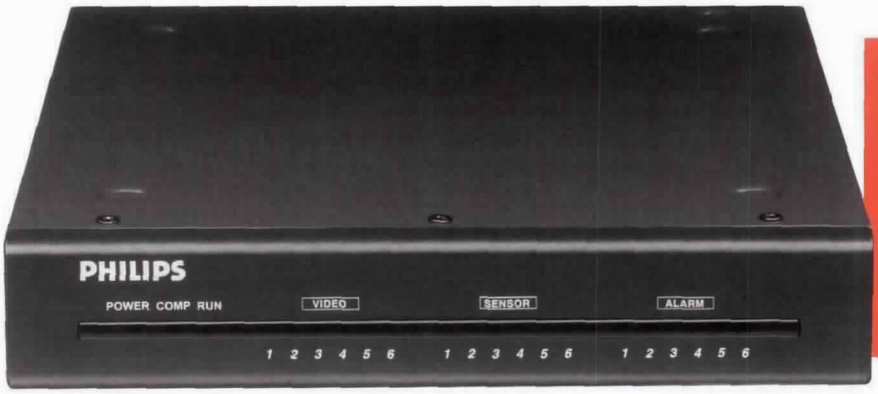

NETWORK-BASED DIGITAL CAMERAS
Bosch Security Systems has extended its Philips-brand NetCam range of network-based digital cameras to include the NetCam2, the NetSVR 1, and NetSVR 6. adding have been modified with additional feature enhancements and a more user-friendly software interface as well.
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FOAM SYSTEM
Nordic Systems Inc. has released the new Mark V foam system that offers a multitude of functions, remote diagnostic capabilities, dual control and displays, multiple formats.
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MONITOR
Bosch Security Systems' OD850 features motion analyzer signal processing and linear travel distance that measures the distance traveled by a target and eliminates false alarms.
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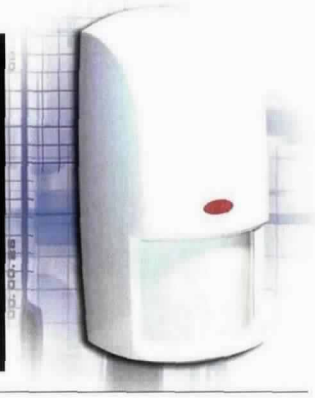

CLASSIFIEDS

Fire Protection System Specialist

U.S. Department of State, Office of Overseas Buildings Operations, Operations and Maintenance Office, Fire Protection Division has two (2) openings for a Fire Protection System Specialist at the GS-9/11/12 equivalent position. The primary purpose of these positions is to manage system modifications and repairs and to develop and implement criteria, standards and procedures that ensure the installation quality and performance of the Department installed fire alarms. Worldwide travel required. Additional information available on Monster.com, search under "Fire Protection System Specialist." Mandatory Requirements: Applicant must be a U.S. citizen. Failure to state this on original application will render you ineligible for consideration. Top Secret security and medical clearances required prior to start. Position is a one-year renewable Personal Services Contract. Please submit an OF-612, SF-171 or detailed resume by COB 7/31/03 via FAX: (703) 875-5771 OBO/RM/HR Announcement #2003-023.

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STRUCTURAL OPS *FROM PAGE 76*

dle fires in many apartment buildings, dormitories, and hotels, as well, except in large common areas. However, we don't advocate using anything smaller than a 1½-inch hose line.

Finally, a strategic plan for one- and two-family dwelling fires should address not only the tactical, life-safety priorities for firefighters and occupants, but also extinguishment and property conservation, in that order.

AD INDEX

DATEBOOK

Fire Risk and Hazard Assessment Research Application Symposium
July 9-11 • Baltimore, Maryland
Hear 30 cutting edge technical papers on fires' environmental impacts, fire toxicity, and on new fire test facilities and capabilities.

Jack Snell, director of NIST's Building & Fire Research Laboratory, is the keynote speaker at this year's event. For more information, visit www.nfpa.org/foundation.

Securitex and Fire Malaysia 2003
July 23-26 • Kuala Lumpur, Malaysia
Numerous topics including Access Control Systems, Building Management Systems, Detection & Alarm Systems and Guard Control & Monitoringwill be discussed, among other topics in this year's seminar held in one of Southeast Asia's leading security and fire protection markets. For more information, visit www.mes.com.my/elenex2003/securitex.htm.

LOOKINGBACK

Cold-Storage and Warehouse Building Fire, Worcester, Massachusetts

PHOTOGRAPH: AP/WORLD WIDE

For more information, visit www.nfpajournal.org

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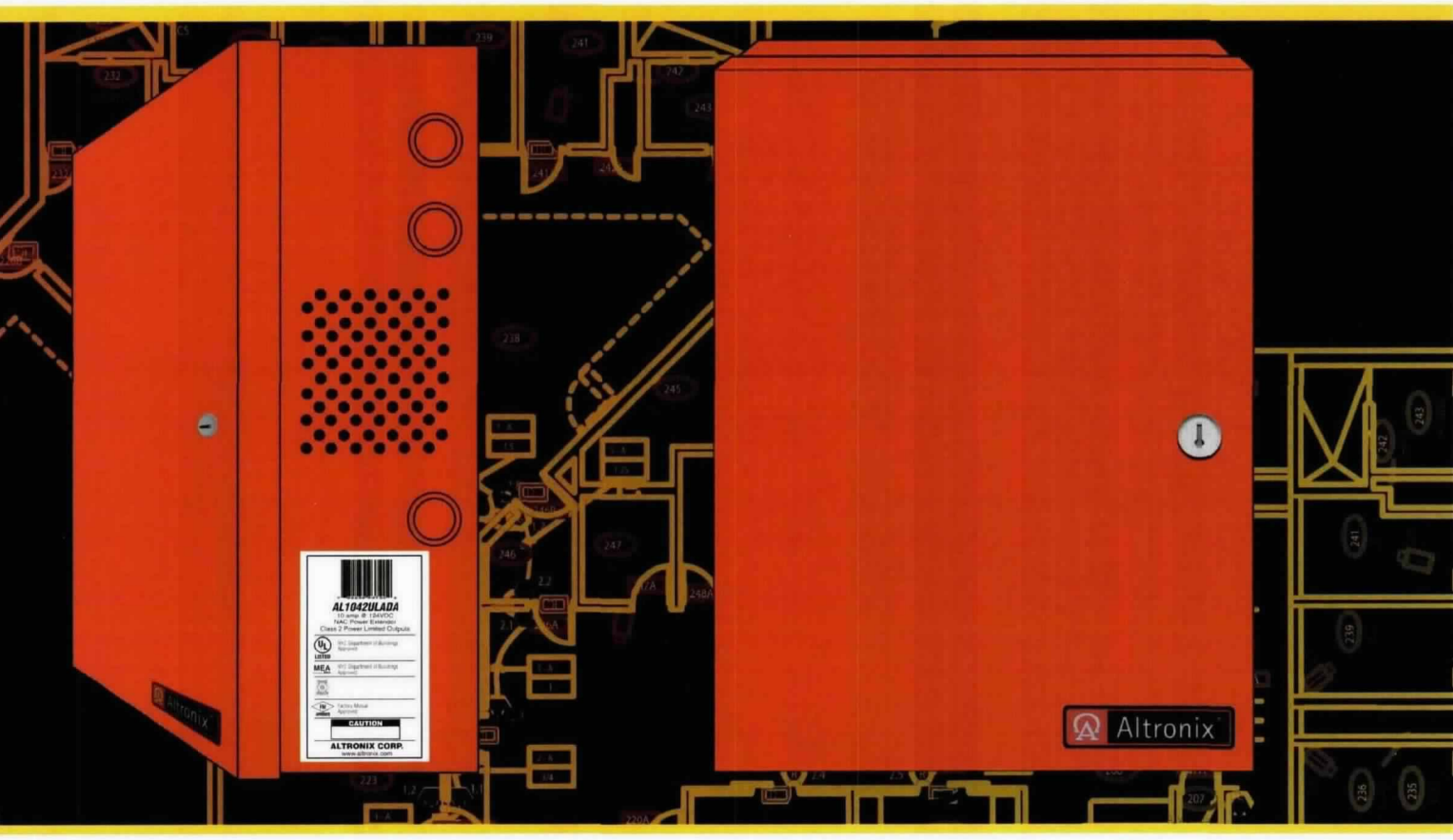

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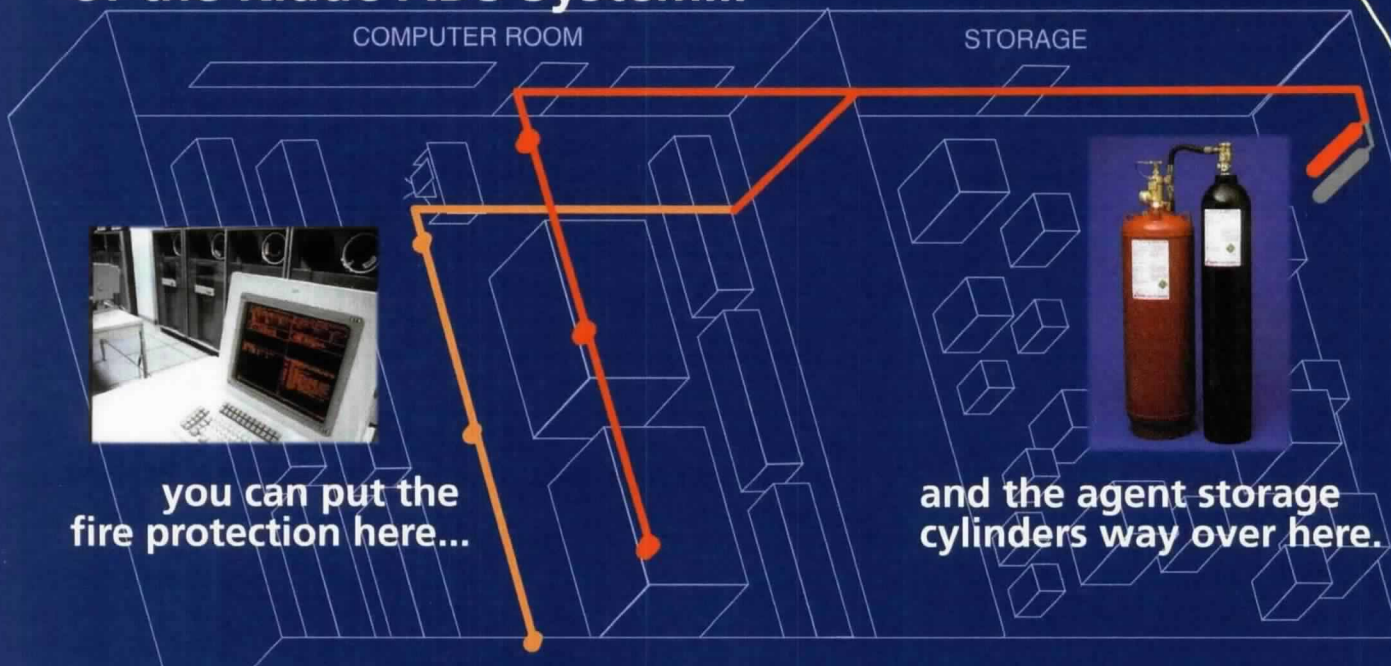

you can put the fire protection here...

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