nfpa JOURNAL
THE AUTHORITY ON FIRE, ELECTRICAL, & BUILDING SAFETY

# LARGE-LOSS FIRES 2004

Direct property damage by fire in the United States dropped 81 percent last year

## Firefighter Injuries in 2004

NFPA estimates U.S. firefighter injuries at more than 75,840

## Crash Ready

How ARFF crews responded when Air France flight 358 landed nose down in a ravine

## Safe Heat

High home heating fuel costs may pose a safety threat this winter

## Fuel Fire

How a major petro-chemical plant dealt with a dead-of-winter fire at a critical facility

NFPA
NOVEMBER/DECEMBER 2005
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Direct property damage dropped 81 percent.

**By Stephen G. Badger**

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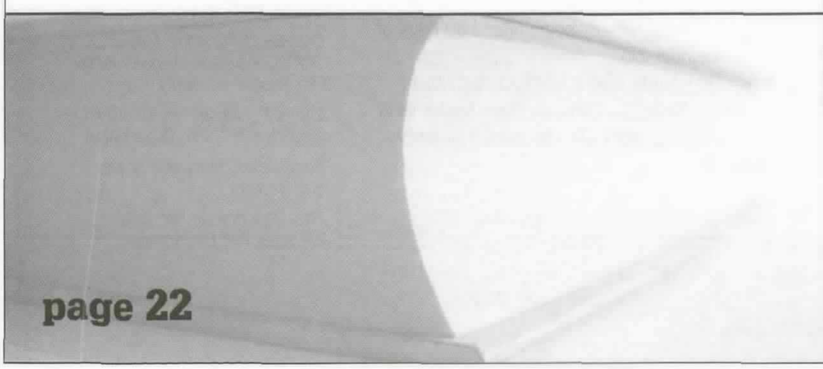

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COVER ILLUSTRATION: DAVE EMBER

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## ABOUT NFPA

NFPA has been a worldwide leader in providing fire, electrical, building, and life safety information to the public since 1896. The mission of the international non-profit 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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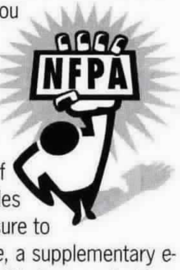


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# FirstWord by James M. Shannon

PHOTOGRAPH: JOEL W. BENJAMIN

## The Choice Is Simple

In my last column, I wrote that California Governor Arnold Schwarzenegger was deciding whether to sign into law the fire-safe cigarette bill that had been passed by the legislature. I am happy to report that on October 7, the governor signed the bill into law. Now the people of California will have the same protection as the citizens of New York and Vermont, which had already enacted similar legislation, and Canada, which adopted a law that, as of October 1, 2005, requires that only fire-safe cigarettes be manufactured, imported, or exported.

This movement toward fire-safe cigarettes is a tremendous step forward in fire safety, but its full benefit will only be achieved when such cigarettes are the standard everywhere. Let's look again at how smoking contributes to the fire problem in the United States.

Smoking-related fires are the leading cause of U.S. residential fire deaths, accounting for more than 25 percent of reported home fire deaths. To put it more starkly, about 700 people a year die in fires caused by smoking.

How effective would a nationwide requirement to manufacture fire-safe cigarettes be? An analysis released in September revealed a one-third reduction in the number of deaths attributed to cigarette fires in New York after its fire-safe cigarette law took effect last year. That is great news by anyone's standards, but there is reason to believe that the full impact will be much greater. During much of the year, smokers were still smoking non-compliant cigarettes, and retailers were still free to sell their non-compliant inventories. Once those old cigarettes are out of the picture—and they should be by now—we will see an even more dramatic reduction in the loss of life.

Where do we go from here? There are three ways to achieve our goal of a national fire-safe cigarette standard. The first is to support the national legislation sponsored by Rep. Ed Markey (D-Mass.) and Rep. Peter King (R-N.Y.). NFPA is working with a coalition of fire service and public health advocates to get this bill through, but its prospects are not great in the short term. It must compete with many other national priorities, and the tobacco lobby has shown its considerable muscle whenever national legislation to regulate it has been discussed in the past. Nevertheless, we will continue to fight hard for its passage.

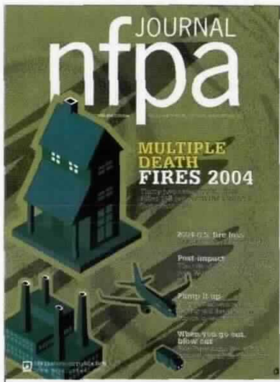
The second way is to continue the state-by-state approach. Here, the momentum is on our side, and we can expect that the experience in New York, California, and Vermont will set an example that other states will follow. But the well-funded lobbying efforts of cigarette manufacturers and their allies could slow things down. I am confident we can get to a *de facto* national standard state-by-state, but probably only after thousands of unnecessary deaths.

The third and quickest way to achieve our goal is to get the U.S. cigarette industry to manufacture fire-safe cigarettes exclusively before they are forced to do so. This possibility is not as farfetched as it might seem. To reach their market in the three states where the law has been changed, companies will have to manufacture fire-safe cigarettes. New York's tax revenues from cigarettes did not decline, so the tobacco industry has no reason to fear adverse economic effects for their shareholders. Their choice is simple: They can obstruct this reform at the cost of many lives, or they can save these lives at no cost to themselves.

In 1929, Congresswoman Edith Nourse Rogers took the first step toward requiring fire-safe cigarettes when she sponsored a bill that led the National Bureau of Standards to develop the first such cigarette. After it had been developed, the director of the Bureau said "that all there is to do is to find a manufacturer to take up that idea." That is as true today as it was then.

For the sake of all of those people whose lives are in the tobacco companies' hands, we are going to keep pushing the industry.

**James M. Shannon**, President and CEO, NFPA

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## GUIDANCE ON FIREPROOFING

I recently read the article "Post Impact" in the September/October issue of *NFPA Journal*. The article mentions that the fireproofing system must be inspected regularly but I am not aware of any good guidance on what is acceptable. Is cracking OK? How big? How much?

There should also be more guidance and possibly testing on things such as attachments that includes pipe hangers, small supports, etc. that are installed after the fireproofing has been applied and result in parts of the fireproofing being removed. Do they need to be covered? How much? How far?

**MATTHEW MURTHA, PE**
Fire Protection Engineer
FirstEnergy Corporation

**NFPA RESPONDS**

UL's Fire Council and Standards Technical Panel (STP) 263 on Fire Resistance of Building Construction and Assemblies is working on a draft of UL 2431, which will provide a means of measuring the ability of fire-resistive materials to retain their fire-resistive properties after being subjected to various conditioning environments.

When the work is completed, architects and specifiers will have a clearer understanding of which products are compliant with the intended application. Until then, manufacturers should provide sufficient evidence that the products they offer will withstand the anticipated need for long-term durability.

## POINT OF CONFUSION

I enjoyed your article on fire pumps in the recent issue September/October issue of the *NFPA Journal*. I do think this will clarify many issues with people not skilled in fire pumps and related equipment.

I did notice one point of confusion in the "Latest Devices" box (page 66). You indicate that the 2003 edition of NFPA 20 does not recognize variable speed drives. The 2003 edition does specifically recognize both variable speed diesel engine drivers and variable speed controllers for motor driven fire pumps. To wit: See Clauses 10.5.5 for electric drive fire pump controllers and 11.2.4.2 and 11.6.1.3. for variable speed diesel drivers, and, finally, 12.5.2.1.6(5). Also see 14.2.7.3.7.3 in the test and maintenance chapter. Other references are in 3.3.45, 5.7.4.3, 5.18.1.3, 7.3.2.9, 10.5.5.

It is true that the committee is adding additional clauses to cover variable speed electric drive controllers for the 2006 edition. These will be quite numerous and have already cleared both the public proposal and the public comment stages.

**JIM NASBY**
Director of Engineering
Master Control Systems, Inc.
Lake Bluff, Illinois

**EDITOR'S NOTE**

Jim Nasby was a source of information for the article on fire pump maintenance.

## HIGHLIGHTING AN IMPORTANT ISSUE

I read with great interest the "Pump It Up" article in the most recent issue of *NFPA Journal*.

The diesel fire pump controller does not control the speed of the diesel engine, but the speed is controlled by the engine itself, either with a mechanical or electrical governor.

Also, variable speed devices, either electrical controller or diesel engines, are described in detail, but the sidebar mistakenly states that they are not recognized by NFPA 20 (2003 edition). These devices were not recognized previous to the 2003 version, but were added in 10.5.5 and 11.2.4.2.

Finally, my experience has been that variable speed controllers for electric units are considerably more than two times the price of an ATL controller.

The technology of fire pumps and their associated equipment continues to progress significantly, with improved pump designs and user-friendly controllers. Ultimately, this equipment must be tested and maintained by trained, experienced personnel to be effective as designed.

**DARREN DALE MANSUR**
Janssen Pump & Equipment

**CLARIFICATION**

The photograph that appeared with the feature on fire pumps (September/October 2005) was for illustrative purposes only, and it was not intended to imply that the pump shown was in need of testing or maintenance.

# IN A FLASH!

**NFPA NEWS**
COMPILED BY
**JOHN NICHOLSON**

LEGISLATION

## NFPA hopes legislation will lead to nationwide use of fire-safe cigarettes

CALIFORNIA GOVERNOR ARNOLD SCHWARZENEGGER'S recent approval of a bill mandating the use of cigarettes that are much less likely to cause fires will save lives in that state and could lead to nationwide use of such "fire-safe" cigarettes. Late last month, Governor Schwarzenegger signed AB 178, the California Cigarette Safety and Fire-fighter Protection Act.

As a result, that legislation, sponsored by California Assemblyman Paul Koretz (D-West Hollywood), will require that all cigarettes sold and manufactured in California after January 1, 2007, will be required to comply with standards demonstrating that they have a reduced propensity to burn when left unattended. Such "fire-safe" cigarettes help prevent smoking-related fires. Each year, smoking-related fires needlessly kill approximately 800 people across the country. They are the leading cause of home fire fatalities and a threat to firefighters and other first responders.

Fire-safe cigarette requirements are already in place in the states of New York and Vermont. A recent preliminary report out of New York showed that the number of deaths caused by cigarette-ignited fires has dropped 33 percent since that state's fire-safe cigarette requirement went into effect.

"National Fire Protection Association has been advocating the use of fire-safe cigarettes for many years," said James M. Shannon, president of NFPA. "The new requirement to use those cigarettes in California will certainly help to save lives and property in that state. But, we also hope the new California law will show tobacco companies that it is time to make fire-safe cigarettes the standard nationwide."

NFPA PROMOTIONS

## McNabb named director of government affairs for NFPA

NANCY MCNABB HAS JOINED NFPA's Washington, D.C. office as director of government affairs. McNabb previously served as the Association's building code regional manager in Dallas.

In her new role, McNabb will work with congressional and federal agencies, as well as allied organizations, to promote NFPA policies and positions. She will report to John Biechman, NFPA's vice-president for Government Affairs.

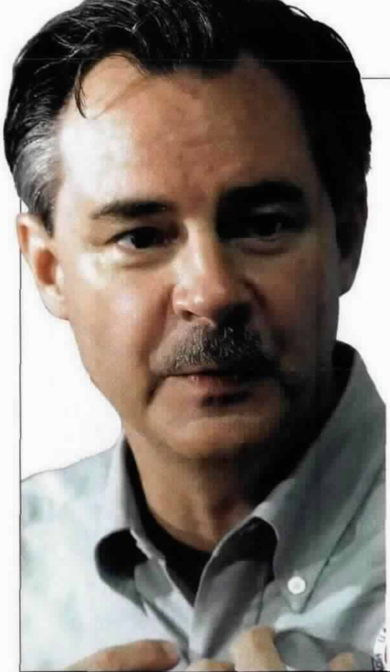
Before joining NFPA in 2001, McNabb facilitated code adoptions, conducted training on code interpretations, and testified at legislative hearings as service coordinator for the Building Officials and Code Administrators International (BOCA). She also served as a staff architect for BOCA, working with building officials in New York State and providing member services throughout the region. She also worked as assistant director for code development and code interpretation for the New York State Department of State, codes division, and as a project architect for a number of architectural firms in Pennsylvania.

McNabb holds a master's degree in architecture in structures and a bachelor's degree in architecture from the University of Illinois at Champaign/Urbana, as well as a bachelor's degree in fine arts from Bradley University. She is a registered architect in both New York and Pennsylvania.

"We are delighted to have Nancy aboard," said Biechman. "Her credentials and experience will add a new and important dimension to our D.C. office because she is able to approach her work from both the technical and policy sides of our issues."

PHOTOGRAPH: EDWARD KARAA

APPOINTMENTS



## NFPA supports appointment of Chief R. David Paulison

NFPA supports the appointment of Chief R. David Paulison to acting undersecretary for Emergency Preparedness and Response for the Department of Homeland Security, as well as acting director of the Federal Emergency Management Agency.

Said James M. Shannon, president of NFPA, "We are pleased that the Administration has chosen an experienced member of the fire service and an accomplished emergency manager to handle these two important functions. We are certain Chief Paulison's leadership will benefit the disaster efforts currently underway and our overall national preparedness and response."

Paulison was appointed to the position on September 12. He was formerly administrator for the U.S. Fire Administration, having retired as fire chief of the Miami-Dade Fire Rescue Department.

SURVEY

## Candle fire survey supports NFPA's public safety message

A NEW SURVEY commissioned by NFPA finds that many U.S. adults are practicing candle safety, one of the important home fire safety messages NFPA sent out during this year's Fire Prevention Week.

NFPA commissioned Harris Interactive® to conduct the telephone survey on candle safety for the 2005 Fire Prevention Week (FPW), which was held from October 9 through 15. This year's theme was "Use Candles with Care. When You Go Out, Blow Out." The survey contacted 1,002 adults, ages 18 and older, living in private households in the continental United States.

"We are excited to learn that people are getting our Fire Prevention Week message and using candles with care," said NFPA Assistant Vice-President for Public Education Judy Comoletti. "Placing candles a safe distance from anything that can burn and extinguishing them when you leave the room are important measures when using candles in the home."

According to the survey, 91 percent of U.S. adults who use candles at least once a year say they never deliberately leave them burning overnight, and 81 percent say they never inadvertently fall asleep while a candle is lit. Among younger adults who use candles at least once a year, however, there is a higher likelihood that they may deliberately be left burning overnight. According to NFPA's most recent statistics, 41 percent of home candle fires start in the bedroom, resulting in a quarter of associated fire deaths, and 11 percent of the home candle fires start after someone falls asleep.

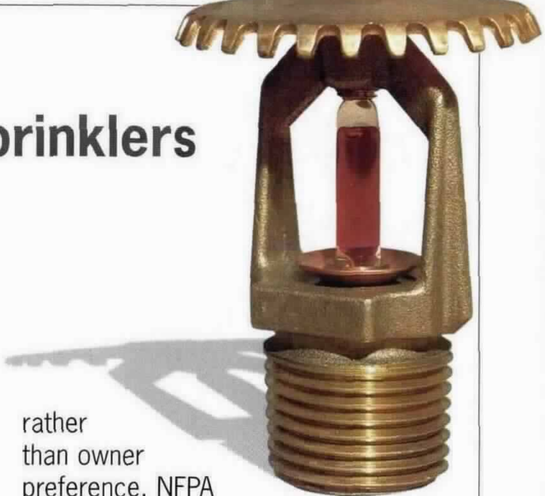
The survey also found that 29 percent of adults who use candles at least once a year have a specific household rule to never leave a burning candle unattended. About 18 percent have no specific household rules at all when it comes to candle use. Respondents who use candles at least once a year in homes where children are not present are more likely to say they have no specific household rules regarding candle use than those in homes where children are present.

For a look at the complete survey, please visit www.nfpa.org.

PHOTOGRAPHS: TOP—AP/WIDEWORLD; BOTTOM—TINA RENCELJ

REPORTS

# NFPA report finds reliability of fire sprinklers even higher than estimated



AN UPDATED NFPA REPORT with new evidence on the tremendous value of automatic fire sprinkler systems finds sprinklers to be even more reliable in reducing U.S. fire deaths than previously estimated. But the *U.S. Experience with Sprinklers and Other Fire Extinguishing Equipment* report also confirms that the century-old technology remains underused in the United States, especially in the place where the risk of fire death is greatest, the home.

The report states that the chances of dying in a fire in a home in which sprinklers have been installed are reduced by one-half to three-fourths, compared to fires where sprinklers are not present. Sprinklers are now estimated to operate in 93 percent of fires large enough to activate them. And for the first time, it is possible to document that nearly all sprinkler failures involve errors in judgment, including 65 percent that occurr because the systems have been shut off before the fire.

Sprinklers appear to be present in most health care facilities, high-rise hotels and office buildings, and, to a lesser extent, in department stores and manufacturing facilities.

Most fires still occur in unsprinklered properties, says the report, and the systems remain especially rare in homes. NFPA estimates sprinklers are present in less than 1 percent of the reported fires that occur in one- and two-family dwellings and in less than 8 percent of reported fires in apartments. Where sprinklers are present in homes, their impact on life safety is as large as it has been in other properties where sprinklers have long been established.

With most home sprinkler installations still occurring as a result of ordinances and other mandates rather than owner preference, NFPA has taken a lead role in raising awareness of residential sprinkler availability among homeowners.

The home sprinkler installation tide may be beginning to turn. An historic floor action by NFPA's membership in June established provisions requiring sprinklers in new one- and two-family dwellings in the 2006 editions of NFPA 101®, *Life Safety Code®*; NFPA 5000®, *Building Construction and Safety Code®*; and NFPA 1, *Uniform Fire Code™*. The codes, issued by the NFPA Standards Council in August 2005, also require fire sprinklers in all nursing homes, among other properties.

MEMBER SECTIONS

# Metro Fire Chiefs/Urban Fire Forum make DHS recommendations

AS THE FEDERAL GOVERNMENT re-evaluates the roles and responsibilities of federal agencies responding to natural disasters and acts of terrorism, the Metropolitan Fire Chiefs have offered their collective experience and resources to assist with the re-structuring efforts. As a first step, the Metropolitan Fire Chiefs Section will work with NFPA, the International Association of Fire Chiefs, and the International Association of Fire Fighters to develop a list of qualified and experienced individuals to be considered for appointment to these key positions in the Department of Homeland Security and FEMA.

At a recent meeting at NFPA headquarters, the NFPA-sponsored Urban Fire Forum, which includes the executive board of the Metropolitan Metro Fire Chiefs Section, reviewed the preparedness for, response to, and aftermath of both Hurricanes Katrina and Rita. After the meeting, the Urban Fire Forum recommended accelerating the mandated implementation of the National Incident Management System (NIMS), which is essential to the successful coordination of preparedness, response, and recovery efforts for all incidents, and enforcing it at all levels of government, without any exceptions.

In addition, the Urban Fire Forum recommended that the director of FEMA be elevated to a Cabinet-level position to ensure that the prevention, response, mitigation, and recovery efforts for natural and man-made disasters receive appropriate commitment and support. Qualified individuals with appropriate fire service and emergency management experience must be appointed to the following key positions: FEMA director, undersecretary for Preparedness, and administrator of the United States Fire Administration.

Members of the forum also recommended that the U.S. fire service, which developed the incident management system and has demonstrated experience in emergency preparedness, response, and recovery, assume a leadership role in emergency response and public safety through appointments to key positions in the Department of Homeland Security and FEMA.

PHOTOGRAPH: MATTHEW PULLICINO

## CERTIFICATIONS

We are pleased to announce and recognize the following individuals for earning NFPA certifications in the specified fields of practice:

**Certified Fire Protection Specialist**
David Bair, Aero Automatic Sprinkler Co, Phoenix, Arizona
Scott Bloxham, Tinker AFB Fire & Emergency Services, Tinker AFB, Oklahoma
Martin Buchsbaum, Insurance Services Office, Tesuque, New Mexico
Peter Caiello, Insurance Services Office, Jersey City, New Jersey
Anthony Dynderski, Sikorsky Aircraft Fire Department, Stratford, Connecticut
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Edward Franck, Insurance Services Office, Jersey City, New Jersey
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Alan Baradoy, Cochrane, Alberta, Canada
Michael Bartlett, Murfreesboro, Tennessee
Cynthia Bautista, Nashua, New Hampshire
Scott Becker, Dow Corning Corporation, Midland, Michigan
Nicholas Bishop, Canton Fire Department, Canton, Michigan
Jimmie Blacker, Lawrence Township Fire Department, Lawrence, Michigan
Edward Blight, Mundy Township Fire Department, Grand Blanc, Michigan
Kevin Bloss, Clio Area Fire Department, Clio, Michigan
Aaron Brown, Grand Blanc Fire Department, Grand Blanc, Michigan
Michael Burkley, Flint, Michigan
Charlie Butler, Great Falls Fire Rescue, Great Falls, Montana
Loren Colbert, Flint Township Fire Department, Flint, Michigan
Nelson Collins, Maine State Fire Marshal's Office, Augusta, Maine
William Cooke, Rochester Hills Fire, Rochester Hills, Michigan
Hector Cyr, Brewer, Maine
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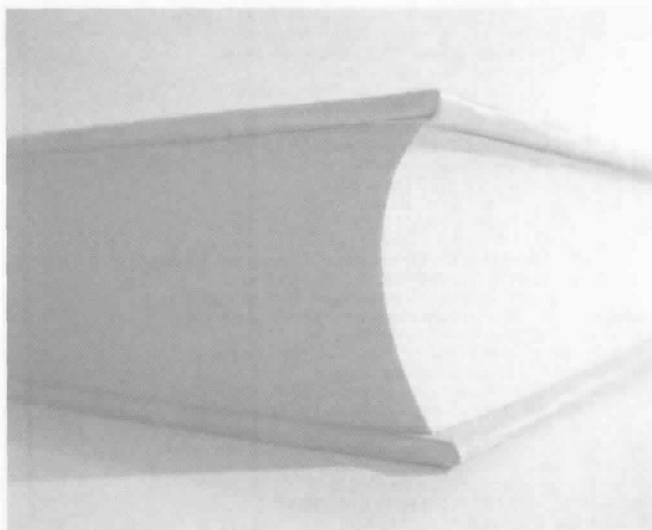
 BY KATHLEEN H. ALMAND, P.E., FSFPE

# 'Grand Challenges' face fire suppression



**IN HIS 1900** retirement lecture, the famous German mathematician David Hilbert outlined 23 "Grand Challenges" in mathematics for his successors to solve. This stimulated the mathematics community so that all but one of these challenges had been solved within 20 years.

This concept has been adopted today in a variety of scientific fields to draw attention and funding to problems that, if solved, could lead to major advances. For example, the Bill and Melinda Gates Foundation is providing millions of dollars of funding to solve various Grand Challenges to decrease illness and death from disease in the developing world through vaccine development and distribution, insect control, and other measures.

Other fields that have taken this strategic approach include high-performance computing, robotics, bridge design and even automobile design.

**A better understanding of fire suppression mechanisms is one of research's Grand Challenges.**

So what are the Grand Challenges for fire suppression systems research?

Since the introduction of the automatic sprinkler and the formation of NFPA's first Committee on Automatic Sprinklers in 1897, there has been a thirst for information on all aspects of suppression as a fire protection strategy.

New life-safety technologies, new configurations, new hazards, and new regulations have all had an impact on the design and installation of fire sprinkler systems and the standards that govern them. From its early days, the Fire Protection Research Foundation has been engaged in major research programs, both domestic and international in scope, designed to provide the type of information that can better support the NFPA codes and standards process. Many of these research projects have been in the field of fire suppression–in commodity protection, in halon alternatives, and in smoke and heat venting.

In 1999, the Foundation formed a Fire Suppression Futures Research Advisory Council, the puropse of which was to develop and set priorities for research needs designed to enhance fire safety and its regulation as it relates to fire suppression systems. The council consisted of members of the design, research, and manufacturing community who met several times over a five-year period to develop a prioritized list of research recommendations, ranging from the development of a compendium of fire tests to the development of fire suppression models for various extinguishing agents to the development of the technical basis for integrating fire suppression and risk/hazard.

The Foundation is currently engaged in several projects that address various fire suppression system challenges. These projects include the development of a sprinkler test report catalogue, protection strategies for combustible liquids in composite IBCs, a hazard classification method for oxidizing chemicals, and protection requirements for retail solid shelf storage of commodities.

Of course, the Foundation's work is only a small part of all the research currently underway all over the world in fire suppression.

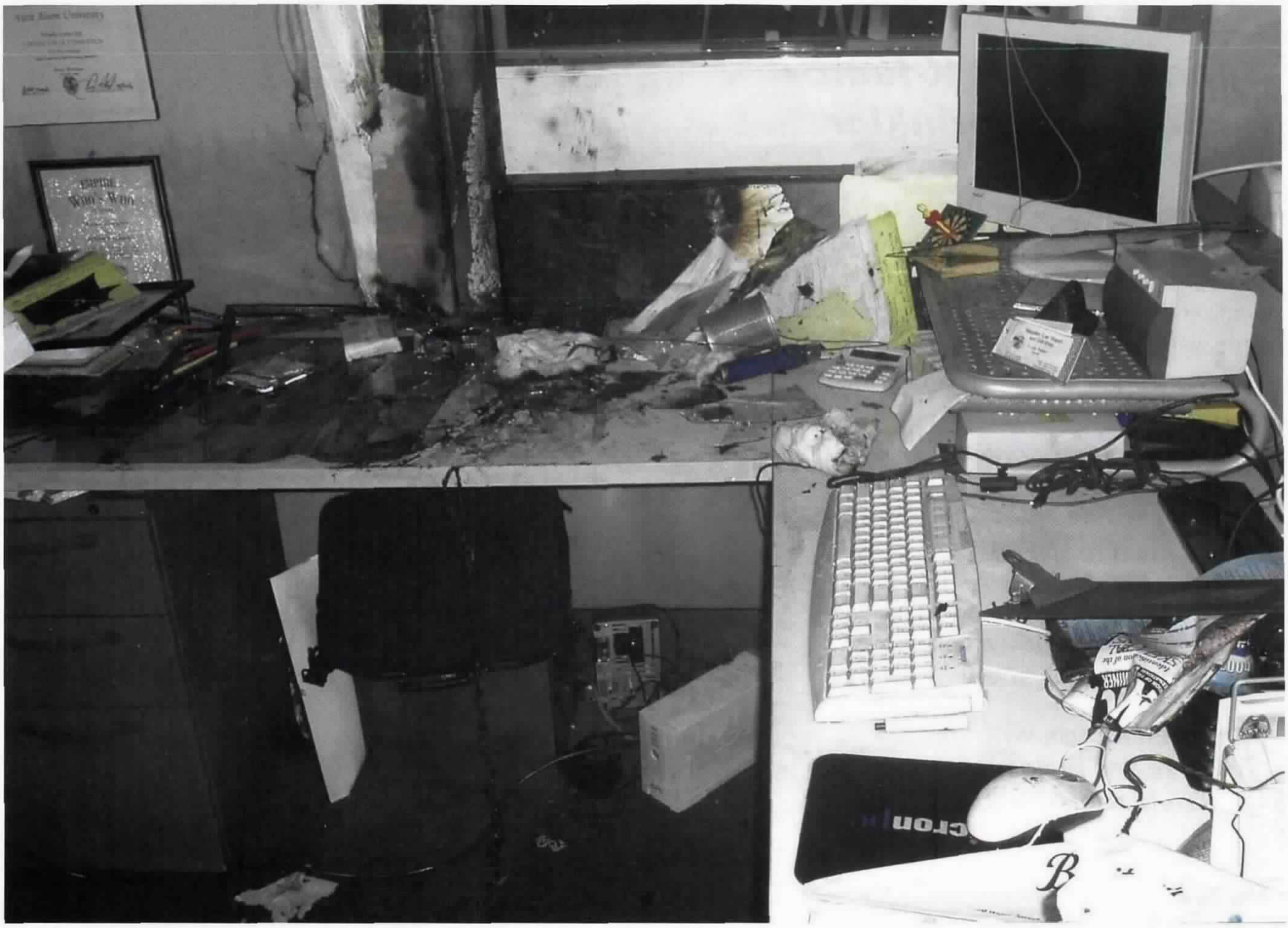
So, are these Grand Challenges? In fact, many of these issues are simply problems to be solved. I would like to suggest that the one Grand Challenge that emerges for fire suppression systems is a comprehensive understanding of the performance of fire suppression mechanisms and an accompanying design methodology. Until we have a better and more fundamental understanding of the impact of any the items in the list above, all our problems will be big ones, and expensive ones to solve.

I would challenge all of us to frame our short- and medium-term fire suppression research issues into the broader framework I've outlined above so that we can meet this Grand Challenge.

KATHLEEN H. ALMAND is the executive director of the Fire Protection Research Foundation.

# Fire Watch

by **Kenneth J. Tremblay**



A security and alarm monitoring company was damaged in a fire started by an employee using illegal drugs. The two-story building had a sprinkler system that provided complete coverage, but it lacked a separate smoke detection system.

## MERCANTILE

### Use of illegal drugs ignites fire

CALIFORNIA–A security and alarm monitoring company employee was using a torch to heat illegal drugs in his second-floor office workstation when he inadvertently ignited combustibles on his desk.

The two-story building in which the fire occurred was constructed of wood and masonry materials. A sprinkler system provided complete coverage, but the building lacked a separate smoke detection system.

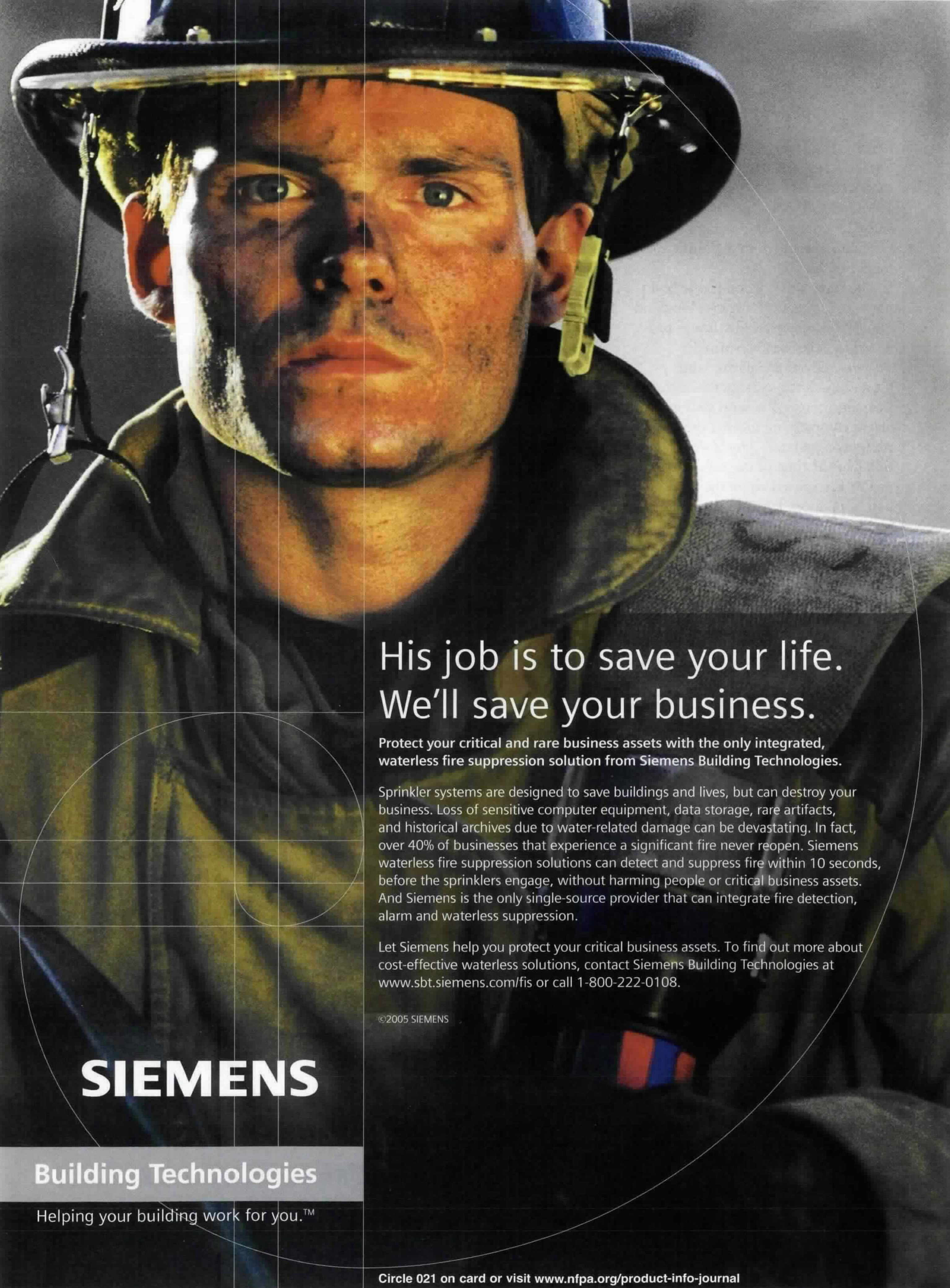
The fire began when flames from the small gas torch the 26-year-old employee was using to heat the drugs ignited combustibles on the desk and the wall covering of his cubicle. As he tried to extinguish the flames with clothing, he tossed the still-operating torch off the desk onto a chair, where it ignited the upholstery fabric.

Unable to extinguish the blaze, the young man left the room to find a portable fire extinguisher, but he locked himself out when the door shut. By the time he called a co-worker to let him back in, a single sprinkler had activated and extinguished the flames.

Firefighters responding to the water-flow alarm at 5:52 a.m. discovered that the fire was already out and began salvage operations, as investigators sorted through the scene. Based on the evidence and the two employees' statements, the investigators were able to determine the cause of the fire.

The employee who started the blaze was hospitalized with burns to his hands and face, and the second employee was treated for smoke inhalation at the scene. The building, valued at $2.25 million and its contents, valued at $960,000, sustained combined losses of $236,000.

PHOTOGRAPH: NFPA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## RESIDENTIAL

### Sprinkler extinguishes cooking fire

WASHINGTON–One residential sprinkler successfully extinguished a fire in an apartment in a 12-unit apartment building.

The three-story, wood-frame building was 130 feet (39 meters) long and 50 feet (15 meters) wide. It was protected by a residential sprinkler system, and smoke alarms were located in all the apartments, including sleeping rooms. A central station alarm company monitored the fire protection systems, which were operational at the time of the fire.

The fire started when the liquid in a pan of potatoes left cooking unattended on the stove evaporated. Single-station smoke alarms activated around 5:30 p.m., and, alerted to the the blaze, the apartment's occupant left the unit.

Shortly afterward, a sprinkler 5 feet (1.5 meters) from the stove activated and extinguished the fire, limiting fire and smoke damage to the stovetop and surrounding area.

Damage to the building, valued at $1.2 million, was estimated at $15,000, and damage to its contents, valued at $50,000, was estimated at $2,000. The fire department credited the building's emergency evacuation plan for the rapid evacuation of its occupants

### Dorm smoke alarm alerts occupants

CONNECTICUT–Smoke from a bedroom fire in a college dormitory room activated the smoke detection system in the dorm's hallway and common areas, alerting the fire department and the occupants, all of whom evacuated without incident.

The four-story building had concrete floors and walls, and a brick exterior. A fire detection system with smoke detectors in the corridors and common areas was monitored by a central station alarm company. There were no sprinklers.

The 8:30 p.m. fire began when an electric appliance cord that was touching a metal bed frame failed and ignited the bedding in one of the bedrooms of a first-floor suite.

There was no estimate of the damage. Although the fire, which was initially limited to the bedroom, spread when an investigating campus police officer left a bedroom door open, damage was limited to the suite where the fire started.

### One killed in smoking fire

VIRGINIA–A 53-year-old man died of burns and smoke inhalation after he fell asleep while smoking and ignited his sofa. He awoke after the fire started and left the apartment, but he only made it as far as the building foyer, where he died.

The three-story, garden-style apartment building had concrete block walls with a brick exterior and a wooden, asphalt-shingled roof. The victim's apartment, which was partly below grade, had no fire detection or suppression equipment.

A passerby discovered the fire when flames vented out the apartment's living-room window and called the fire department at 6:50 p.m. Fortunately, the building's firewalls and non-combustible floors and walls helped confine the fire to the unit of origin.

The unit, valued at $80,000, and its contents, valued at $40,000, were destroyed.

## Nuns die in rectory fire

WISCONSIN–Two 68-year-old nuns died in a fire that filled a church rectory, which was separated from the church by firewalls and doors.

The wood-frame building had a brick exterior, and asphalt shingles covered the wooden roof. An automatic detection system protected the dining and kitchen area, the stairwell, and the second-floor hallway.

The fire department received a 911 call from an occupant reporting the fire at 12:30 a.m., and firefighters responded within six minutes. First-arriving crews did not see the fire as they approached, but it broke out of first-floor windows as a second engine arrived, and crews set up for an interior attack. Working in snow and temperatures near 0°F (-18°C), firefighters knocked down the blaze and began searching for victims. Crews used approximately 1,000 gallons (3,785 liters) of water on the fire.

Fire crews used a thermal imaging camera to search for occupants on the first floor. When they found none, they continued the search and found the first victim on the second landing of the second set of steps. Another team searching the second floor found the second victim in a bedroom.

Investigators were unable to determine the exact cause of the fire.

The two women died of smoke injuries. One had also been burned. A firefighter was cut by broken glass. Property damage was not reported.

## Propane-fired heater ignites home

COLORADO–A fire in a home under construction in a rural area burned for nearly eight hours before a passerby detected it. Responding firefighters reported seeing flames 30 feet (9 meters) high as they approached the new subdivision, where they found the house well involved in fire.

The single-family, wood-frame house, which incorporated heavy timber beams, was 82 feet (24 meters) long and 37 feet (11 meters) wide. At the time of the fire, it had been framed in, and the rough plumbing and electrical wiring were placed in the walls. However, there was no insulation or wallboards, and the smoke detection system was not yet operational. There were no sprinklers.

The passerby called the fire department at 4:14 a.m., and two engines and a ladder truck were sent to investigate. When arriving firefighters discovered that the roof and one side of the house had already collapsed, they hooked their hoses up to the nearest hydrant, only to find that it yielded no water. Additional companies established a water supply, and the fire department used master streams to knock down the blaze and prevent the fire from spreading to a construction trailer and other homes.

Investigators used a video-surveillance camera on the construction trailer to determine that the fire started around 8:40 the previous night when a propane-fired room heater the contractor left operating in a mudroom on the home's first floor ignited wooden framing near a doorway leading to the garage. Lack of interior walls and compartmentation allowed the fire to spread throughout the house before venting through the roof.

Damage to the house is estimated at $450,000. There were no injuries.

### Smoking materials ignite deadly fire

NORTH CAROLINA–Although smoke from a fire in a rear bedroom of a manufactured home activated the structure's smoke alarms, two intoxicated 16-year-olds were unable to escape and died in the blaze.

The wood- and steel-frame manufactured home, which was 86 feet (26 meters) long and 26 feet (7 meters) wide, had a wooden roof covered with asphalt shingles. Operational smoke alarms had been installed in the hallways near the bedrooms. There were no sprinklers.

The sleeping occupants first awoke to the sound of a crying and coughing baby, then realized the house was on fire. Everyone but the two teenagers escaped to a neighbor's house and called 911 at 6 a.m.

Investigators found an ashtray on a bedroom chair and noted burn patterns indicating that the fire started in that area. They determined that smoking materials ignited the chair and paper items located nearby.

The home, valued at $100,000, and its contents, valued at $50,000, were completely destroyed.

## HVAC system ignites unoccupied home

PENNSYLVANIA–A disabled fire-detection system and high winds helped a fire spread undetected in the attic of a single-family home.

The exterior of the three-story, wood-frame house was covered with wood siding and wood shingles. An automatic fire and security detection system had been installed on all three floors, but the system had been disabled due to frequent alarms some time before the fire and never repaired. There were no sprinklers.

At the time of the fire, the house was being cared for by a house sitter, who smelled something like smoke on the third floor the evening before the fire, but could not locate its source and did not notify the fire department. Late the next morning, the sitter left the house. A passerby reported the blaze around 3 p.m.

Investigators later determined that the fire started near a propane-fueled heating and air conditioning system in the attic. The propane fed the fire, and the wood structural components contributed to the fire spread.

The home, valued at $1.5 million, and its contents, valued at $500,000, sustained damages of $700,000 and $200,000, respectively. No one was injured in the fire.

## Man dies in residential hotel fire

CALIFORNIA–A fire started by a smoldering ignition source in the first-floor recreation room of a three-story residential hotel killed a 54-year-old man when it spread up the stairwell, trapping him in the second-floor hallway outside his unit. Officials said that he might have ignored the smoke alarm until it was too late to escape.

The building had a flat roof covered with built-up layers of composite material. In addition to the recreation room, there was an antique store on the first floor. Staircases on either side of the store led to the guest rooms, and common hallway bathrooms on the second and third floors. Hard-wired smoke alarms in every room, hallway, and common area had battery back-up. The hotel also had a standpipe system and hose cabinets.

The fire department was alerted to the fire at 7:07 a.m.

Investigators determined that the blaze started in upholstered furniture in the first-floor recreation room. Though they could not identify the exact ignition scenario, they did determine that the fire began with a smoldering ignition source.

The man was burned over most of his body. Damage to the building was estimated at $1.2 million; damage to contents was estimated at $500,000.

## STORAGE
### Sprinkler controls smoldering fire

NEW JERSEY–A sprinkler controlled a fire that began when cardboard boxes left on top of a furnace in the mechanical room of a multi-tenant warehouse ignited. When the occupants tried to remove the boxes, the flames flared and activated the sprinkler.

The single-story, steel-frame building had concrete floors and walls, and a built-up metal roof supported by a metal bar joist. A wet-pipe sprinkler system and heat detectors protected the building.

An occupant of the building called 911 at 11 a.m. to report that there was smoke in the building. When firefighters arrived, they discovered the sprinkler operating in the mechanical room and used a pressurized water can to complete extinguishment.

The extent of the damage was not reported. There were no injuries.

## MANUFACTURING
### Hazardous materials fire threatens neighborhood

OKLAHOMA–A fire heavily damaged a single-story plant that manufactured concrete forms for yard art such as birdbaths and statues.

The concrete-and-metal-frame building had metal walls covered with a brick and stone veneer and a metal roof. There was no fire detection or suppression equipment.

Workers called the fire department at 1:22 p.m., and firefighters arriving three minutes later found heavy black smoke emanating from both ends of the building and the ridgeline. The incident commander noted that a portion of the east wall had collapsed and that the north wall was about to collapse, as well.

Before the fire crews began a defensive attack, workers informed them that the plant contained a number of hazardous materials in the form of resin, acetone, and kerosene.

As low-hanging smoke began to spread to a nearby residential neighborhood, several local agencies began coordinating a protect-in-place strategy to keep civilians inside their homes. Officials also monitored the nearby storm drains and sewers for signs of contamination.

Investigators learned that before the fire broke out, several paint brushes and rollers had been left soaking in a 5-gallon (19-liter) bucket of acetone 37 inches (94 centimeters) away from two operating kerosene heaters. They determined that the blaze started when the heaters ignited the acetone.

Damage to the building was estimated at $468,000, and damage to its contents was estimated at $500,000. There were no injuries.

## HEALTHCARE
### Electrical arc kills one, injures two

FLORIDA–An arc in an electrical panel in the basement of a hospital sparked an explosion that killed one worker and injured two others.

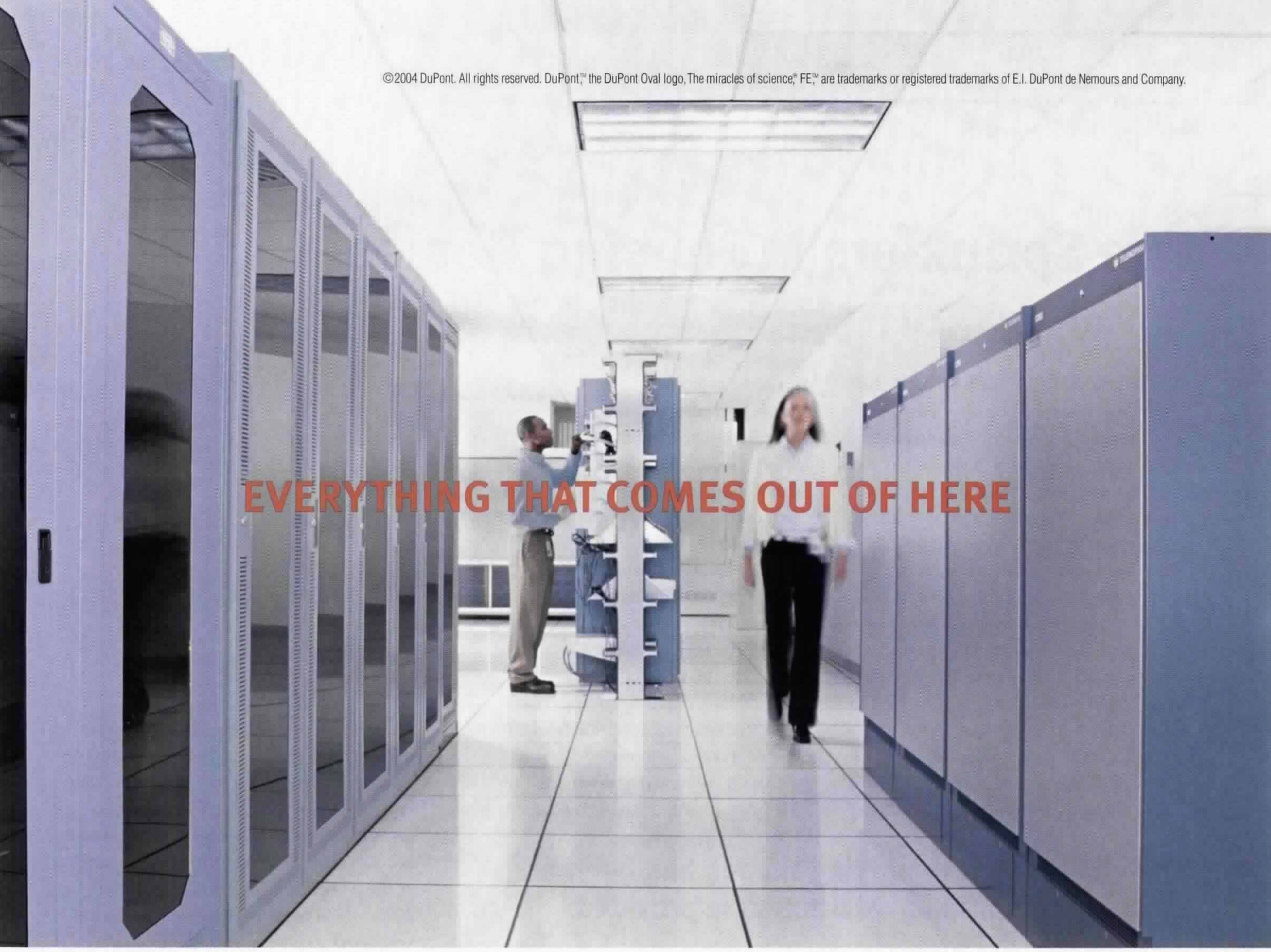
The arc, which produced enough energy to propel the men into a wall, ignited the victim's clothing, and smoke from the burning clothes activated the smoke detection system. However, there was not enough heat to activate the sprinklers.

Firefighters responded to a report of the explosion and extinguished the victim's burning clothing.

The extent of property damage to the steel-and-concrete building, which had full-coverage fire detection and suppression systems, was not reported.

A passing motorist saw smoke coming from the roof of this three-story Pennsylvania house and alerted the fire department. The wood-frame home's fire detection system had been disabled.

PHOTOGRAPH: KIMBERTONFIRE.ORG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 BY RUSSELL P. FLEMING, P.E.

# Fire Sprinklers in Nursing Homes

**ARE THERE SPECIAL SPRINKLER** rules for nursing homes? Not really. The only place nursing homes are mentioned in NFPA 13, ***Installation of Sprinkler Systems***, is Section 8.14.8.1.2, which requires that nursing home bathrooms have sprinklers, regardless of size and construction.

Because patient rooms are light-hazard areas, quick-response sprinklers must be used to help ensure activation while the fire is still small. The requirement for quick-response or residential sprinklers in nursing home patient rooms was actually added to NFPA 101®, ***Life Safety Code***®, in 1994, before NFPA 13's 1996 mandate for quick-response sprinklers in all light-hazard areas.

The challenge with nursing homes has been to ensure that sprinkler protection is provided. After decades of effort, federal regulations and code requirements now call for sprinklers in new and existing facilities, but there are still unsprinklered nursing homes. An October 6 article in ***USA Today*** titled "Many Nursing Homes Run Risk of Catastrophic Fires" reported that more than half the nation's 16,000 nursing homes violate federal fire safety standards each year and that government regulations let thousands of older facilities operate without required sprinklers or smoke alarms.

**The challenge with nursing homes has been to ensure that sprinkler protection is provided.**

The article also noted that four of every five nursing homes that have had fatal fires over the past five years had waivers from regulators that allowed them to keep doing business despite fire safety deficiencies.

Recognition of the need for sprinklers goes back more than half a century. Several multiple-fatality nursing home fires between 1948 and 1953 focused attention on the hazards, yet a 1955 survey revealed that Louisiana was the only state to require fire sprinkler protection throughout all such homes.

In 1962, the National Safety Council and the American Nursing Home Association jointly issued a safety manual that recognized sprinkler systems as providing the "greatest 'safety to life' feature available in the fire protection field." By 1966, 34 states had enacted laws requiring fire sprinkler systems in nursing homes under one or more conditions.

Also in 1966, Congress enacted the Medicare program, giving the nursing home industry unprecedented growth. The 1968 and 1971 amendments to the Medicaid and Medicare programs required institutions furnishing medical care to comply with the 1967 edition of NFPA 101. That edition required complete sprinkler systems in facilities not built of fire-resistive or protected noncombustible construction, and later editions strengthened the requirement.

Yet in the years since Congress set these standards, at least 500 people have died in nursing home fires. ***USA Today*** noted that the 18 worst fires during this period all took place in facilities without sprinklers and that about 3,500 nursing homes still had none.

Noting that no government agency tracks the number of nursing homes without sprinklers, ***USA Today*** compiled its own list, with four states falling into the 100 percent sprinklered category: Alaska, Arizona, Vermont, and West Virginia. The states with the lowest percentage of sprinklered nursing homes were South Dakota, Utah, Michigan, New York, Arkansas, and Colorado.

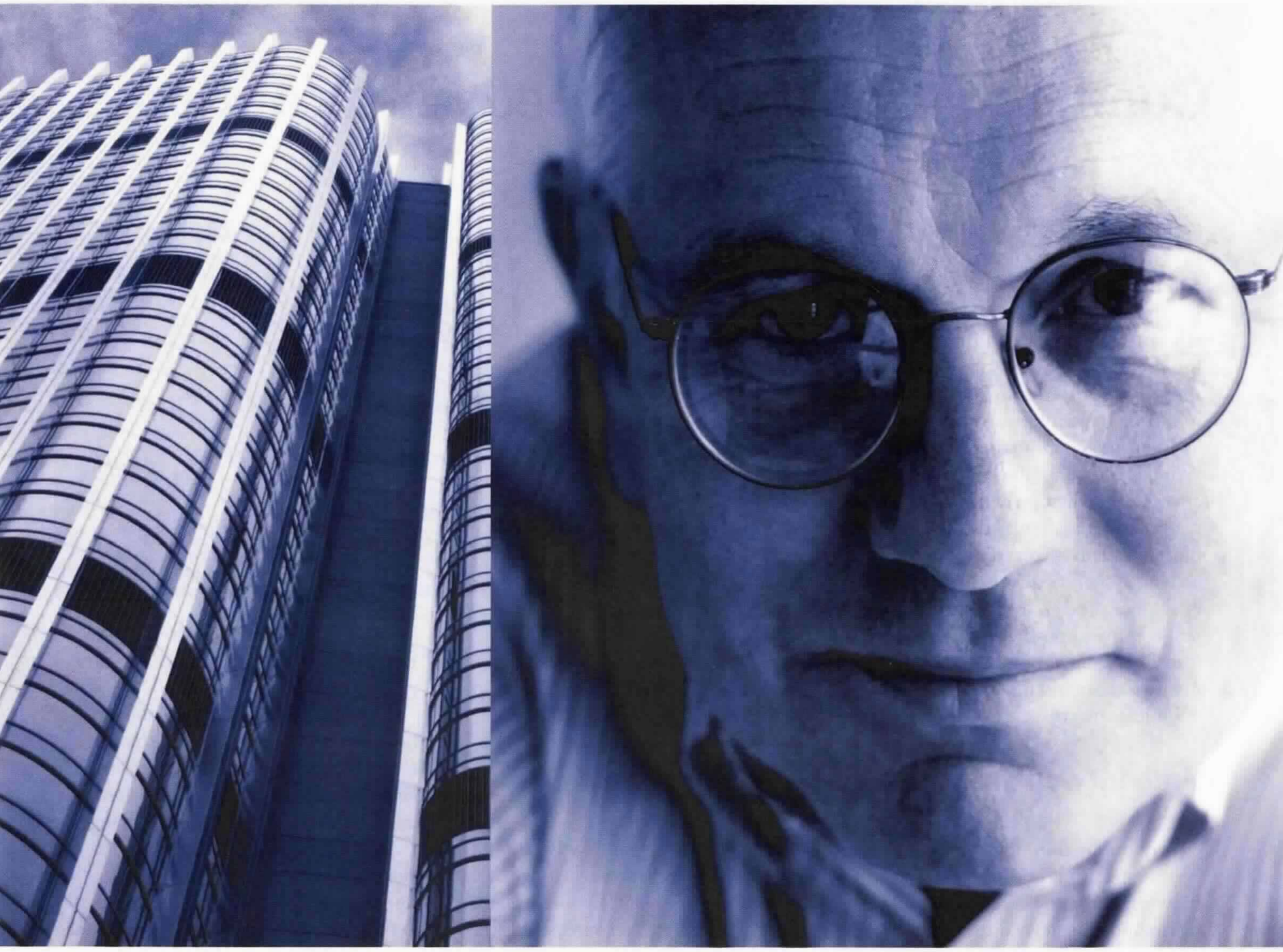
In the 108th Congress, legislation introduced as the Nursing Facility Fire Safety Act would have required retrofitting all nursing homes with fire sprinklers, with low-cost loans funded through Medicare. Legislation is being introduced into the 109th Congress as the Nursing Home Fire Safety Act of 2005, which requires protection within five years, and includes a grant program.

The Florida legislature should be commended on its recent action to handle the problem. Credited by ***USA Today*** as having 96 percent of its nursing homes sprinklered, the state passed a bill in May requiring sprinklers in the remaining 35 homes that lack them. Tennessee and Connecticut enacted similar legislation in 2004.

In the March 2004, NFPA President Jim Shannon called for sprinkler protection of all nursing facilities. The recent ***USA Today*** article allowed him to update his call for sprinklers, ending with a quote: "It seems intolerable to me that in the 21st century we still have a situation where we can have these multiple-death fires in nursing homes...The problem now is to keep people focused on the problem. ... It's past time."

**RUSS FLEMING** is the executive vice-president of the National Fire Sprinkler Association and a member of the NFPA Technical Correlating Committee on Automatic Sprinklers.

ILLUSTRATION: JACK DESROCHER





 BY BEN KLAENE & RUSS SANDERS

# Command transfer: Proceed with caution

**FIRE DEPARTMENT STANDARD** operating procedures (SOPs) must address command transfer. In larger departments with a multi-level rank structure, it is essential that later-arriving company officers know whether they are required to assume command or have other options.

To ensure coordination, the first-arriving company officer or member in charge of the first-arriving unit is the initial incident commander (IC). This officer is often involved in hands-on activities, such as advancing the initial attack line, and so may not be at a formal command post. When command is transferred, however, a stationary command post should be established.

Unless the reasons for doing so are clearly outlined in department SOPs, command should not be transferred between company officers. Multiple command transfers in the initial stages of an operation generally result in confusion and could reduce the number of people engaged in hands-on life safety and extinguishment activities. However, an officer who finds an unsafe operation in progress upon arrival should immediately take command, establish a formal command post, and take corrective actions.

Because information can be lost in the command transfer, it is necessary for the new IC to communicate with the previous IC to determine the status of the operation and the available resources. While the two ICs are communicating, arriving units should be awaiting orders. The longer it takes to transfer command, the greater the chance of freelancing. A strong command presence and efficient transfer process will ensure a smooth transition and eliminate independent actions.

The IC assuming command must evaluate the safety and effectiveness of the operation in progress. If the operation is unsafe or not focused on accomplishing the incident priorities, the new IC must reorganize and reassign operating units. It is difficult to reorganize and re-direct operations, but it is sometimes necessary. The new IC should improve the operation by updating the size-up and augmenting operations in need of additional resources. Information available to the IC improves as companies relay critical information from the interior or remote positions and as more time is available to review pre-incident plans and other information.

**Authority can be delegated, not responsibility.**

If department procedures give a more senior or higher-ranking officer the option of taking command or allowing the current IC to continue serving in the position, numerous and unnecessary command changes can be eliminated. However, higher-ranking officers, especially chief officers, face a dilemma in allowing a lower-ranking officer to retain command.

If there is a major problem in resolving the incident, the highest-ranking officer will be held accountable even if he or she did not assume command. Remember, authority can be delegated, not responsibility.

The need for command transfer between chief officers other than the chief of department is less obvious, since a department's culture or rules may require those command changes.

On rare occasion, command of a structure fire can be transferred to another agency. Where fires and explosions are used as weapons of terror, law enforcement would assume command from the fire department after the fire is brought under control. The first attack on the World Trade Center is an example.

Hazardous materials can also be used as a terrorist weapon, but most state and local jurisdictions assign responsibility for hazmat incidents to fire departments because most hazmat incidents are not terror-related and because fire departments are typically the best-trained and best-equipped agencies to handle such incidents.

This column is adapted from the book ***Structural Fire Fighting***, available at www.nfpa.org or (800) 344-3555.

PHOTOGRAPH: BEN KLAENE

 BY CHIP CARSON, P.E.

# Emergency lighting


ILLUSTRATION: DAVE EMBER

**NFPA 101®**, *Life Safety Code®*, requires emergency lighting in many occupancies, but some provisions of Section 7.9, which specifies how such lighting should work, are often overlooked.

Chapter 3 of NFPA 101 defines exit access as "That portion of the means of egress that leads to an exit." This includes virtually all the occupied portions of a building's floors. For purposes of installing emergency lighting, however, Section 7.9.1.2 states that exit access includes "only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit." This means that, although each office does not require emergency lighting, the corridor just outside the offices does.

While emergency lighting is not required in restrooms, each individual situation should be evaluated. For example, emergency lighting may be beneficial in a large restroom in an assembly occupancy where alcoholic beverages may be served, where the occupants may not be familiar with the space, and where the restroom may periodically be crowded.

NFPA 101 requires that the emergency lighting activate automatically upon the failure of the public utility; the opening of a single-circuit breaker or fuse; and a manual act, including accidental opening of a switch controlling normal lighting facilities.

Unfortunately, the lighting may not activate when the last two situations occur. If a single-circuit breaker supplies the lights in a stair or corridor, for example, tripping that one breaker would put that stair or corridor in darkness. And if the building were served by a generator, the generator transfer switch would not see the stair or corridor as being dark, so it would not operate.

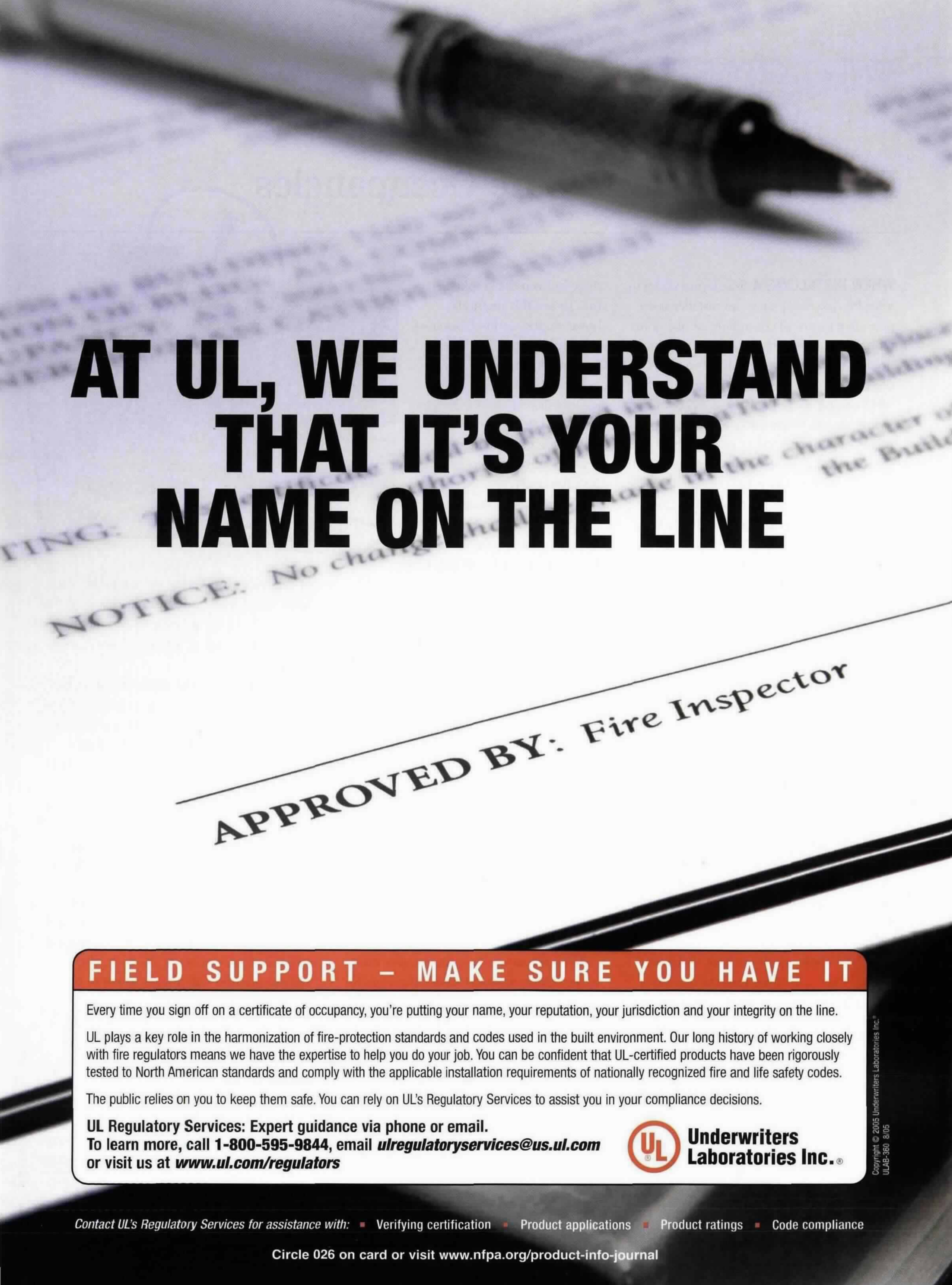
This problem can be solved by putting enough lights to provide one foot-candle at the floor on a separate breaker so that two breakers would have to trip before the stairwell was plunged into total darkness. The same applies if the lights in an area are controlled by a single switch. Arranging some of the lights on a separate switched circuit or even a non-switched circuit would be acceptable.

**Installing emergency lighting properly requires knowledge of the code requirements and a careful review of the actual installation.**

Another area often overlooked is the exit discharge. The lights on the exterior of the building where the required egress doors open must be on the emergency circuit or they must have battery back-up if the building requires emergency lighting. Battery-operated emergency lights are acceptable in lieu of a generator, but they must be supplied from the lighting circuit in the area. We have all seen situations in which the circuit breaker to emergency lights supplied from a receptacle trips but the receptacle circuit still has power so the battery-operated lights don't come on.

Installing emergency lighting properly requires knowledge of the code requirements and a careful review of the emergency lighting installation. Of course, thorough acceptance testing is critical to ensure that the emergency lighting system, once installed, works properly.

**CHIP CARSON** is owner and president of Carson Associates, Inc., in Warrenton, Virginia. He is also a member of the NFPA Board of Directors.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FIELD SUPPORT – MAKE SURE YOU HAVE IT
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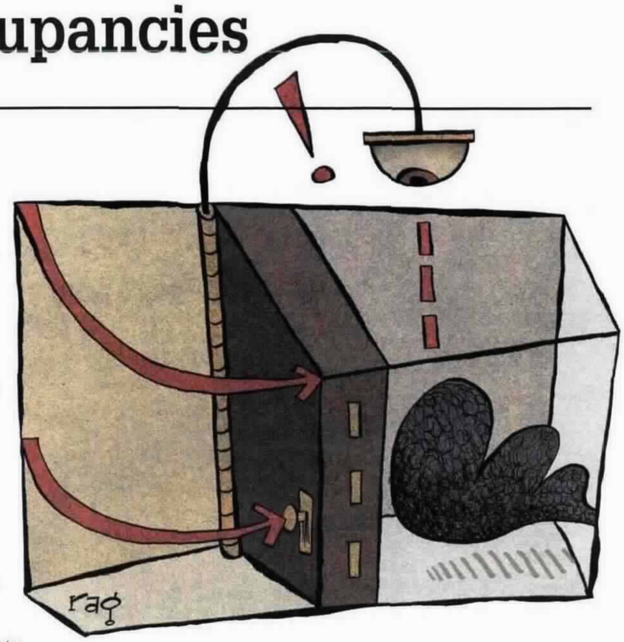
 BY WAYNE D. MOORE, P.E., FSFPE

# Protecting Health Care Occupancies



**WHEN INSTALLING A** fire alarm system in a health care occupancy, an installer must provide a means of controlling smoke doors with smoke detectors and magnetic door holders in order to maintain the integrity of the smoke compartments, according to the 2005 edition of NFPA 101®, *Life Safety Code*®. Doors frequently penetrate smoke compartments, so a building's fire safety system must control them to ensure they close and remain closed during a fire.

Unfortunately, designers often do not understand how to accomplish this task.

The 2002 edition of NFPA 72®, *National Fire Alarm Code*®, allows two methods of controlling doors in a smoke compartment. The first uses area smoke detectors to control that doors for that specific area. The second controls the door holder mechanism directly with a dedicated smoke detector or smoke detectors. Because automatic sprinkler protection in all new hospitals has relaxed the requirements for corridor smoke detection, the second method has become the more popular in this occupancy.

The requirements of Subsection 5.14.6 of NFPA 72 apply equally to both design concepts. When a designer uses the open area protection system, Paragraph 5.14.6.1 allows the spacing in the corridors normally required for area protection in conformance with Subsection 5.7.3 to also serve as smoke door release service. In this case, the explicit spacing requirements of Paragraph 5.14.6.2 do not apply.

At least one requirement in Section 5.14.6 applies to both methods. Section 5.14.6.3 provides for smoke door release directly from the smoke detector. To use this method, however, the testing laboratory must have listed the detector for releasing service.

When a system designer uses dedicated smoke detectors for door release service, the requirements of Paragraph 5.14.6.3 through Paragraph 5.15.6.6 apply.

The confusion occurs when the designer assumes that both open area requirements and door release service requirements apply together.

When a designer uses the dedicated smoke detector arrangement, he or she must determine the number of detectors required by evaluating the depth of the wall section above the doors and decide whether multiple doorways exist. When the wall section above the door measures 24 inches (0.9 meters) on both sides, NFPA 72 requires two ceiling-mounted or wall-mounted smoke detectors to be located one on either side of the door.

**The choice of using smoke detectors for smoke door release depends solely on the fire protection goals of the building's owner.**

On a smooth ceiling, the installer must locate ceiling-mounted smoke detectors for a single or double doorway on the centerline of the doorway; no more than 5 feet (1.5 meters) measured along the ceiling perpendicular to the doorway; and no closer than 24 inches (61 centimeters) to the doorway.

Typically, a designer spacing corridor protection will assume that one must always have a smoke detector on either side of the door within 5 feet (1.5 meters) of the doorway. Trying to "integrate" the open area protection requirements with the dedicated smoke detector requirements will always result in too many detectors in a corridor.

The choice of using smoke detectors for smoke door release to ensure the integrity of the smoke compartment depends solely on the fire protection goals of the building's owner. If the goal is to wait for the smoke to travel through the corridor until it is detected at the door serving the smoke compartment, the second method meets that goal. If the goal is to close the doors before smoke can travel from one smoke compartment to another before it reaches a door opening, area detection installed in compliance with the 2002 edition of NFPA 72 will meet that goal. Although both methods satisfy the requirements of the code, the second method will always prove to be more economical tahn the first.

Regardless of which method a designer chooses, the methods represent separate and equal solutions and a designer must not combine them.

WAYNE D. MOORE, P.E., FSFPE, is a principal with Hughes Associates, Inc., and is chair of the National Fire Alarm Code TCC.

ILLUSTRATION: RICHARD GOLDBERG


FIRE

 BY SANDRA ARAUJO

# Maintenance is crucial, too

**SINCE I WORK** for NFPA, my family and friends often ask for smoke alarm advice.

"How many smoke alarms does my home need? Where exactly should they be installed?"

"I have an alarm in the kitchen, and it constantly sounds when I'm cooking."

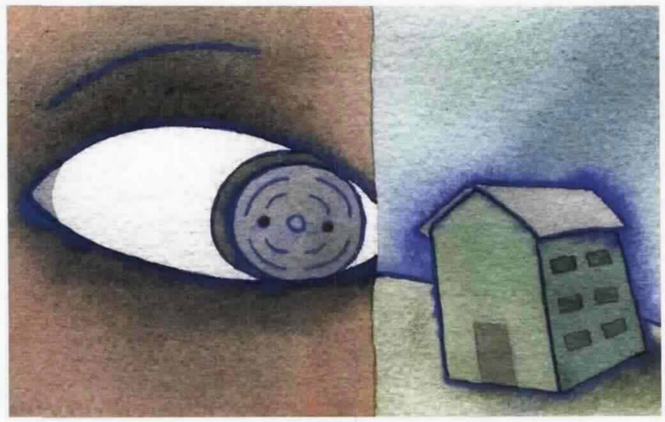
"I installed an alarm in my attic. Is that okay?"

I'm no expert, but I have learned a thing or two, and I can generally point them in the right direction for the information they need. Among this information is how to maintain their smoke alarms.

According to NFPA's report *U.S. Experience with Smoke Alarms and Other Fire Detection/Alarm Equipment*, "Homes with smoke alarms (whether or not they are operational) typically have a death rate that is 40 to 50 percent less than the rate for homes without alarms." Research also shows that the smoke alarms present in 25 percent of the fires occurring in homes that had smoke alarms were not working, usually because their batteries were dead or missing. Roughly 70 percent of home-fire deaths occur in homes that have no smoke alarms or no working smoke alarms.

**Maintaining smoke alarms is critical to fire and life safety in the home.**

All my family and friends have smoke alarms, which is typical because we know that 96 percent of homes have at least one smoke alarm. When I ask them when they last tested the alarms or how old their alarms are, however, they usually say they're not sure. This tells me that we've done a good job getting smoke alarms into homes, but we need to do more to make homeowners aware that they have to maintain them, too.



Here are some tips to keep in mind when talking about or installing smoke alarms:

- Install smoke alarms on every level, including the basement. It's especially important to have them outside each sleeping area.
- Interconnected smoke alarms are required on every level, outside each sleeping area, and inside each bedroom of new a home. Although this is the ideal for all homes, it may not be possible for existing homes. Existing homes should have smoke alarms at least on every level and outside each sleeping area.
- For manufactured homes, install a smoke alarm outside each sleeping area and inside each bedroom.
- Smoke alarms are not recommended in kitchens, attics, garages, and within 3 feet (1 meter) of a bathroom door. Avoid installing alarms in kitchens and bathrooms because cooking and steam from showers and baths can increase the chance of unwanted alarms. Alarms are not recommended for areas where temperature or humidity is below 40°F (4.4°C) or above 100°F (37.7°C).
- Mount smoke alarms high on walls or on the ceiling.
- Test all smoke alarms monthly to ensure that they work.
- Replace batteries once a year or when the alarm begins to chirp, which means the battery is low.
- Consider installing alarms with 10-year batteries.
- Smoke alarms should be replaced every 10 years.
- Replace an alarm if you don't know how old it is. Use a permanent marker to indicate the date the alarm was installed.
- Do not remove batteries from smoke alarms without replacing them with fresh batteries.
- Consider the special needs of the occupants. Smoke alarms are available for those individuals with hearing disabilities.
- Make sure that everyone in your home knows the sound of the smoke alarm and knows exactly what to do if the alarm goes off.

Working smoke alarms are essential for home-fire safety, but installing smoke alarms is only part of the job. Maintenance is crucial, too.

**SANDRA ARAUJO** is a public education specialist at NFPA.

ILLUSTRATION: CYNDY PATRICK


FCI
FIRE CONTROL INSTRUMENTS
POWER
ON
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PHOTOGRAPH: ASSOCIATED PRESS/CP, TORONTO STAR—HANS DERYK

An alert airport fire department responded quickly to a runway overshoot of **Air France Flight 358**

# Crash ready

**TORONTO PEARSON INTERNATIONAL** Airport firefighters were watching the arrivals of aircraft on runway 24L on August 2, 2005 during a red alert condition that involved reduced ground activity due to electrical/thunderstorm activity, when it appeared that an Airbus A-340; Air France Flight 358 from Charles de Gaulle Airport, Paris; was landing abnormally long.

The alert fire department responded quickly because they decided to roll the aircraft rescue and firefighting (ARFF) vehicles in the direction of the troubled aircraft before the dispatch call was received. This explains the early onsite arrival of the vehicles at the crash scene of the A-340 that overshot the runway. >>

By **Mark Conroy**

Transportation Safety Board recovery agents are framed in the wreckage of Air France Flight 358.

The Transportation Safety Board of Canada, which is the the Canadian equivalent to the U.S. National Transportation Safety Board, investigation continues to determine why the flight crew was unable to keep the aircraft on the runway. While the story of how the 297 passengers and 12 crew members were able to escape with no fatalities and only 43 reported injuries has been covered by the media, an account of the emergency response to the accident hasn't been completely detailed, until now.

### First-hand information

To get the information first hand, I flew to Pearson International on September 27 to meet with Pearson Airport Fire Chief Mike Figliola and Air Canada A-340 pilot, Captain Brian Boucher, the former chairman of the NFPA technical committee on ARFF, who recently stepped down, due to NFPA's tenure rule, after 10 years.

**Initially the wind was from the west, it then shifted to come from the north and continued to shift during the firefighting efforts. This wreaked havoc on the application of foam from the roof turrets and the turrets mounted on the Snozzles®.**

To understand the coverage, Chief Figliola explained that the 4,428-acre (1,792-hectare) airport has two fire stations, one on the north side of the airport and one on the south. Each has an Oshkosh T-1500 and two Oshkosh T-3000 ARFF vehicles. A T-3000 carries 3,000 gallons (11,355 liters) of water for foam production and a T-1500 carries 1,500 gallons (5,677 liters). Each station is also assigned a structural pumper. There are normally 15 firefighters on duty, but due to scheduled vacations, there were 13 on duty at the time of the crash. This is the absolute minimum to operate safely at the Pearson Airport.

Response time is critical in aircraft accidents. The response time for an accident is the time from when the emergency call is received by the fire department's dispatch notification until the first ARFF vehicle arrives and discharges agent. Since the vehicles were on their way to the accident site before air-traffic control notified the dispatch center, the ARFF crews arrived in under a minute from the time of dispatch notification.

This also explains why passengers and crew were still in the process of self-evacuation when the first T-3000 arrived and began applying foam to the under-belly on the left side wing root where there was the first sign of visible flames.

The aircraft was on the slope of a ravine; nose down with heavy brush and small trees. A second T-3000 was positioned on the right side of the tail and began fighting the fire as it appeared on that side. Due to the relentless thunderstorms it was difficult to maintain the foam blanket and suppress the fuel vapors. The fire initially spread up under the aircraft to the tail and then down to the nose. It was suspected that fuel was leaking and flowing downhill. It is undetermined if there was fuel in the tail-section tanks, up to 6230 liters (1650 gallons), but this fuel is normally expended earlier in the flight before landing.

Chief Figliola considered conducting a primary search of the interior, starting from the front of the aircraft. By this time, however, the cabin was fully involved and the decision was made against sending firefighters inside with hand lines.

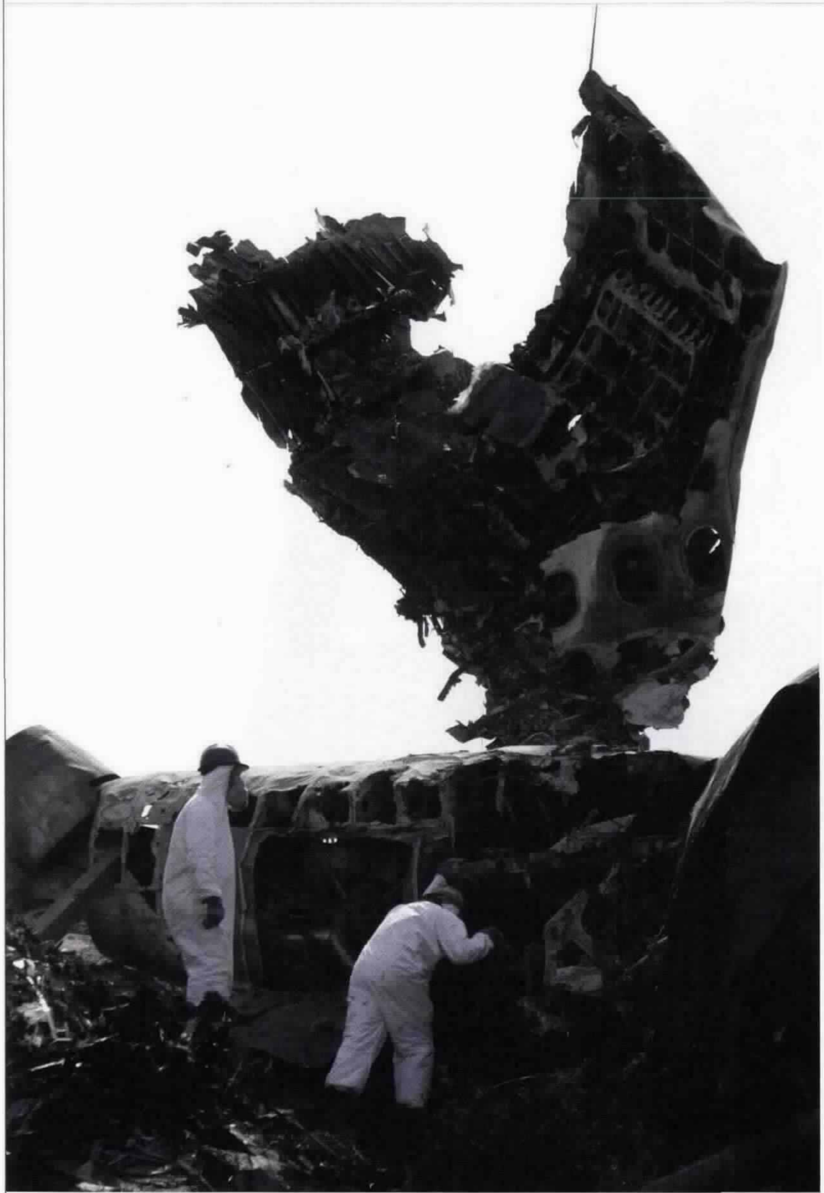
He then received word from the Peel Regional Police Department that the pilot reported everyone was off the aircraft. This seemed amazing at the time, since only four of the eight exit doors reportedly worked, and two of the slides malfunctioned. Although somewhat skeptical of this early assessment, Chief Figliola was later relieved that he had not put his firefighters at risk on an empty aircraft.

A T-1500 arrived moments later and began applying foam to the left side. The two T-3000 vehicles and the T-1500 were the vehicles that were considered part of the initial attack and knockdown. The three ARFF vehicles from the north station then arrived along with the two pumpers.

The ARFF vehicles were rotated in and out when their water supplies were exhausted. The vehicles were replenished at the scene by the pumpers and mutual aid departments with water tankers.


PHOTOGRAPH: ASSOCIATED PRESS/FRANK GUNN

A firefighter watches over as a demolition worker attaches a crane to part of the fuselage of Air France flight 358 at Pearson Airport in Toronto.



A team of investigators examine the fuselage of Air France flight 358 at Pearson Airport in Toronto.

PHOTOGRAPH: ASSOCIATED PRESS/FRANK GUNN

The first seconds at an aircraft fire are vital in getting an upper hand. With fuel flowing from the aircraft down hill and the obstruction of the aircraft over the fire, combined with the heavy brush and trees made for a difficult fire to control.

There were also high-shifting winds. Initially the wind was from the west, it then shifted to come from the north and continued to shift during the fire-fighting efforts. This wreaked havoc on the application of foam from the roof turrets and the turrets mounted on the Snozzles®, which are elevated booms on top of two of the trucks. Additionally, dry-chemical hose lines were used as they often provide for quick knock down of the fire. By all accounts, you could not have designed a more difficult scenario to fight an aircraft fire. The fire eventually entered the aircraft through the open exit doors and without interior application, eventually consumed the aircraft.

The aqueous film forming foam (AFFF) concentrate was not the mil-spec foam (Mil-F-24387), which is common in the United States and required by NFPA 403, *Aircraft Rescue and Fire Fighting Services at Airports*, but a Canadian Standards Association AFFF, which is considered equivalent to mil-spec foam by Transport Canada, which is the Canadian FAA. Later in the fire scene, several 65-millimeter (2.5 inch) hand-hose lines were used on the right side of the aircraft to help knock down the fire. The 65-millimeter hose lines are standard at the airport and the high-flow rates from these hoses were reportedly to be very effective at this fire. The hose line application was to the right side of the aircraft, which was for the most part upwind of the fire.

### Mutual aid

The demonstrated response time from the nearby Mississauga Fire Station, which can be seen from the airport, is under three minutes.

The airport is located in Mississauga.

According to plan, portable water tanks were established and the water tanker from Mississauga and another two tankers from the Caledon Fire Department were used to replenish the ARFF vehicles. The pumpers would draft from the portable tanks and pump into the ARFF vehicles or the tankers would pump directly into the ARFF vehicles. Since the ARFF vehicles carry a limited supply of water, replenishment is usually necessary at major accidents. There were no problems reported with water replenishment of the ARFF vehicles at this accident.

### Safe locations

The airport duty manager arrived at the scene early and called for buses to transport passengers and crew to safe locations. The location of the lot where the buses came form is actually closer to the fire scene than the south fire station. The duty manager directed the evacuees coming up the right side of the aircraft to the arriving buses. The buses transported them to the terminal building where they were re-evaluated and then if they were found to need medical attention, they were sent to a hospital. Although there were ambulance-buses equipped with stretchers available from the Toronto Fire Department, these were not dispatched as it was felt that the normal ambulances could handle the load.

Those with injuries were evaluated at a triage area at the scene and quickly moved to area hospitals by ambulance. Most of the injuries were reported to be minor with only a few broken bones. The 43 injured people went to two hospitals that were about 10 minutes away. One is to the north of the airport and the hospital is to the south. A medical supply trailer with backboards and other supplies was available but was not needed and therefore not brought to the scene.

**Communications**

A discrete radio frequency channel has been established at Pearson Airport for the ARFF chief to speak directly to the pilot. Although available, it was not needed at this accident as the flight crew was evacuating as soon as the aircraft came to rest. One thing that worked at this accident was that a communications officer from the airport fire department was assigned to one crew from the Mississauga Fire Department. They were able to communicate verbally and then transmit the needs clearly over the radio to their departments without confusion. Additionally, the airport fire department had a radio that was tuned to the Mississauga Fire Department frequency to monitor their transmissions.

The agencies involved in the response have adopted the unified incident command system, which allows all of the agencies to establish common goals and objectives. The system works, because it is not about who is in charge, but is about who is in charge of what. It enables several agencies to respond in a coordinated effort through one incident commander. Through full-scale and simulated training exercises, and monthly tabletop planning exercises, the individuals from the agencies established a relationship and an understanding. Any possible trouble spots were resolved before arrival on the accident site.

A full-scale training exercise was conducted in 2003, which simulated an aircraft that had run off a runway on the north side of the airport. This too helped work out some of the bugs that could have interfered with the response at this accident.

For example, the airport fire department uses SCBA airpacks from a different manufacturer than that of the Mississauga Fire Department. Since the Toronto Fire Department uses the same type as the airport, the Toronto Fire Department's light and air truck was used for exchanging and recharging air cylinders. The high intensity lights on the truck also came in handy as night fall arrived and did a nice job of illuminating part of the accident scene.

During the firefighting activity, the airport duty manager called in a bulldozer from the airport field-maintenance department. The aircraft had torn through two fences, one at the airport perimeter and one at the top of the ravine. The one at the ravine was partially in the way of the activities. The bulldozer mowed the fence down and made the ground level partway down the left side of the aircraft. This made it easier for the ARFF crew to get closer to the aircraft to apply agent to the fire.

The health of the airport fire fighters following this accident was a concern because 25 percent of the aircraft is constructed with carbon-fiber materials. Two days after the accident, the firefighters underwent physical exams with blood tests to establish a baseline for follow-up evaluations.

**Go Teams**

It is common today for large airports to send a "Go Team" to another airport's accident to learn from their experience in a major accident. Since this was the only major accident in several years, several airports had funding available and fire fighters ready to go at a moment's notice. The fire chief did not anticipate this. When the Go Teams started to arrive, they were not only unexpected, but the chief was still tied up with the response and the cleanup that followed. Once he grasped the need, he assigned his chief training officer to provide the insights needed. He suggests that airports should now plan for these arriving Go Teams and establish a liaison officer or public information officer who can collect information and relay it to the Go Teams in a manner similar to the way the media gets information. Unlike the media, the Go Teams are only interested in the emergency response and they normally will not share information outside of their own organizations for fear that they will not be invited to another one. The idea of a group, such as the ARFF Working Group to take on establishing a protocol for Go Teams and receiving airports has been discussed.

MARK CONROY is a Senior Fire Protection Engineer with NFPA and the staff liaison to NFPA's aviation technical committees.

BY STEPHEN G. BADGER

# Large-Loss Fires for 2004

The direct property loss in large-loss fires was down 81 percent

**EACH YEAR, NFPA REPORTS** on large fire and explosion losses in the United States, defined as events that resulted in property damage of at least $5 million. In 2004, U.S. fire departments responded to 1,550,500 fires. These fires caused an estimated loss of $9.79 billion.[1] Many of them were small with little or no property damage reported; however, 46 resulted in losses of $5 million or more each.[2] Together, these large-loss fires resulted in $524 million in direct property loss, and injured 17 firefighters and 16 civilians. Despite the fact that these fires accounted for only .003 percent of all the fires estimated to have occurred in the United States last year, they accounted for 5.4 percent of the total estimated dollar loss.

The direct property loss in large-loss fires for 2004 was down 81 percent from the corresponding figure in 2003, when the loss was $2.8 billion, and down 25 percent from 2002. The high losses in 2003 were primarily due to two wildland fires in California, where the combined loss was over $2.0 billion.

Even before inflation adjustments, the number of large-loss fires in 2004 was tied as the second lowest total in the 10 years since 1995 (see Table 1 and Figure 1 and Figure 2).[3] When adjusted for inflation to 1995 dollars, the number of fires that occurred in 2004 that could be categorized as large-loss (i.e., loss of $5 million in 1995 dollars) drops to 27, with a total adjusted loss of $342 million. This is the lowest number of large-loss fires since 1995. The adjusted loss is still the lowest in the 10-year period and is 72 percent lower than the 10-year average adjusted loss total.

The number of large-loss fires and explosions and the losses in these fires are volatile and has shown no consistent trend.


### SUMMARY

- The direct property loss in large-loss fires for 2004 was down 81 percent from the corresponding figure in 2003, when the loss was $2.8 billion, and down 25 percent from 2002.

- Even before inflation adjustments, the number of large-loss fires in 2004 was tied as the second lowest total in the 10 years since 1995.

- The number of large-loss fires and explosions and the losses in these fires are volatile and has shown no consistent trend.

- Large-loss fires occurred in every major property category except health care and correctional facilities.

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


### Costliest Fire in 2004

At 12:30 a.m., a fire broke out in a 240,000-square foot (22,296-square meter) automobile parts distribution center. The incendiary fire was set in rack storage of parts, most of which were coated with protective petroleum-based jelly. The fire spread quickly due to this coating, a lack of in-rack sprinklers, and strong winds. No other information on the presence of smoke detection equipment is available. A sprinkler system was present and operated. The company Web site reported that the fire resulted in the loss of substantially all the facility's equipment and inventory. Since the fire, an employee has plead guilty to the crime and been sentenced to jail. Authorities have released no other information.

This fire was one of 16 fires that caused a loss of $10 million or more in property damage last year (see Table 2). Together these 16 costliest incidents resulted in a combined loss of $336.7 million. This represented 64.3 percent of the total dollar loss in the 46 large-loss fires for 2004, and 3.4 percent of the total U.S. fire loss in 2004.

### Where the fires occurred

Large-loss fires occurred in every major property category except health care and correctional facilities (see Table 3 and Figure 3). Thirteen fires occurred in special properties, resulting in $124.7 million in property loss. Eight large-loss fires occurred in residential properties, resulting in $47.5 million in property loss. Seven fires occurred in manufacturing properties resulting in $108.5 million in property loss. There were six fires in storage properties, resulting in $138.8 million in property loss. There were three vehicle fires resulting in $30.0 million in property loss, and three fires in stores and office properties, two of which were stores and one in an office, resulting in $21.0 million in property loss, or $10.0 million and $11.0 million respectively. There were two fires each in outside properties and educational properties, resulting in $21.2 million and $13.6 million, respectively. There was one fire each in industrial and public assembly properties, resulting in $10.8 million and $8.0 million, respectively

Nearly all (41 of 46) of the large-loss fires for 2004 occurred in structures, with a combined loss of $472.8 million. Two outside fires and three vehicles accounted for the rest of the fires. Twenty-one of the 41 structure properties were operating at the time of the fire, including 14 at full operation, two partially operating, and five construction sites where work was ongoing. Another 14 were closed or had no one on the site. The operating status of the other six structures was unknown or not reported.

Five of the 24 structure fires with known causes were intentionally set, as was the outside fire. These six fires accounted for 13 percent of last year's large-loss fires, and resulted in a combined property loss of $47.9 million, or 9.1 percent of the loss in these large-loss fires.

Seventeen fires broke out between 11 PM and 7 AM. Twelve of these properties were unoccupied. Four were occupied to some extent and the operating status of the last one was not reported.

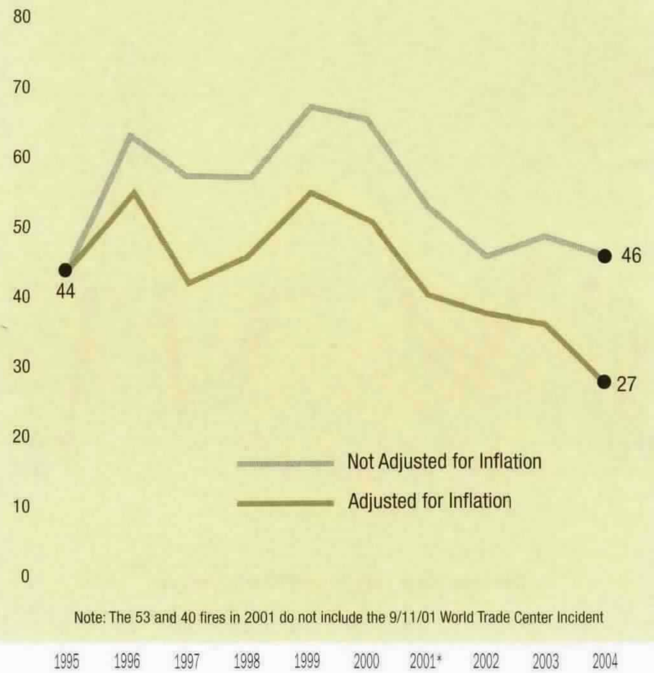
**TABLE 1 - Large-Loss Fires that Caused $5 million or More in Property Damage, 1995-2004**

| Year | Number of Fires | Number of Fires Causing $5 million or More in 1994 Dollars | Property Loss (unadjusted) (in millions) | Property Loss 1994 Dollars (in millions) |
|---|---|---|---|---|
| 1995 | 44 | 44 | $1,362 | $1,362 |
| 1996 | 63 | 55 | $1,544 | $1,461 |
| 1997 | 57 | 42 | $885 | $769 |
| 1998 | 57 | 46 | $1,167 | $1,039 |
| 1999 | 67 | 55 | $2,285 | $2,036 |
| 2000 | 65 | 51 | $2,029 | $1,732 |
| 2001* | 53 | 40 | $978 | $784 |
| 2002 | 46 | 38 | $698 | $556 |
| 2003 | 48 | 36 | $2,785 | $2,252 |
| 2004 | 46 | 27 | $524 | $342 |

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

Note: Number of fires and unadjusted loss are based on data from studies that appeared in previous annual large-loss studies. Some odf the information may differ from previously published material because material was updated after publication. Note: Adjustment fo is based on the Consumer Price Index using 1995 as a base year. Note that adjustment for inflation not only reduces the the total dollar loss for each year but also reduces the number of fires when adjusted losses large enough to qualify as large-loss fires.

**FIGURE 1 - Large-Loss, Unadjusted and Adjusted for Inflation (1995-2004)**




Note: The 53 and 40 fires in 2001 do not include the 9/11/01 World Trade Center Incident

## Detection and suppression systems

Of the 41 structure fires, 16 were in properties that had no automatic detection equipment present. Some form of automatic detection equipment protected 16 properties, and its unknown or not reported if the other nine properties had any detection equipment at all. This means that 50 percent of the properties for which the presence of detection equipment was known, had some type of automatic detection system.

Of the 16 structures protected by an automatic detection system, five had complete coverage - four by smoke detection equipment and one by an unreported type system. Three properties had partial coverage by automatic detection equipment two by smoke alarms and one by heat detection. The extent of coverage of detection equipment in the other eight properties was not reported. Seven had smoke detection systems and one was not reported.

Ten of the 16 systems operated. Two did not operate; one because of dead batteries and one system was missing batteries. The operation of the other four systems was not reported.

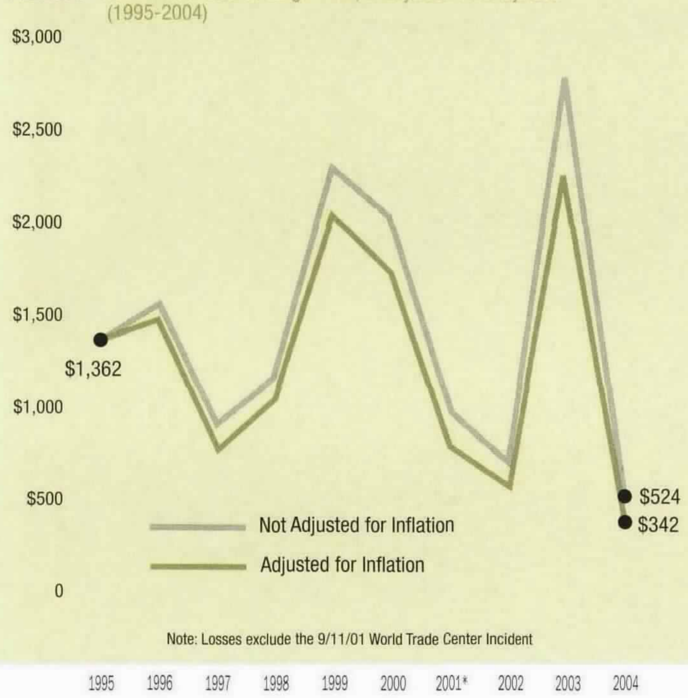
Of the 41 structures involved in large-loss fires in 2004, only 10 were known to be equipped with automatic suppression equipment. Twenty-five had no automatic suppression equipment, and it is unknown or was not reported whether the other six properties had any type of suppression equipment present. This means that 29 percent of the

GRAPHICS: CHRISTOPHER McCUSKER

**TABLE 2 - Large-Loss Fires of $10 Million or More in 2004**

| *Incident and Location* | *Loss in Millions* |
|---|---|
| Automobile parts storage, Tennessee | 100.00 |
| Chemical manufacturing, Georgia | 50.00 |
| Apartment building under construction, Nebraska | 40.00 |
| Dairy products manufacturing, Minnesota | 15.00 |
| Saw mill, Ohio | 15.00 |
| Aircraft, Colorado | 12.00 |
| Vehicle and highway overpass, Connecticut | 11.20 |
| Building under construction, Texas | 11.00 |
| Store, Georgia | 11.00 |
| Electric power plant, Hawaii | 10.75 |
| Storage, Washington | 10.50 |
| Electronics equipment storage, Minnesota | 10.25 |
| Manufacturing plant, California | 10.00 |
| Building under construction, California | 10.00 |
| Aircraft, Minnesota | 10.00 |
| Storage, Utah | 10.00 |
| Total -16 Fires | $336.70 |

FIGURE 2 - Direct Dollar Loss in Large-Loss, Unadjusted and Adjusted (1995-2004)




structures for which the presence of automatic suppression equipment was known were equipped with some sort of system.

Six of the 10 protected properties had complete coverage sprinkler systems. Four had a wet-pipe system, one had a dry-pipe system, and one had unknown type system. One property had partial sprinkler system coverage of an unreported type. The extent of coverage for three was not reported. One had a wet-pipe sprinkler system, and two systems were not described.

Suppression systems operated in four of the 10 properties protected; and four systems did not operate. The operation of the last two systems was unknown or not reported. One of the systems that operated was effective in controlling or extinguishing the fire. Three systems were ineffective due to, respectively, being inadequate water flow, being overpowered by the fire spread, and inability to reach the seat of the fire. (The last was effective in controlling the fire spread.) Of the four that did not operate, two systems were not completely installed and were not operational, one system had been shut down before the fire due to a leak, and an explosion damaged another.

Table 4 shows that of the 32 structures with detection and suppression systems fully reported, four had detection and suppression systems, five had just an automatic suppression system. Three of these five structures were under construction with the system installed but not operational, and one was operational but shut down due to a leak. Twelve had just an automatic detection system, and 11 had neither. Six of these 11 structures were under construction and not at the stage where these systems could be installed.

### What we can learn

In 2004, the number of large-loss fires fell by two, and the direct property loss was comparable to 2003 except for the two unusually large losses in two wildland fires. In eight of the past 10 years, 1995 to 2004, there had been at least one fire with direct property loss in excess of $100 million.

In 2004, there was one fire with a loss of $100 million, or 19.1 percent of the total large-loss fire loss. In three of the past 10 years, there has been a billion dollar loss fire. This was not one of those years.

Each year the large-loss fire study reports on the fraction of fires accounting for major losses that occurred in properties both protected and not protected by automatic detection or suppression systems. Each year, large-loss fires are reported in properties with no automatic detection or suppression systems, partial protection, or systems rendered ineffective by actions or omissions made before fire began. Such was the case again this year. Initial explosions or structural collapse, also sometimes damage a system to the point of being inoperable or ineffective, and sometimes systems were installed but not completed.

Adherence to the fire protection principles reflected in NFPA's codes and standards is essential to reducing the occurrence of large-loss fires and explosions in the United States. Human error or negligence is a major contributing factor in today's fires, but proper design, maintenance, and operation of fire protecting systems and features can keep a fire that starts through human error from becoming a large-loss fire.

Reducing the risk of explosions is also important. Proper construction, storage methods, and housecleaning will make fires less likely and help control or limit the fire spread if fire occurs.

### Where We Get Our Data

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

### Acknowledgments

Thanks to the U.S. fire service for its data contributions. In many cases, the fire departments could not provide data to NFPA because legal action is pending or ongoing, or they are unable to determine many pieces of information we need to make our study as complete as possible. The author wishes to thank Norma Candeloro for providing the support this study requires.

### Endnotes

1. Michael Karter Jr. "Fire Loss In The United States During 2004," Abridged Report, June 2005.
2. The 46 large-loss fires of 2004 are those for which losses were reported and verified.
3. Figures for prior years are adjusted for late arriving information and so may not match previously published figures.
4. Table 4 does not represent all large loss fires, just those with a loss of over $5,500,000.

STEPHEN G. BADGER is a member of the NFPA Fire Analysis and Research Division, and is a retired firefighter from the Quincy, Massachusetts, Fire Department.

FIGURE 3 - Large-Loss Fires by Major Property Use

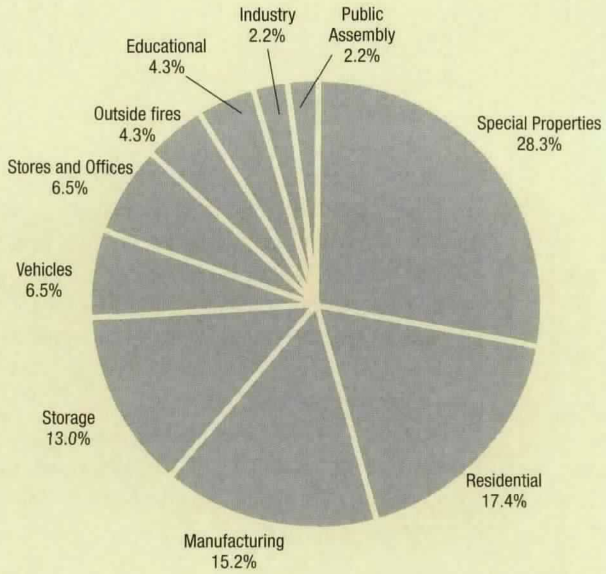



TABLE 3 - Large-Loss Fires by Major Property Use Classification

| *Property Use* | *Number of Fires* | *Percent of Fires* | *Total Dollar Loss (in millions)* | *Percent of Loss* |
|---|---|---|---|---|
| Special Properties | 13 | 28.3% | $124,700,000 | 23.8% |
| Residential | 8 | 17% | $47,500,000 | 9.1% |
| Manufacturing | 7 | 15% | $108,501,000 | 20.7% |
| Storage | 6 | 13% | $138,750,000 | 26.5% |
| Vehicles | 3 | 7% | $30,010,000 | 5.7% |
| Stores and Offices | 3 | 7% | $21,000,000 | 4.0% |
| Outside fires | 2 | 4% | $21,200,000 | 4.0% |
| Educational | 2 | 4% | $13,572,000 | 2.6% |
| Industry | 1 | 2% | $10,750,000 | 2.1% |
| Public Assembly | 1 | 2% | $8,000,000 | 1.5% |
| Totals | 46 | 100% | $523,983,000 | 100.0% |

## TABLE 4[4] LARGE-LOSS FIRE INCIDENTS OF 2004

**Special Properties**

NEBRASKA
Dollar Loss: $40,000,000
Month: January
Time: 11:30 PM

Property Characteristics and Operating Status:
This nine-story 100-plus-unit apartment building was of heavy-timber construction and covered 205,000 square feet (19,045 square meters). The building was under construction at the time. No one was at the site when the fire broke out.

Fire Protection Systems:
There was no smoke detection equipment present. There was a wet pipe sprinkler system installed but it was not yet operational. The coverage of the system was not reported.

Fire Development:
During the day, workers had used cutting tools in an elevator shaft on the ninth story. An ember fell into a pile of construction debris where it smoldered unnoticed. After workers had left for the day, the fire broke out and was discovered by a person in an adjacent building. Upon arrival, firefighters found fire on the ninth-story and roof of the structure. The fire spread latterly across the upper floors and vertically via the elevator shaft and when an upper floor collapsed.

Contributing Factors and Other Details:
Firefighters halted an initial interior fire attack which proved unable to cope with the large volume of fire on the upper stories.

---

TEXAS
Dollar Loss: $11,000,000
Month: August
Time: 5:56 PM

Property Characteristics and Operating Status:
This four-story 100-unit apartment building was of unprotected wood-frame construction covering 32,000 square feet (2,972 square meters). The building was under construction at the time. Some workers were at the site when the fire broke out.

Fire Protection Systems:
There was no detection equipment yet installed. There was a complete coverage wet-pipe sprinkler present but it was shut down before the fire due to a leak in the system.

Fire Development:
A fire of unknown cause broke out on the second level of the building. Wind helped spread the fire throughout the units in the section of the building that was still in the framing phase. The fire spread to a parking garage then ignited a structure on the opposite side of the street.

Contributing Factors and Other Details:
Despite openings not yet protected by fire-rated doors, fire walls were effective in limiting the spread of fire. Two firefighters were injured.

---

CALIFORNIA
Dollar Loss: $10,000,000
Month: January
Time: 7:29 PM

Property Characteristics and Operating Status:
The structure was under construction; no other information was reported.

Fire Protection Systems:
No information reported.

Fire Development:
This incendiary fire was set on the second-story. No other information was reported.

Contributing Factors and Other Details:
No information reported.

---

KANSAS
Dollar Loss: $8,500,000
Month: March
Time: 2:22 AM

Property Characteristics and Operating Status:
This four-story senior citizen center was of unprotected wood-frame construction and covered 144,000 square feet (13,378 square meters). The building was under construction and no one was on the site at the time of the fire.

Fire Protection Systems:
There was no automatic smoke detection or suppression system present.

Fire Development:
This incendiary fire was set on the first-story using available materials. Openings in the construction and doors left open contributed to the fire's spread. This was the second fire at this building in

two days, and one of a series of arson fires in the area.

Contributing Factors and Other Details:
One firefighter was injured. Loss to the structure was estimated at $8,000,000 and $500,000 to the contents.

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MARYLAND
Dollar Loss: $8,000,000
Month: November
Time: 8:25 AM

Property Characteristics and Operating Status:
This three- and four-story historic courthouse was of unprotected ordinary construction. The ground floor area was not reported. Part of this building was undergoing renovations. In that section, there were construction workers on site. The newer section of the courthouse was open and partially operating with workers arriving for the day.

Fire Protection Systems:
There was an automatic detection system present. The type and coverage were not reported. The system activated. There was a sprinkler system present, but no information was reported on it.

Fire Development:
The fire broke out in temporary lighting in the attic area of the section undergoing renovations. The exact ignition sequence was not reported.

Contributing Factors and Other Details:
Firefighters successfully battled to keep the fire from extending horizontally to the newer section of the courthouse.

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**Residential Properties**
WYOMING
Dollar Loss: $8,000,000
Month: March
Time: 3:33 PM

Property Characteristics and Operating Status:
This two-story college dormitory was of protected noncombustible construction. The ground floor area was not reported. The dorm was occupied.

Fire Protection Systems:
There was a system of automatic smoke detection equipment present. The coverage was not reported but the system did operate. There was no suppression system present.

Fire Development:
An overheated power-strip plug (relocateable power tap) on a wall heated the wall fastenings to a point of failure. The relocateable power tap fell to the floor at the end of the bed and continued to heat and ignited nearby combustibles. The fire was contained to the upper floor.

Contributing Factors and Other Details:
Four students were treated at the hospital for smoke related injuries.

---

MARYLAND
Dollar Loss: $7,000,000
Month: March
Time: 5 PM

Property Characteristics and Operating Status:
This two-story single-family home was of protected wood-frame construction and covered 14,000 square feet (1,300 square meters). The home was occupied at the time of the fire.

Fire Protection Systems:
There was a complete coverage smoke detection system present in the house, all levels and sleeping areas were covered. There was no detection equipment in the garage, where the fire originated. It is not known if the system activated in the house. There was no suppression system present.

Fire Development:
Juveniles playing with matches ignited newspapers in the garage. A cardboard box was used to smother and extinguish the fire. Not realizing that the box was burning, the juveniles placed it in a trash pile in the garage and went into the house. Upon leaving the house about 20 minutes later, they found the garage well-involved with fire. Upon arrival, firefighters found that the fire had spread into the attic of the house.

Contributing Factors and Other Details:
No one met the firefighters upon their arrival, so crews began searching the house for possible occupants in need of rescue, which delayed their initial suppression activities. This house was in a rural area with no municipal water supply.

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**Manufacturing Properties**
GEORGIA

## TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2004

Dollar Loss: $50,000,000
Month: May
Time: 4:25 AM

Property Characteristics and Operating Status:
This one-story chemical manufacturing plant was of protected ordinary construction and covered 400,000 square feet (37,161 square meters). The plant was in operation at the time.

Fire Protection Systems:
There was no automatic detection equipment present. There was a complete coverage wet-pipe sprinkler system present. The system activated but was overpowered by the spreading fire. The reason for this was not reported.

Fire Development:
A fire broke out when a chemical reaction occurred in the warehouse area of the plant.
The chemicals involved were not identified.

Contributing Factors and Other Details:
Very heavy smoke covered the area, causing local officials to evacuate many downwind of the fire. Damage to the structure was estimated at $20,000,000 and $30,000,000 to the contents.

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OHIO
Dollar Loss: $15,000,000
Month: March
Time: 7:54 PM

Property Characteristics and Operating Status:
This 50-foot (15-meter) tall sawmill was of protected wood-frame construction. The ground floor area and operating status were not reported.

Fire Protection Systems:
There was no information reported on automatic detection equipment. There was no automatic suppression equipment.

Fire Development:
This suspicious fire broke out in bulk storage of wood product.

---

MINNESOTA
Dollar Loss: $15,000,000
Month: December
Time: 6:13 PM

Property Characteristics and Operating Status:
This two-story dairy product plant was of unprotected ordinary construction and covered 200,000 square feet (18,580 square meters). The plant was in full operation at the time of the fire.

Fire Protection Systems:
There was a smoke detection system present. Its coverage and performance were not reported. There was a local coverage sprinkler system present. Its type, activation and performance were not reported.

Fire Development:
A malfunction in a compressor in a second-story machine room caused an explosion and fire which extended to the warehouse section.

Contributing Factors and Other Details:
Melted butter made for slippery footing at the fire scene. The loss was estimated at $5,000,000 to the structure and $10,000,000 to the contents.

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CALIFORNIA
Dollar Loss: $10,000,000
Month: July
Time: 1:22 PM

Property Characteristics and Operating Status:
This 10-story manufacturing plant covered 30,000 square feet (2,787 square meters). The type of product manufactured there and the type of building construction were not reported. The plant was in full operation at the time the fire broke out.

Fire Protection Systems:
There was a complete coverage smoke detection system present. The system operated and alerted the occupants. There was a complete coverage wet-pipe sprinkler system present. This system operated and contained the fire. The water flow alarm notified the fire department.

Fire Development:
A heater in a basement manufacturing area ignited nearby plastic materials. No information was reported on the fire's spread.

Contributing Factors and Other Details:
Damage was estimated at $5,000,000 to the structure and $5,000,000 to the contents. Much of the loss was in a laboratory in the basement.

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OREGON

## TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2004

Dollar Loss: $8,501,000
Month: March
Time: 8:21 AM

Property Characteristics and Operating Status:
This one-story petroleum recycling plant was of heavy-timber construction. The plant was in full operation at the time.

Fire Protection Systems:
No information was reported on any detection equipment. There was a complete coverage dry-pipe sprinkler system present. The system operated, but its rate of application was insufficient to control the fire.

Fire Development:
A spark from an oxy/acetylene cutting torch fell into an open sludge-oil pit and ignited the contents instantaneously. The fire grew out of control quickly despite the activation of the sprinkler system. The fire spread through several businesses inside the building.

Contributing Factors and Other Details:
Firefighters reported insufficient water pressure in hydrants originally. Two firefighters were injured. Damage to the structure was estimated at $3,000,000 *and* $5,501,000 *to the contents.*

**Storage Properties**
TENNESSEE
Dollar Loss: $100,000,000
Month: March
Time: 12:19 AM

Property Characteristics and Operating Status:
This was an auto parts storage warehouse containing 244,000 square feet (22,668 square meters) of rack storage. The height and type construction were not reported.

Fire Protection Systems:
No information was reported on automatic detection. There was a sprinkler system present and operated, but there was no in-rack suppression equipment. The coverage and effectiveness of the sprinkler system was not reported.

Fire Development:
An incendiary fire was set by a worker looking to get off from work for the night. The arsonist has been found guilty and is serving prison time.

Contributing Factors and Other Details:
Fire spread was rapid due to a petroleum based jelly coating on the auto parts in racks with no in-rack sprinkler system. A strong wind through the open doors helped fan the fire. Three firefighters were injured.

MINNESOTA
Dollar Loss: $10,250,000
Month: November
Time: 6:03 AM

Property Characteristics and Operating Status:
This 1-story electronic equipment warehouse was of unprotected non-combustible construction and covered almost 10,000 square feet (929 square meters). The warehouse was closed for the weekend at the time of the fire.

Fire Protection Systems:
There was no automatic smoke detection system or suppression system present.

Fire Development:
A gas water heater in the mezzanine level above office space ignited paper records. The fire burned records and the office space. Fire officials estimated that the fire burned for up to hours *unnoticed and created a tremendous amount* of heat throughout the warehouse. A passerby discovered the fire and called 911.

Contributing Factors and Other Details:
The water heater was in poor operating condition and clearance was not maintained with the paper product. Loss was estimated at $250,000 to the structure and $10,000,000 to the contents which was electronic equipment.

MINNESOTA
Dollar Loss: $8,000,000
Month: July
Time: 5:50 AM

Property Characteristics and Operating Status:
This was a 120,000-gallon (5,450-kiloliter) slurry oil storage tank in a refinery. The refinery was operating at the time of the fire.

Fire Protection Systems:
No automatic detection or suppression equipment present.

Fire Development:
Lightning struck the top of this storage tank. The

top of the tank lifted off and oil ignited. The fire melted part of the side of the tank and some product escaped.

**Vehicle**
COLORADO
Dollar Loss: $12,010,000
Month: November
Time: 10 AM

Property Characteristics and Operating Status:
An 18-passenger corporate jet crashed on takeoff near the end of the runway and slid about 1,400 feet (426 meters) in a field. At the time there was light snow and mist. At the time of the crash and fire there were six passengers on board

Fire Development:
A post impact fire ensued, destroying the aircraft. During the crash, aviation fuel was released and ignited, engulfing the aircraft.

Contributing Factors and Other Details:
Three people died in the crash of impact-related injuries, and three others survived. Loss to the aircraft was estimated at $12,000,000 and $10,000 to the contents.

MINNESOTA
Dollar Loss: $10,000,000
Month: April
Time: 7:14 PM

Property Characteristics and Operating Status:
This fire involved a military aircraft on landing on an airport runway.

Fire Development:
An Air National Guard C-130 aircraft reported an unsafe landing gear prior to landing. Just after landing and during roll out, the right wing tip, prop and engine all hit the ground. The landing gear collapsed and the engine burst into flames. Fire apparatus on scene due to the alert of a pending problem extinguished the fire in a short time.

FLORIDA
Dollar Loss: $8,000,000
Month: April
Time: 6:39 PM

Property Characteristics and Operating Status:
A yacht at a marina pier

Fire Development:
The cause and origin of this fire has not been determined. Upon arrival, firefighters reported light smoke showing from the yacht. During initial set up of hose lines, the fire on the yacht flashed over and firefighters went to a defensive attack.

Contributing Factors and Other Details:
Two crew members and two good Samaritans who tried to extinguish the fire were injured.

**Store and Office Properties**
GEORGIA
Dollar Loss: $11,000,000
Month: June
Time: 11:59 PM

Property Characteristics and Operating Status:
This two-story sporting goods store was of unprotected noncombustible construction and covered 100,000 square feet (9,290 meters). The store was closed at the time of the fire.

Fire Protection Systems:
There was an automatic smoke detection system present that operated. The coverage of the system was not reported. There was no suppression system present.

Fire Development:
A fire of undetermined cause broke out in the storage area of this store. Firefighters making an interior attack were faced with a flashover as the door to the fire area was opened. Firefighters withdrew to a defensive attack at that point.

Contributing Factors and Other Details:
During the fire, multiple rounds of ammunition discharged and several kegs of black powder exploded. The owner had made firefighters aware of these contents as well as a large amount of two-pound propane cylinders and camp fuel stored inside.

**Outside Fire**
CONNECTICUT
Dollar Loss: $11,200,000
Month: March
Time: 10 PM

Property Characteristics and Operating Status:
This incident involved a tanker truck carrying 12,000 gallons (54 kiloliters) of fuel oil on an interstate highway

Fire Development:
The tanker truck collided with a car on an inter-

## TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2004

state. The ensuing fireball caused severe damage to the highway and an overpass. The fire burned out of control for several hours causing the elevated section of highway to buckle and sag.

Contributing Factors and Other Details:
One firefighter and one civilian suffered minor injuries.

UTAH
Dollar Loss: $10,000,000
Month: July
Time: 7:10 PM

Property Characteristics and Operating Status:
Outside storage area for rolled paper at a paper plant.

Fire Development:
This incendiary fire was set with available combustibles at the location. The area was fully involved in fire on arrival.

Contributing Factors and Other Details:
There was a sprinkler system in an exposed building that activated and assisted in keeping the fire from spreading into that structure.

**Educational Properties**
CALIFORNIA
Dollar Loss: $8,572,000
Month: February
Time: 12 PM

Property Characteristics and Operating Status:
This one-story middle school was of protected ordinary construction and covered 14,400 square feet (1,337 square meters). The school was not in session that day but a teacher was in the building preparing for classes.

Fire Protection Systems:
There was partial coverage of heat detection equipment present, though not in the area of fire origin. A detector activated shortly after the fire was discovered. There was no suppression system present.

Fire Development:
The exact source of ignition of this fire could not be determined. It broke out above the ceiling of a classroom in the science wing and burned undetected through the open combustible construction of the attic and mansard roof. The fire destroyed the science wing as well as parts of two other wings.

Contributing Factors and Other Details:
No fire stops or separations in mansard or overhangs, and no fire rated walls allowed the fire to spread. Loss to the school was listed as $8,072,000 and $500,000 to the contents.

**Basic Industry Properties**
HAWAII
Dollar Loss: $10,750,000
Month: January
Time: not reported

Property Characteristics and Operating Status:
Electric power plant. No other information was reported.

Fire Protection Systems, Fire Development, Contributing Factors and Other Details:
No information reported.

**Public Assembly Properties**
ARIZONA
Dollar Loss: $8,000,000
Month: December
Time: 7:33 PM

Property Characteristics and Operating Status:
This two-story convention center was of protected non-combustible construction. The ground floor area was not reported. The center was fully operating at the time of the fire.

Fire Protection Systems:
There was a smoke detection system present that operated and alerted the occupants. The coverage was not reported. There was a wet-pipe sprinkler system present. The system did activate with over 30 heads flowing water.

Fire Development:
Heat from a halogen light ignited walnut dust used in filming a collapse scene in a mine for a movie. The fire ignited polyurethane beams and walls of a cave and extended to the cave roof. A covering over the movie set prevented water from the sprinkler from reaching the seat of the fire but the sprinkler flow did prevent the fire's spread beyond the set.

Contributing Factors and Other Details:
Original reports were that one worker was missing. A primary search was initiated but the worker was located unharmed. Visibility was zero as firefighters attempted an initial fire attack. Firefighters were warned initially of loose rattlesnakes at the movie set. The snakes were corralled by an animal handler and posed no threat to the firefighters.

BY MICHAEL J. KARTER, JR. AND JOSEPH L. MOLIS

# Firefighter Injuries for 2004

NFPA estimates that there were more than 75,840 injuries in 2004


SUMMARY

▪ 75,840 firefighter injuries occurred in the line of duty in 2004, a decrease of 3.7 percent from 2003.

▪ 36,880 or 48.6 percent of all firefighter injuries occurred during fireground operations. An estimated 14,250 occurred during other on duty activities, while 13,150 occurred at non-fire emergency incidents.

▪ The major types of injuries received during fireground operations were strain, sprain, muscular pain (48.5 percent); wound, cut, bleeding, bruise (17.2 percent); burns (7.8 percent); smoke or gas inhalation (5.5 percent).

▪ The complete report is available at www.nfpa.org/research.


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

Each year, the NFPA studies firefighter deaths and injuries to provide national statistics on their frequency, extent, and characteristics. Earlier this year, NFPA reported 103 firefighters died on duty (See "2004 Firefighter Fatalities," *NFPA Journal*®, July/August 2005).

This report addresses 2004 firefighter injuries in the United States. The results are based on data collected during the NFPA Survey of Fire Departments for U.S. Fire Experience (2004). An earlier report measured the national fire experience in terms of the number of fires that fire departments attended and the resulting civilian deaths, civilian injuries, and property losses that occurred[1].

This year's report includes among its results:

- An estimate of the 2004 firefighter injuries;
- Estimates of injuries by type of duty;
- An estimate of exposures to infectious diseases;
- Trends in firefighter injuries and rates;
- Fireground injuries by cause;
- Fire department vehicle accidents and resulting firefighter injuries;
- The average number of fires and fireground injuries per department by population of community protected; and
- Descriptions of selected incidents that illustrate firefighter safety problems.

### Overall Results

Based on survey data reported by fire departments, NFPA estimates that 75,840 firefighter injuries occurred in the line of duty in 2004.[2] This is a decrease of 3.7 percent and the lowest it's been since 1977 when NFPA started using its current survey methodology. However, the lower number of injuries since 1994 is due in part to additional questions on exposures, which allows us to place them in their own categories. Previously some of these exposures may have been included in total injuries under other categories.

NFPA estimates that there were 10,550 exposures to infectious diseases (e.g., hepatitis, meningitis, HIV, others) in 2004. This amounts to 0.7 exposures per 1,000 emergency medical runs by fire departments in 2004.

NFPA estimates that there were 18,300 exposures to hazardous conditions (e.g., asbestos, radioactive materials, chemicals, fumes, other) in 2004. This amounts to 17.9 exposures per 1,000 hazardous condition runs in 2004.

An estimated 18,200-firefighter injuries resulted in lost time in 2004.

### Injuries by Type of Duty

Estimates of firefighter injuries by type of duty are displayed in Figure 2. The type of duty is divided into five categories:

- Responding to or returning from an incident (includes fire and nonfire emergencies);
- Fireground (includes structure fires, vehicle fires, brush fires, etc.), and refers to all activities from the moment of arrival at the scene to departure time (e.g., setup, extinguishment, overhaul);
- Nonfire emergency (includes rescue calls, hazardous calls, such as spills, and natural disaster calls);
- Training and

ILLUSTRATION: VEER

**TABLE 1** - Firefighter Injuries at the Fireground and at Nonfire Emergencies, 1988-2004

| *Year* | *Injuries at the fireground* | *Injuries per 1,000 Fires at the fireground* | *Injuries at nonfire emergencies* | *Injuries per 1,000 Incidents at nonfire emergencies* |
|---|---|---|---|---|
| 1988 | 61,790 | 25.4 | 12,325 | 1.13 |
| 1989 | 58,250 | 27.5 | 12,580 | 1.11 |
| 1990 | 57,100 | 28.3 | 14,200 | 1.28 |
| 1991 | 55,830 | 27.3 | 15,065 | 1.20 |
| 1992 | 52,290 | 26.6 | 18,140 | 1.43 |
| 1993 | 52,885 | 27.1 | 16,675 | 1.25 |
| 1994 | 52,875 | 25.7 | 11,810 | 0.84 |
| 1995 | 50,640 | 25.8 | 13,500 | 0.94 |
| 1996 | 45,725 | 23.1 | 12,630 | 0.81 |
| 1997 | 40,920 | 22.8 | 14,880 | 0.92 |
| 1998 | 43,080 | 24.5 | 13,960 | 0.82 |
| 1999 | 45,500 | 25.0 | 13,565 | 0.76 |
| 2000 | 43,065 | 25.2 | 13,660 | 0.73 |
| 2001 | 41,395 | 23.9 | 14,140 | 0.73 |
| 2002 | 37,860 | 22.4 | 15,095 | 0.77 |
| 2003 | 38,045 | 24.0 | 14,550 | 0.70 |
| 2004 | 36,880 | 22.1 | 13,150 | 0.62 |

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (1988-2004)

• Other on-duty activities (e.g., inspection or maintenance duties).

Results by type of duty indicate that the largest share of injuries occur during fireground operations: 36,880 or 48.6 percent of all firefighter injuries in 2004. Table 1 displays firefighter injuries at the fireground and injury rates for the 1989-2004 period. Before 1988, firefighter injuries were around 100,000 per year, with no trend up or down, since NFPA's first calculation of estimates in 1977. Injuries at the fireground decreased from their high of 61,790 in 1988 to a low of 36,880 in 2004 for a decrease of 40.3 percent. The rate of injuries per 1,000 fires has generally decreased during the period. This is because the number of fire incidents also decreased a considerable 36.4 percent for the 1988 to 2004 period.

In addition to injuries at the fireground, an estimated 14,250 or 18.8 percent occurred during other on-duty activities, while 13,150 or 17.3 percent occurred at nonfire emergencies.

### Nature of Fireground Injuries

Estimates of 2004 firefighter injuries by nature of injury and type of duty are displayed in Table 2. The nature of injury cause categories are based with modifications on NFPA 901, *Uniform Coding for Fire Protection*. Table 2 indicates that the four major types of injuries that occur during fireground operations are strain, sprain (48.5 percent); wound, cut, bleeding, bruise (17.2 percent); burns (7.8 percent); smoke or gas inhalation (5.5 percent); thermal stress (5.1 percent).

Results were consistent during all non-fireground activities, with strains, sprains, and muscular pain accounting for 56.4 percent of all non-fireground injuries, and wound, cut, bleeding, bruise accounting for 17.4 percent.

### Causes of Fireground Injuries

Because fireground injuries are of particular concern, their causes were examined (see Figure 3). The definition of cause here refers to the initial circumstance leading to the injury. The cause categories included on the survey are based on NFPA 901. Fall, slip, jump (29.7 percent), overexertion, strain (25.7 percent) were the leading causes of fireground injuries. Other major causes were contact with object (9.0 percent); exposure to fire products (8.8 percent).

### Fire Department Vehicle Collisions

NFPA reported earlier that 17 firefighters died in motor vehicle collisions in 2004. (See "2004 Firefighter Fatalities", July/August 2005, *NFPA Journal*).

In 2004, there were an estimated 15,420 collisions involving fire department emergency vehicles, where departments were responding to or returning from incidents (see Table 3). To put this number in perspective however, fire departments responded to more than 22.6 million incidents in 2004 so that the number of collisions represents about one tenth of 1 percent of total responses. However, these collisions resulted in 980 firefighter injuries or 1.2 percent of all firefighter injuries.

In addition, 1,150 collisions involving firefighters' personal vehicles occurred in 2004 while departments were responding to or

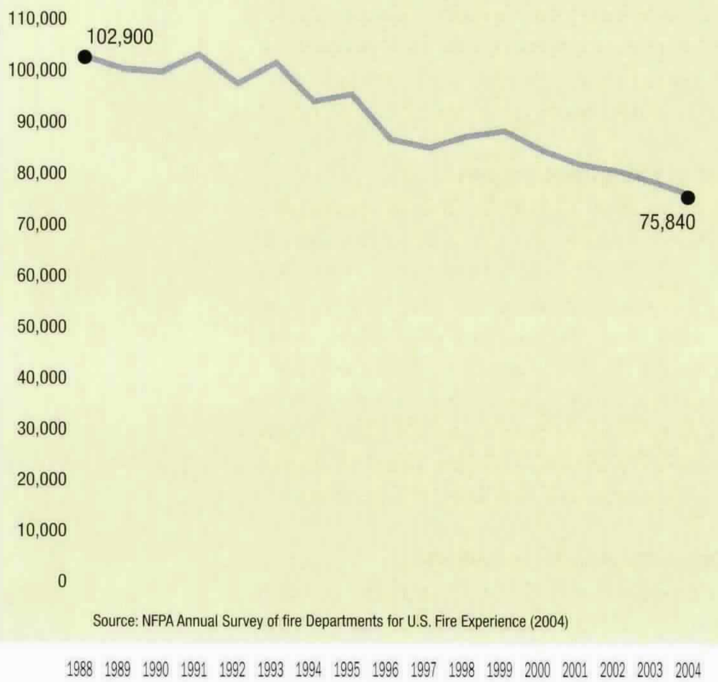
GRAPHICS: CHRISTOPHER McCUSKER

**TABLE 2 - Firefighter Injuries by Nature of Injury and Type of Duty, 2004**

| | *Responding to or Returning from an Incident* | | *Fireground* | | *Nonfire Emergency* | | *Training* | | *Other On-Duty* | | *Total* | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Nature of Injury*** | *Number* | *Percent* | *Number* | *Percent* | *Number* | *Percent* | *Number* | *Percent* | *Number* | *Percent* | *Number* | *Percent* |
| Burns (Fire or Chemical) | 50 | 1.0 | 2,860 | 7.8 | 110 | 0.8 | 380 | 5.7 | 260 | 1.8 | 3,660 | 4.8 |
| Smoke or Gas Inhalation | 115 | 2.4 | 2,040 | 5.5 | 105 | 0.8 | 45 | 0.7 | 80 | 0.6 | 2,385 | 3.1 |
| Other Respiratory Distress | 100 | 2.1 | 875 | 2.4 | 200 | 1.5 | 180 | 2.7 | 125 | 0.9 | 1,480 | 2.0 |
| Burns and Smoke Inhalation | 5 | 0.1 | 585 | 1.6 | 15 | 0.1 | 25 | 0.4 | 25 | 0.2 | 655 | 0.9 |
| Wound, Cut, Bleeding Bruise | 910 | 18.8 | 6,325 | 17.2 | 2,010 | 15.3 | 1,035 | 15.4 | 2,840 | 19.9 | 13,120 | 17.3 |
| Dislocation, Fracture | 230 | 4.8 | 1,045 | 2.8 | 275 | 2.1 | 245 | 3.7 | 375 | 2.6 | 2,170 | 2.9 |
| Heart Attack or Stroke | 80 | 1.7 | 290 | 0.8 | 125 | 1.0 | 50 | 0.7 | 325 | 2.3 | 870 | 1.2 |
| Strain, Sprain Muscular Pain | 2,955 | 61.0 | 17,890 | 48.5 | 7,735 | 58.8 | 3,840 | 57.1 | 7,460 | 52.4 | 39,980 | 52.6 |
| Thermal Stress (frostbite, heat exhaustion) | 35 | 0.7 | 1,875 | 5.1 | 175 | 1.3 | 345 | 5.1 | 80 | 0.6 | 2,510 | 3.3 |
| Other | 360 | 7.4 | 3,095 | 8.4 | 2,400 | 18.3 | 575 | 8.6 | 2,680 | 18.8 | 9,110 | 12.0 |
| | 4,840 | | 36,880 | | 13,150 | | 6,720 | | 14,250 | | 75,840 | |

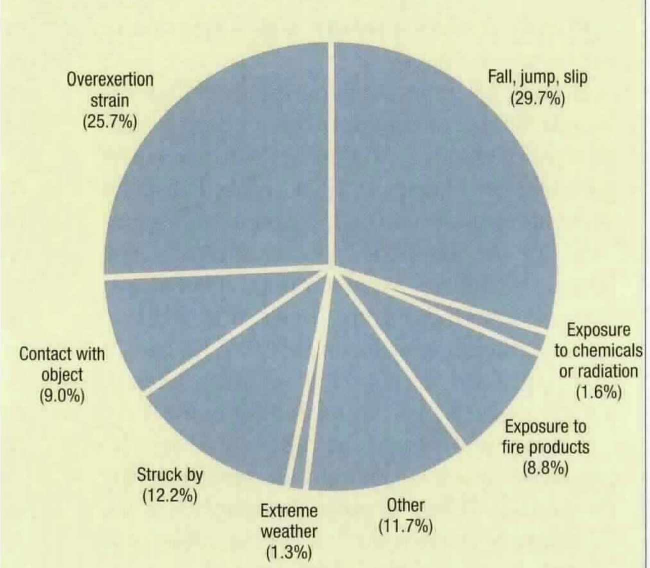
Source: NFPA Survey of Fire Departments for U.S. Fire Experience, 2004
Note: If a firefighter sustained multiple injuries for the same incident, only the nature of the single most serious injury was tabulated.

FIGURE 1 - Total Firefighter Injuries by Year (1988-2004)



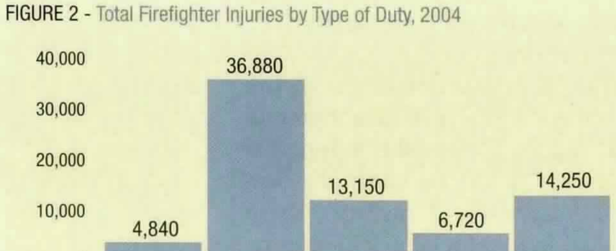

Source: NFPA Annual Survey of fire Departments for U.S. Fire Experience (2004)

FIGURE 3 - Fireground Injuries by Cause, 2004




Source: NFPA Annual Survey of fire Departments for U.S. Fire Experience (2004)

FIGURE 2 - Total Firefighter Injuries by Type of Duty, 2004




Source: NFPA Annual Survey of fire Departments for U.S. Fire Experience (2004)

returning from incidents. These collisions resulted in an estimated 220 injuries.

**Average Fires and Fireground Injuries per Department by Population Protected**

The average number of fires and fireground injuries per department by population of community protected in 2004 are displayed in Table 4. These tabulations show (1) that the number of fires a fire department responds to is directly related to the population protected, and (2) that the number of fireground injuries incurred by a department is directly related to its exposure to fire, i.e., and the number of fires attended by the department. The second point is clearly demonstrated when we examine the range of the

PHOTOGRAPH: AP PHOTO/THE DAILY TIMES, TOM SHERLIN

**TABLE 3 -** Fire Department Vehicle Collisions and Resulting Firefighter Injuries While Responding to or Returning from Incidents, 1990-2004

| *Year* | *Collisions Involving Fire Department Emergency Vehicles* | *Firefighter Injuries Involving Fire Department Emergency Vehicles* | *Collisions Involving Firefighters' Personal Vehicles* | *Firefighter Injuries Involving Firefighters' Personal Vehicles* |
|---|---|---|---|---|
| 1990 | 11,325 | 1,300 | 950 | 175 |
| 1991 | 12,125 | 1,075 | 1,375 | 125 |
| 1992 | 11,500 | 1,050 | 1,575 | 150 |
| 1993 | 12,250 | 900 | 1,675 | 200 |
| 1994 | 13,755 | 1,035 | 1,610 | 285 |
| 1995 | 14,670 | 950 | 1,690 | 190 |
| 1996 | 14,200 | 910 | 1,400 | 240 |
| 1997 | 14,950 | 1,350 | 1,300 | 180 |
| 1998 | 14,650 | 1,050 | 1,350 | 315 |
| 1999 | 15,450 | 875 | 1,080 | 90 |
| 2000 | 15,300 | 990 | 1,160 | 170 |
| 2001 | 14,900 | 960 | 1,325 | 140 |
| 2002 | 15,550 | 1,040 | 1,030 | 210 |
| 2003 | 15,900 | 850 | 980 | 85 |
| 2004 | 15,420 | 980 | 1,150 | 220 |

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (1990-2004)

**TABLE 4 -** Average Number of Fires, Fireground Injuries and Injuries Rates by Population of Community Protected, 2004

| *Population of Community Protected* | *Average Number of Fires* | *Average Number of Fireground Injuries* | *Number of Fireground Injuries per 100 Fires* | *Number of Fireground Injuries per 100 Firefighters* |
|---|---|---|---|---|
| 500,000 to 999,999 | 2,998.9 | 86.0 | 2.9 | 6.8 |
| 250,000 to 499,999 | 1,358.8 | 67.6 | 5.0 | 12.4 |
| 100,000 to 249,999 | 655.6 | 11.7 | 1.8 | 4.9 |
| 50,000 to 99,999 | 277.9 | 6.4 | 2.3 | 5.6 |
| 25,000 to 49,999 | 139.8 | 2.4 | 1.7 | 3.9 |
| 10,000 to 24,999 | 73.0 | 1.2 | 1.6 | 2.8 |
| 5,000 to 9,999 | 40.5 | 0.7 | 1.7 | 2.0 |
| 2,500 to 4,999 | 26.6 | 0.4 | 1.5 | 1.3 |
| Under 2,500 | 12.2 | 0.2 | 1.6 | 0.9 |

Source: NFPA Survey of Fire Departments for U.S. Fire Experience (1990-2004)

statistic: from a high of 86.0 for departments that protect communities of 500,000 to 999,999 to a low of 0.2 for departments that protect communities of less than 2,500.

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

The overall range of rates varied little from a high of 5.0 for departments that protect communities 250,000 to 499,999 to a low of 1.5 for departments that protect communities of 2,500 to 4,999 population. Thus, the wide range noted in average fireground injuries by population protected narrows when relative fire experience is taken into account. The overall injury rate for departments protecting communities of 50,000 population or more was 2.6 injuries per 100 fires or 70 percent higher than the injury rate for departments protecting communities of less than 50,000 population.

The risk of fireground injury per 100 firefighters by size of community protected was also calculated and is displayed in column 5 of Table 4. Larger departments generally had the highest rates with departments protecting communities of 250,000 to 499,999 having the highest rate with 12.4 injuries per 100 firefighters. As community size decreases, the rate drops quite steadily to a low of 0.9 for departments protecting less than 2,500 people. That is a more than a thirteen-to-one difference in risk of injury between communities of 250,000 to 499,999, and the smallest communities (less than 2,500).

Although a department protecting a community with a population of 250,000 to 499,999 has, on average, more than 23 times as many firefighters than a department protecting a population of less than 2,500, the larger department attends more than 110 times as many fires, and as a result, it incurs considerably more fireground injuries.

**TABLE 5 -** Average Number of Fires and Fireground Injuries per Department and Injuries per 100 Fires by Population of Community Protected and Region, 2004

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

| Population of Community Protected | Northeast | | | North Central | | | South | | | West | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 500,000 to 999,999 | * | * | * | * | * | * | 3,434.0 | 53.7 | 1.6 | 2,684.2 | 49.8 | 1.9 |
| 250,000 to 499,999 | * | * | * | 2,037.3 | 86.7 | 4.3 | 1,360.8 | 26.2 | 1.9 | 797.0 | 26.6 | 3.3 |
| 100,000 to 249,999 | 738.0 | 27.2 | 3.7 | 744.7 | 17.3 | 2.3 | 760.4 | 7.3 | 1.0 | 452.6 | 10.1 | 2.2 |
| 50,000 to 99,999 | 361.1 | 16.6 | 4.6 | 241.5 | 6.0 | 2.5 | 321.1 | 5.4 | 1.7 | 211.1 | 3.0 | 1.4 |
| 25,999 to 49,999 | 118.0 | 4.2 | 3.6 | 109.1 | 2.8 | 2.6 | 169.1 | 1.7 | 1.0 | 147.4 | 1.5 | 1.0 |
| 10,000 to 24,999 | 61.9 | 1.5 | 2.4 | 60.5 | 1.4 | 2.3 | 97.0 | 0.8 | 0.8 | 72.9 | 1.1 | 1.5 |
| 5,000 to 9,999 | 31.2 | 0.8 | 2.6 | 35.0 | 0.7 | 2.0 | 53.2 | 0.6 | 1.1 | 52.3 | 0.5 | 1.0 |
| 2,500 to 4,999 | 20.9 | 0.5 | 2.4 | 22.2 | 0.3 | 1.4 | 35.5 | 0.3 | 0.8 | 30.3 | 0.4 | 1.3 |
| Under 2,500 | 11.4 | 0.2 | 1.8 | 9.6 | 0.2 | 2.1 | 18.4 | 0.2 | 1.0 | 12.6 | 0.2 | 1.6 |
| Overall Regional Rate | | | 4.2 | | | 2.5 | | | 1.3 | | | 1.7 |

Source: NFPA Survey of Fire Departments for U.S. Fire Experience, 2004
*Insufficient data

### Average Fires and Fireground Injuries by Population Protected and Region

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

### Improving Firefighter Safety

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

• Commitment on the part of top fire service management to reducing injuries

• Establishment of a safety committee headed by a safety officer to recommend a safety policy and the means of implementing it. The policy should include a thorough investigation of all time loss injuries

• Provision of appropriate protective equipment and a mandate to use it

• Development and enforcement of a program on the use and maintenance of SCBA

• Development and enforcement of policies on safe practices for drivers and passengers of fire apparatus

• Development of procedures to ensure response of sufficient personnel for both fire fighting and overhaul duties

• Implementation of regular medical examinations and a physical fitness program

• Adoption and implementation of an incident management system

• Training and education for all members related to emergency operations

• Implementation of programs for the installation of private fire protection systems, so that fires are discovered at an earlier stage, exposing the firefighter to a less hostile environment

• Increased efforts in the area of fire safety education programs, so that citizens are made aware of measures to prevent fires and of correct reactions to the fire situation

Efforts need to be made to recognize that firefighter injuries can be reduced. By addressing the priorities listed, fire service organizations can make significant strides towards reducing the number and impact of such injuries.

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

### Definition of Terms

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

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

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

### Description of NFPA Survey and Data Collection Method

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

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

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

MICHAEL J. KARTER JR. is a Senior Statistician with the National Fire Protection Association's Fire Analysis and Research Division. JOSEPH L. MOLIS is an NFPA Fire Data Assistant.

### Endnotes

1. Michael J. Karter, Jr., "2004 Fire Loss in the United States," NFPA Journal, Vol. 99, No. 5 (September/October 2005).
2. Around any estimate based on a sample survey, there is a confidence interval that measures the statistical certainty (or uncertainty) of the estimate. Based on data reported by fire departments responding to the NFPA Survey for U.S. Fire Experience (2004), the NFPA is very confident that the actual number of firefighter injuries falls within the range of 66,840 to 87,840.
3. The four regions as defined by the U.S. Census Bureau include the following 50 states and the District of Columbia:

Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

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

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

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

### Acknowledgments

The NFPA thanks the many fire departments that responded to the NFPA Survey for U.S. Fire Experience (2004) for their continuing efforts in providing in a timely manner the data so necessary to make national projections of firefighter injuries.

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

### Firefighter Struck by Vehicle

A firefighter was struck by a vehicle and thrown nearly 80 feet (24 meters) while extinguishing a vehicle fire. A second vehicle drove through a traffic control perimeter, consisting of traffic cones and the company officer directing traffic. The company officer yelled to the two firefighters extinguishing the fire but neither heard his warnings. The vehicle struck one of the firefighters and fled the scene. The firefighter was hospitalized for 33 days in serious condition suffering from multiple traumatic injuries.

A fire department investigation cited several factors that contributed to the severity of the firefighter's injuries. The primary factor was apparatus placement. The truck did not properly block oncoming traffic, leaving the work area vulnerable to the flow of traffic. Another factor was the victim's decreased awareness while wearing full-protective clothing. The firefighter did not hear the officer's warnings because wearing SCBA reduced his peripheral vision, hearing, and sight. Other factors included lack of a lookout in communication with the suppression team, time of day (0200 hours), and a communications delay when using "emergency traffic" over the radio, which delayed the proper dispatch of appropriate resources for several minutes.

After three surgeries and 11 months of rehabilitation, the injured firefighter is now on restricted duty and expected to return to full duty.

### Emergency Medical Incident

A fire department dispatched two firefighters to assist a person suffering from a seizure on a busy four-lane thoroughfare. The unit arrived on scene and located their patient on the opposite side of the road. The paramedic, who was not wearing any protective clothing, exited the truck and began crossing the busy road. An approaching vehicle sped up, in an attempt avoid traffic, drove around the stopped vehicles, and struck the firefighter. The vehicle was traveling approximately 30 miles (48 kilometers) per hour. The 34-year-old firefighter/paramedic broke his right leg in several places and has been out of work for nine months.

### Training

A 41-year-old male firefighter recruit collapsed during training. He was participating in a search and rescue evolution at the fire department's training facility. Immediately after he collapsed, two instructors removed the blindfolded trainee from the darkened building and transferred care to two onsite paramedics.

The recruit suffered from heat exhaustion and dehydration and was diagnosed with rhabdomyolysis. He has not returned to the fire academy as of this time and has not been medically cleared to perform firefighting duties. His future with the department is undetermined at this time

### Fire Suppression

A 38-year-old firefighter was severely injured during an explosion at a pet food manufacturing company. The fire department was called to investigate a small amount of smoke coming from a storage bin containing a fine cellulose material. Investigators believe that some embers from a small fire in a conveyor belt bearing the previous day had ignited product in the bin. The fire department supervised the removal process while company employees slowly began to remove product from the bin using a mixer affixed to the bin. After several hours of removing the material, workers saw some charred but cool material exiting from the mixer. The work continued until the bin was empty. The only remaining material was in the mixer as crews slowly removed remnants.

After several hours of operations, the fire department began terminating the incident. The firefighter then went on a catwalk 20 feet (6 meters) directly above the mixer to retrieve some equipment when a violent explosion occurred. The firefighter was sent flying where he landed on another catwalk nearly 50 feet (15 meters) above the mixer. After being located by fellow firefighters, he was removed from the building and transported to the hospital in an advanced life support unit.

The victim was not wearing a full protective ensemble at the time of injury, primarily because he was not in an IDLH (immediately dangerous to life and health) atmosphere and was picking up tools and hose. He was only wearing his coat, bunker pants, gloves, and boots. He was hospitalized for 21 days with multiple compound fractures in his legs. He has not returned to full duty after 11 months of rehabilitation. He experienced several infections and complications during surgery, prolonging his recovery.

### Fire Suppression

A company officer was injured while operating at an electrical fire on the first story of a two-family dwelling quickly spread throughout the balloon-frame structure. The injured officer was backing down after

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| 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 |
| 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
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| 055 | 056 | 057 | 058 | 059 | 060 | 061 | 062 | 063 |
| 064 | 065 | 066 | 067 | 068 | 069 | 070 | 071 | 072 |
| 073 | 074 | 075 | 076 | 077 | 078 | 079 | 080 | 081 |
| 082 | 083 | 084 | 085 | 086 | 087 | 088 | 089 | 090 |
| 091 | 092 | 093 | 094 | 095 | 096 | 097 | 098 | 099 |
| 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
| 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 |
| 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 |
| 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 |
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searching for fire victims in the attic area that was converted to a bedroom. As he turned to exit, the floor collapsed and he became lodged between the structural members, flooring and ceiling materials.

A dedicated rapid intervention crew of six firefighters removed the company officer from the structure. He was burned over 15 percent of his body, with 10 percent of those burns being third degree. He was wearing a full protective ensemble with a fully integrated PASS device that activated automatically. He returned to work eight months after the incident.

Several other firefighters suffered injuries ranging from heat exhaustion, to minor burns, and a shoulder sprain. The department specifically credits the proper use of protective fire hoods and earflaps on helmets in preventing burns that could have been more serious to all members. The other injured members all returned to work within three weeks.

**Fire Suppression**

A 20-year veteran company officer received extensive injuries after being struck in the head by a falling object. The object, believed to be some ductwork, fell on the captain while he was performing overhaul of a ceiling. The object struck him in the back of the helmet, which drove his head forward. Two firefighters in the area heard the object fall and turned to find the captain kneeling holding his head. The injured officer was dazed and confused and having difficulty moving and breathing. The firefighters laid him on a countertop, removed his hood, and opened his coat. Two other firefighters arrived and the four removed the injured captain from the structure.

The 50-year-old suffered a neck injury, pulmonary embolism, and cardiomyopathy. He was hospitalized for several days and has retired from the fire service.

**Fire Suppression**

Four firefighters were injured while battling a fire in a single-family dwelling. The fire originated in the basement near the furnace. The fire spread throughout the wooden balloon frame construction, breaking out onto the second story where three firefighters were searching for fire. The intense heat forced the three to retreat.

The stairwell leading down to the first story collapsed. One firefighter decided to jump from the second story landing to the first story landing and sprained his ankle. He was wearing his protective ensemble properly and returned to work after being treated at the hospital.

Two firefighters exhausted their air supply while searching for a way out of the building. They found a window and exited onto a ground ladder. The first firefighter climbed down the ladder to the ground. He returned to full duty after being treated and released from the hospital. The second firefighter climbed out of the window and stepped onto the rung of the same ground ladder. He missed the rung and fell two stories, landing on his back. Because he was wearing a full protective ensemble, he did not receive any burns but he did land on his self-contained breathing apparatus, causing severe injuries to his back and spine.

At this time, he is undergoing rehabilitation and does not have any sensation from the waist down.

A fourth member suffered smoke inhalation while rescuing a firefighter from a second story window. He was on the tip of aerial ladder trying to pull and assist the victim when he inhaled a large quantity of smoke. He missed several days of work. The firefighters he helped from the window did not suffer any injuries.

**Cardiac**

Firefighters responded to a reported "odor of something burning" at a single-family dwelling. After a thorough investigation, the origin was located and an overheated blower motor in the furnace was identified as the cause. A half an hour after the incident, while finishing the incident report, the chief suddenly began to feel some discomfort in his chest. His firefighters transported him to the hospital where he was diagnosed with blockage of three coronary arteries causing a myocardial infarction.

After surgery to implant three stents, the 51-year-old chief was hospitalized for three days and medically cleared to resume activities as fire chief a week later.

**Apparatus Incident**

A 35-year-old company officer received a severe foot injury at a structure fire. The officer dismounted the apparatus and was donning his self contained breathing apparatus when the driver of the truck tried to reposition the aerial apparatus, running over and crushing his officer's right foot.

He suffered an extreme injury to his right foot and has not returned to fire duty a year and a half after the incident.

# fuel fire

Teamork in action: Suncor battles dead-of-winter fire at a critical facility By **Gordon Clayton** and **Tyler Robinson**

**PREVENTING AND FIGHTING FIRES** at industrial facilities presents a unique set of challenges: a qualified team must be recruited, facilities and equipment must be set up and managed properly, and employees must be trained in the appropriate codes and techniques relevant to the on-site substances and hazards. And all this must be done in a profit-driven environment.

Although industry routinely underestimates the real value of an on-site emergency services department, its benefits can be far-reaching, especially in large and complex industries such as oil refining and petrochemical processing. This proved to be true at Suncor Energy Inc.'s oil sands facility in Fort McMurray, Alberta, Canada, when a fire broke out in a fractionator tower that separates hydrocarbon vapors into naphtha, kerosene, and gas oil. The Fort McMurray facility recovers bitumen—dense, heavy oil—from oil sand, upgrading it to refinery-ready feedstock and diesel fuel, and the output of the 160-foot (48-meter) fractionator tower accounts for nearly half of the 240,000 barrels the plant produces each day.

The fire that broke out on the morning of January 4, 2005, was one of the largest fires Suncor Energy's Emergency Services team ever faced and most likely the tallest, with flames reaching 600 feet (182 meters) into the air. It was also one of the most dangerous, because of the fuels involved and the fire's potential to spread to other process units if crews could not extinguish it.

Throughout the operation, the cold plagued the Emergency Services' firefighters. With a high temperature of just -29°F (-34°C), regulators froze to masks and harnesses froze to bunker gear. Large snow and ice drifts formed under the monitors' streams, icicles up to 30 feet (9.1 meters) long created a significant safety hazard, and fog and vapor from the fire streams, leaking process liquids and gases, and combustion gases reduced visibility significantly. >>

Still, fires of this type are what Suncor's Emergency Services prepare for and what Suncor designs its water supplies and fire suppression systems to manage.

### The fire

Around 9:14 a.m., a process operator in an adjacent unit heard and saw hot gases emanating from the bottom of the fractionator. These vapors immediately ignited, creating a large pressure fire around the skirt of the vessel about 24 feet (7.3 meters) high. The process operator immediately radioed the upgrader control room to sound the alarm, and the control room operator dialed 911 to report the incident to Emergency Services.

Meanwhile, fire detectors on nearby hydrocarbon pumps initiated water-deluge systems, which minimized damage to pumps and eliminated pool fires. Heat detectors and the deluge-system flow alarms on pumps near the fractionator sounded for up to 10 minutes before they were damaged by the fire and fell silent.

The first officer arrived on the scene at 9:19 a.m. and reported "visible black smoke and flames reaching 80 to 100 feet (24 to 30 meters)." The shift emergency coordinator, who was close behind, immediately established incident command and requested fire-rescue personnel, including auxiliary members, off-duty firefighters, and mutual-aid partners, to respond.

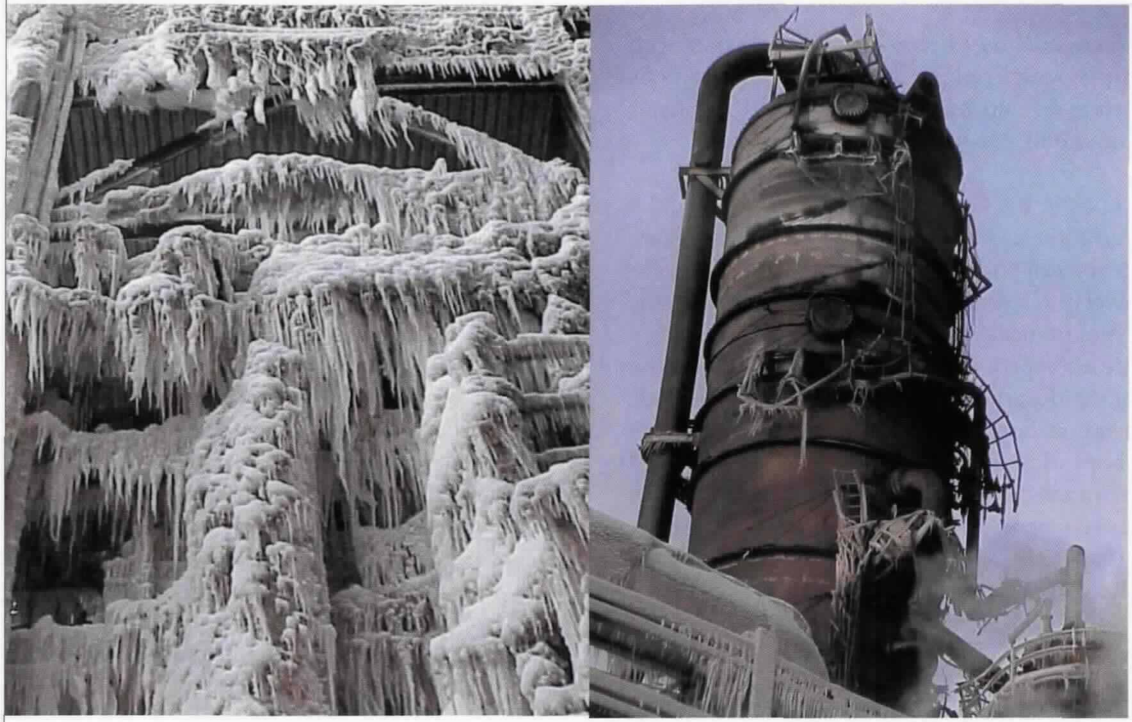
Evacuation of the 400 workers in the upgrading facility and adjacent buildings was completed within 10 minutes after the first flames were spotted. Then, the Emergency Services activated ground-level and elevated fixed plant monitors, and the responding apparatus began staging.

### Staging and control

By this time, flames reaching nearly 600 feet (182 meters) had consumed the fractionator tower, and the incident commander deployed additional monitors to protect the many high-hazard exposures near the tower.

An incident command post was set up to the south of the fire, and three sectors were established and equipped. The east sector had a pumper flowing a 55-foot (16-meter) aerial at 1,000 gallons (3,785 liters) per minute; a four-wheeled monitor, also flowing 1,000 gallons (3,785 liters) per minute; a Blitzfire ground monitor flowing at 500 gallons (1,892 liters) per minute; and a 75-foot (23-meter) elevated monitor flowing at 1,000 gallons (3,785 liters) per minute.

The west sector also had a pumper flowing a 105-foot (32-meter) aerial at 1,000 gallons (3,785 liters) per minute and a deck gun monitor at 1,000 gallons (3,785 liters) per minute, as well as two ground monitors flowing 750 gallons (2,838 liters) per minute. In the north sector, two four-wheeled monitors flowed water at 1,000 gallons (3,785 liters) per



The fire at the Suncor facility required battling a blaze under the toughest of conditions. From left to right, frozen fractionator towers and the peak of the tower after extinguishment.

minute, one ground monitor flowed at 750 gallons (2,838 liters) per minute, and an Ambassador Gun flowed at 2,000 gallons (7,570 liters) per minute.

At this point, two firefighters and several plant operators donned SCBA and entered key areas of the facility to close valves and isolate the flow of fuel to the fire area. After several isolations, a moderate-sized pressure fire remained at the base of the tower. Firefighters focused on containing this fire and locating the appropriate valves for isolation.

The fire was under control by 10:15 a.m., just an hour after it was first discovered, and firefighters finally extinguished it with a dry-chemical agent by 6 p.m. In all, 67 emergency responders and support personnel contributed to the successful mitigation. Mutual aid from a neighboring plant was staged at Suncor's fire station, but their assistance was not required.

### Industrial-strength fire protection

This fire illustrates the benefits of an on-site emergency-response team. But how does one develop such a team?

The best approach to training new employees instills a solid knowledge and skill base from which the firefighter can develop. NFPA codes and standards provide the basis for any training program, as well as the most comprehensive standards to follow for an effective, professional organization. The 1000 series of NFPA codes and standards describe the professional qualifications necessary for responders, instructors, inspectors, investigators and officers, while the 1200 series outlines emergency services, communications systems, and risk management in a fire department. The 1400 series covers training, the 1500 series deals with safety and occupational health, the 1600 series guides emergency preparedness, and the 1900 series summarizes fire apparatus maintenance.

Training programs must be organized so that new firefighters can quickly become effective contributors. To help trainees avoid information overload, the Fort McMurray facility installed a Honeywell Enterprise Buildings Integrator (EBI) central alarm system in 1991 to provide extensive graphic representations of all process areas, buildings, and structures. The graphics terminal clearly illustrates the plant site layout and the interior of all structures, along with their fire detection and suppression systems. It also helps trainees become familiar with the names and identities of all buildings and structures. This is especially important at a complex petrochemical or industrial facility, where one must become familiar not only with the geography of the site but also the hazardous processes and the terminology and acronyms commonly encountered.

### Locating the facilities

Facilities to house and support on-site emergency responders will depend primarily on the level of response the personnel will provide, the types of incidents they must mitigate, how they are equipped, and how many people there are in the department. These facilities may include a fire station, a first-aid center, a maintenance shop, administrative offices, a storage area, and a training center or fire training ground. All these amenities may be at a single location or strategically situated at several sites to address the corporation's objectives and cost concerns or the local geography.

**When it comes to being prepared, NFPA codes and standards provide the basis for any firefighter training program, as well as the most comprehensive standards to follow for an effective, professional organization.**

When choosing a location, especially the main fire station, you must consider main traffic routes so that emergency personnel can quickly and effectively drive response vehicles to an incident anywhere on the site. Consider satellite fire stations if the site is spread out.

In addition, make sure you build the emergency facilities away from process hazards. Develop a comprehensive evaluation of risk contours if the facility has the potential to create a large fire, vapor cloud explosion, or sizeable release of toxic gases or fumes. The evaluation should include heat radiation, blast overpressure zones, and gas dispersion models.

### Expanding services

An on-site emergency response organization can develop a wide range of other services valuable to the corporation that you can use to help justify your costs, reduce the company's reliance on specialty contractors, and help standardize or enhance the level of service in various activities.

For example, emergency personnel can staff first-aid treatment centers and ambulance transport; maintain respiratory protective equipment; inspect, maintain, and recharge portable fire extinguishers; train employees to use portable fire extinguishers; train back-up teams from operations and maintenance in emergency response; and conduct fire and code-compliance inspections. They can also conduct emergency preparedness exercises, fire warden training, water system inspections, fire protection systems isolations, and environmental sampling of air and water. Other possible duties might include providing emergency standby at hazardous work activities; site security; safety training for contractors and new employees; mechanic service for emergency vehicles; and hazardous waste storage and handling. They can even serve as liaisons to insurance underwriters and as risk assessment advisors.

One note of caution, however: these additional services must not be allowed to affect emergency response. Maintaining response skills through practice and training requires a measurable time commitment, and responders have to be available on a moment's notice.

### Joining forces

The effectiveness of an on-site emergency-response team can increase dramatically when efforts are coordinated through mutual-aid arrangements with local emergency response teams and other industrial teams in the area. The oil sands in northeastern Alberta are being developed at a rapid rate, with billions of dollars of capital expenditures planned each year for at least the next decade. Expansion of existing oil sands mines and bitumen upgraders, along with a growing list of new developers, is prompting close working relationships among the region's emergency service organizations.

Suncor, and another oil sands developer, Syncrude Canada, and the City of Fort McMurray developed a mutual aid plan in the early 1990s. Suncor and Syncrude are 15 and 20 miles north of the city in a region of undeveloped northern boreal forest.

Several major fires at the oil sands plants and occasional natural disasters, such as floods and forest fires, in and around the city of Fort McMurray prompted local emergency response groups to consider pooling their resources and consulting with one another to develop comprehensive emergency preparedness plans to protect the people and property of the region. The remoteness to other populated areas of the province also played a major role in generating cooperation between local government and industry.

Suncor and Syncrude recently expanded their operations to remote mines and in-situ production facilities a further 30 miles (77 kilometers) to the northeast. Shell Albian Sands, 50 miles (129 kilometers) north of Fort McMurray, joined the regional mutual-aid group upon completion and startup of its first oil sands mine and extraction plant.

Regular meetings of mutual-aid partners to discuss common issues and opportunities help create and maintain a well-functioning and cohesive emergency-response association. Becoming familiar with key players from other organizations and sharing information are keys to success.

There are a number of ways to continuously improve mutual-aid relationships. Contact names and numbers should be regularly updated, information brought back from seminars, conferences, and expositions should be shared. The partners should also develop common standard operating procedures, establish common training objectives using training grounds and instructors from within the mutual-aid group, use common hose fittings and radio communications, and have common ambulance layouts, medications, and medical protocols.

One of the greatest benefits to mutual aid can be sharing the costs of expensive or specialized equipment and response initiatives. For example, Suncor's Emergency Services group needed to prepare for storage tank fires due to the rapidly increasing number of storage facilities and larger-volume tanks. Buying a large foam tanker, the associated foam concentrate, and high-volume application devices was cost-prohibitive for Suncor, but sharing the costs allowed the mutual-aid group to equip itself with state-of-the art technology and prepare for one of the largest fire threats we faced in this region. One mutual-aid partner bought the tanker, another bought the foam concentrate, and another absorbed the storage and maintenance costs.

The same type of strategy can be used for HAZMAT teams. Instead of training a significant number of responders from each mutual-aid partner, choose a select group of firefighters from each department to train to a command level. First responders can also undergo basic HAZMAT training jointly, providing another excellent opportunity for firefighters to interact and develop trust, respect, and lasting friendships. In addition, the purchase of the HAZMAT response equipment and apparatus can be shared, and the equipment can be stored at a central location.

It was this kind of training and cooperation that allowed Suncor's Emergency Services to successfully tackle the fractionator tower fire last January.

To help eliminate the risk of such fires in the future, Suncor Energy launched an immediate investigation to determine the cause of the blaze. Investigators determined that the fire probably began when hydrocarbon vapor leaking from a ruptured recycling line that filters heavy oil from the fractionator before rerouting it back to the tower came in contact with hot process piping surfaces and ignited. This led to a number of pipe failures, which eventually caused a 36-inch (91-centimeter) overhead vapor line on the fractionator to open, releasing a large volume of fuel. When the fuel ignited, the fire engulfed the tower.

Suncor is currently inspecting similar areas of the plant to ensure that an incident of this magnitude does not happen again. Immediate steps were taken to inspect piping on similar process vessels to ensure their operational integrity, and company standards and design specifications were reviewed to ensure substandard pipe is not installed on new critical process vessels. Inspection procedures are also being re-evaluated.

The upgrading facility affected by the fire was up and running by September. The timely response and appropriate strategies the Emergency Services employed played a valuable role in mitigation.

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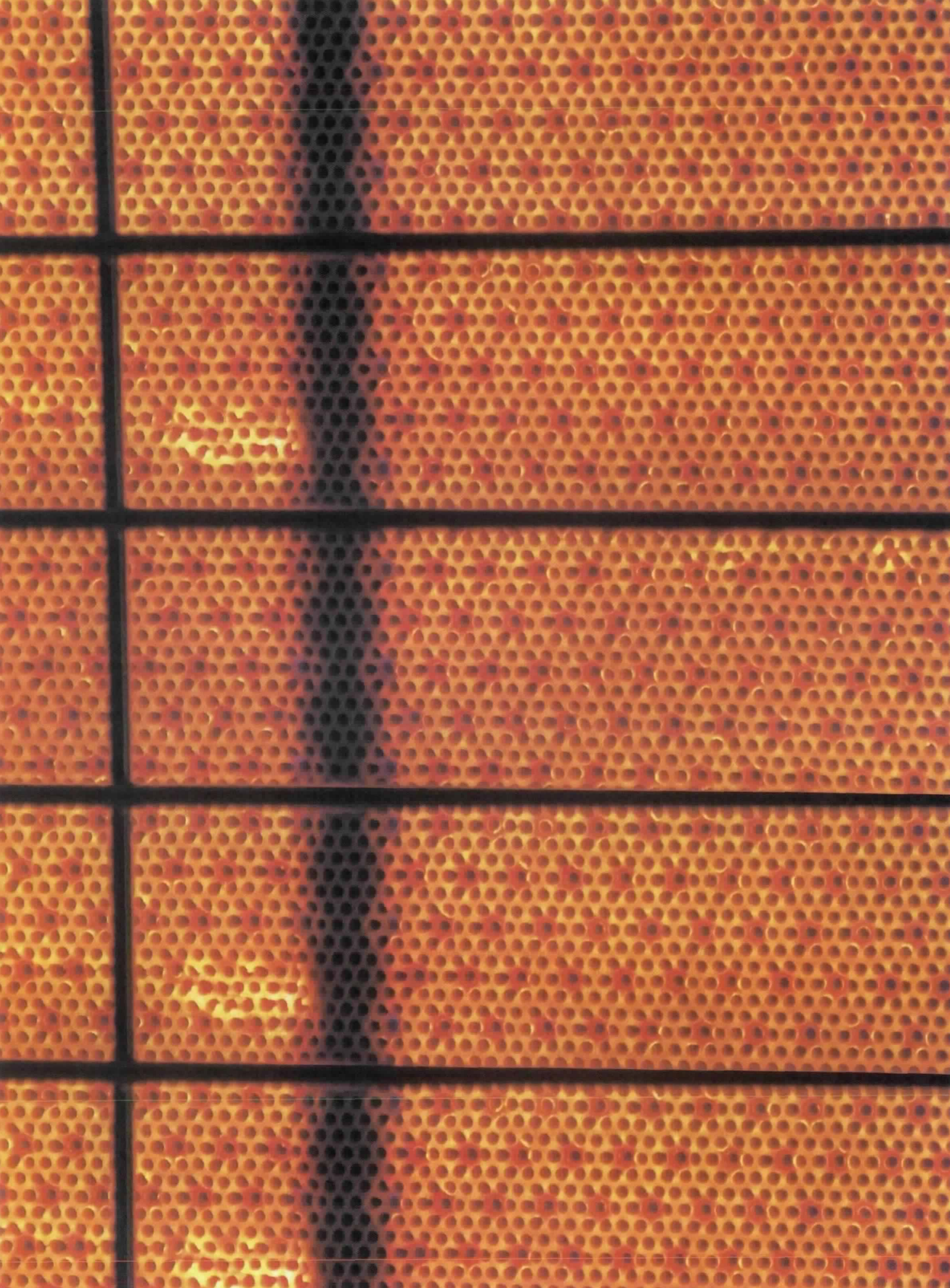
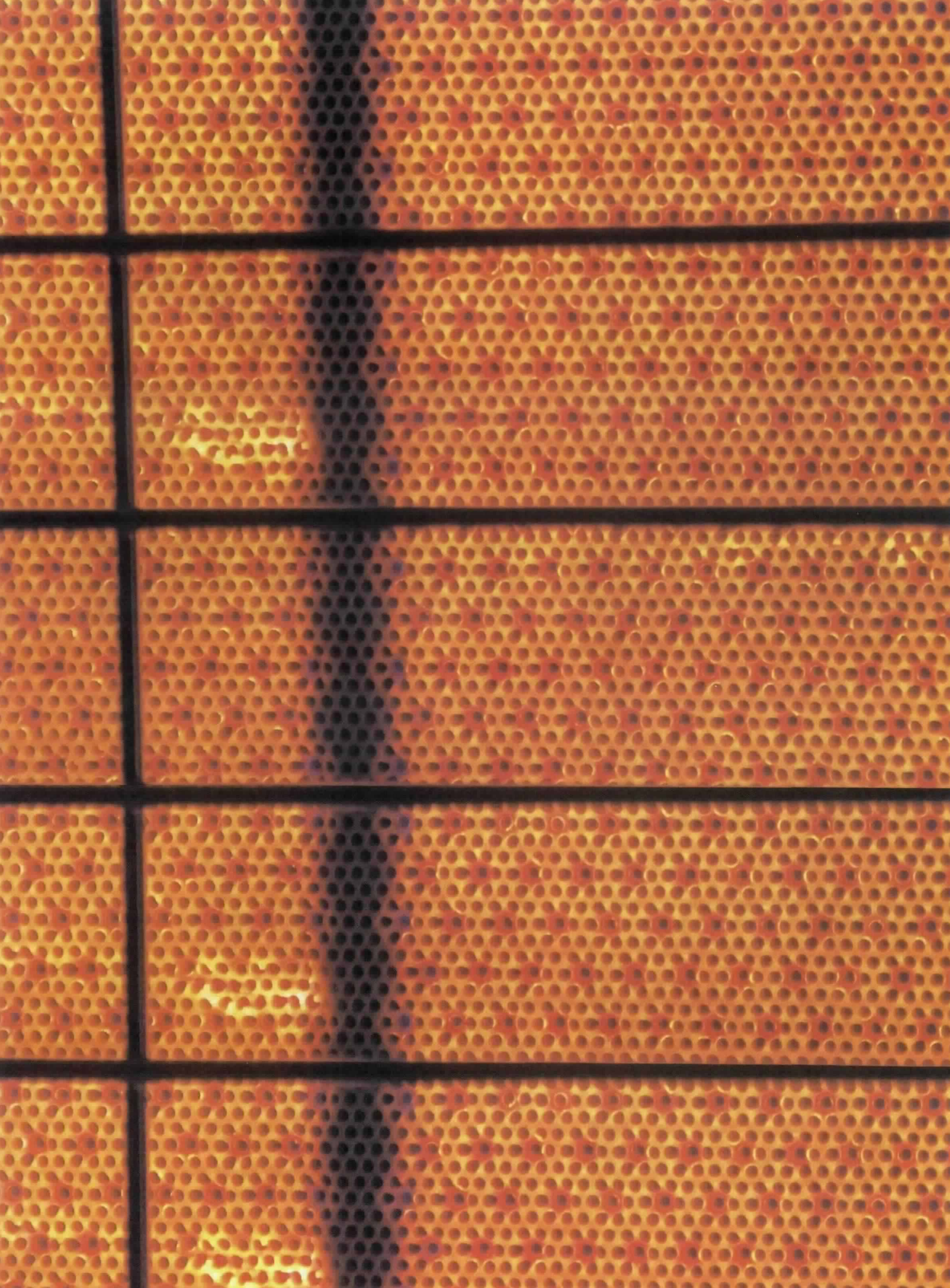
**GORDON CLAYTON** is senior fire prevention specialist for Suncor Energy Inc. Oil Sands. His article about the challenges of fire protection in oil sands facilities, "Towering Challenge," appeared in the November/December 2004 issue of *NFPA Journal*.

**TYLER ROBINSON**, Suncor's emergency services training coordinator, trains all emergency service and fire rescue personnel. Both Clayton and Robinson helped fight the January 4 fire at the Fort McMurray facility.



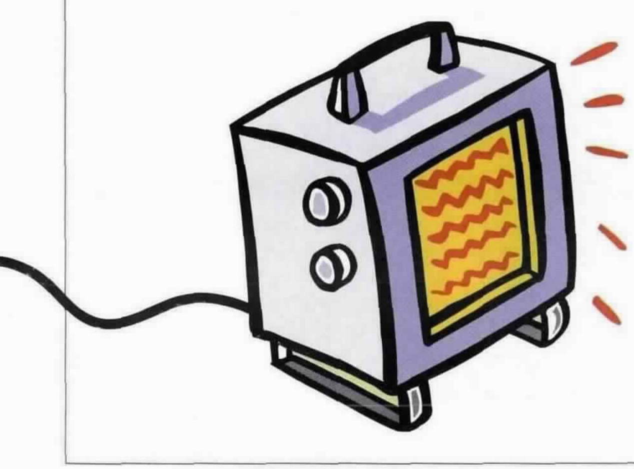


According to Marty Ahrens, manager of NFPA's Fire Analysis Services, the sharp and substantial fuel price increases we have seen this year are larger than any seen in the United States since the mid- to late 1970s. A recent report from the U.S. Department of Energy indicates that home heating fuel prices could rise as much as 31 percent this winter, nearly double a forecast released in August 2005.

"The last fuel crunch brought not only long lines at gas stations but also purchase of wood stoves and, later, portable kerosene heaters by large numbers of households. Space heaters of every type have higher rates of fires, deaths, and damages per million user households than does every type of central heating," Ahrens says.

The price shocks and fuel-supply interruptions for petroleum products of the 1970s occurred before the best national fire incident data began to be collected in 1980. However, the NFIRS data available from 1977 indicate a 60,000-fire increase in home-heating fires from 1979 to 1980 alone. Most of this increase was associated with a switch to wood stoves, resulting in a jump in fires involving solid-fueled fixed space heaters and associated chimneys and chimney connectors, as well as a jump in fireplace fires, which may reflect the use of inserts to convert decorative fireplaces into true space heaters.

**While no one can predict how many fires will occur this winter, it is important to note that the Federal Energy Information Administration projects that the average household will spend $1,666 to heat a home using oil and $1,568 using natural gas.**



According to NFPA statistics, portable and fixed-space heaters, including wood stoves, caused a disproportionate share of the home-heating fire deaths. Space heaters were involved in 25 percent of the home heating fires and 74 percent of the deaths. The leading cause of most space heater fires was the ignition of combustibles left too close to the heater. The exceptions were wood stoves, where the leading cause was failure to clean the stove leading to a build up of combustible creosote, and fixed electric space heaters, where the leading cause was leaving the equipment unattended.

The sharp increase in fires reflected not only the generally higher risk of space heaters of all types–because heating surfaces are closer to combustibles than is the case with furnaces and because occupants often must take a more active direct role in fueling and maintaining the equipment–but also a generation-long loss of familiarity with solid-fuel heating among Americans.

While no one can predict how many fires will occur this winter, it is important to note that the federal Energy Information Administration projects that the average household will spend $1,666 to heat a home using oil and $1,568 using natural gas. Last year, the costs averaged $1,263 for oil and $957 for natural gas, according to the agency.

If you plan to install a wood-burning stove or fireplace, choose one that has been investigated by a recognized testing organization such as Underwriters Laboratories (UL). This means the unit has met product safety standards set by UL in conformance with the applicable NFPA installation standard. Check local fire and building codes, read the manufacturers' instructions carefully, and have a local building department official inspect your home before you install any wood-burning appliance.

If your community does not have an ordinance covering these types of units, make sure your heater installation meets NFPA 211, *Chimneys, Fireplaces, Vents, and Solid-Fuel Burning Appliances.* NFPA 211 contains provisions for chimneys, fireplaces, venting systems, and solid fuel-burning appliances, including their installation. The standard applies to residential as well as commercial and industrial installations.

According to NFPA 211, the proper placement of a wood burner is critical. NFPA 211 recommends that all freestanding wood burners with no label or other manufacturer instructions have a minimum 36-inch (91-centimeter) clearance to combustible materials on all sides. This does not include wood-burning furnaces. Clearance requirements are different for other types of appliances, such as furnaces and pellet-burning appliances. If the appliance has a label or manufacturer's specifications, it should be installed according to those specifications.

Another popular type of solid-fuel-burning device is the pellet-burning stove, which burn pellets made of compressed waste material such as sawdust. The same precautions taken with a wood-burning appliance should also be taken with a pellet-burning appliance or any solid-fuel-burning appliance.

The high temperatures a space heater produces can actually decrease the temperature at which wall coverings, such as wood paneling, will ignite. Since the walls of most homes are made of materials that will burn, recommended clearances must be maintained. Non-combustible wall protectors or shields can be also used to protect walls and to reduce clearances. UL-listed, prefabricated wall protectors are available and should be installed according to the manufacturer's instructions. Sheet metal, brick veneer, drywall, aluminum foil, and other such materials placed directly on a wall are not considered approved wall shields. Heat will still penetrate the material and could start a fire. Even when wall protection is used, clearances to a combustible wall should never be less than 12 inches (30 centimeters).

Floors with wood, carpet, linoleum, and other combustible coverings must have a floor protector underneath, in front of, and to the sides and rear of the heat-producing appliance to protect against live embers and sparks that might fall or shoot from the appliance. The type of floor protection to use will depend upon the type of appliance you have, but they should all meet the appliance manufacturer's requirements and be listed by a recognized testing laboratory. The floor protection should provide a sturdy base that extends at least 18 inches (46 centimeters) on all sides of the heater, unless the manufacturer states otherwise.

### Stovepipes and chimneys

According to NFPA 211, clearances between the stovepipe that connects the stove to the chimney and combustible materials are equally important. Unprotected walls and ceilings need at least 18 inches (46 centimeters) clearance from the stovepipe, which should be as short as possible. Stovepipe sections should be securely fastened together by screws, and the crimped ends of the pipe should point down.

Chimneys should be inspected regularly for creosote buildup. NFPA suggests allowing no more than 1/4 inch (0.6 centimeters) of creosote to build up before cleaning. Using your fireplace two to three times a week during the winter may result in a 1/4 -inch (0.6-centimeter) accumulation every two years.

If a chimney fire does occur, call the fire department immediately and get everyone out of the house. You can try to put a small fire out yourself, but it is best to leave it to the firefighters. If you do try to put it out on your own, however, directing the fire extinguisher discharge up the chimney and then closing the damper can be effective.

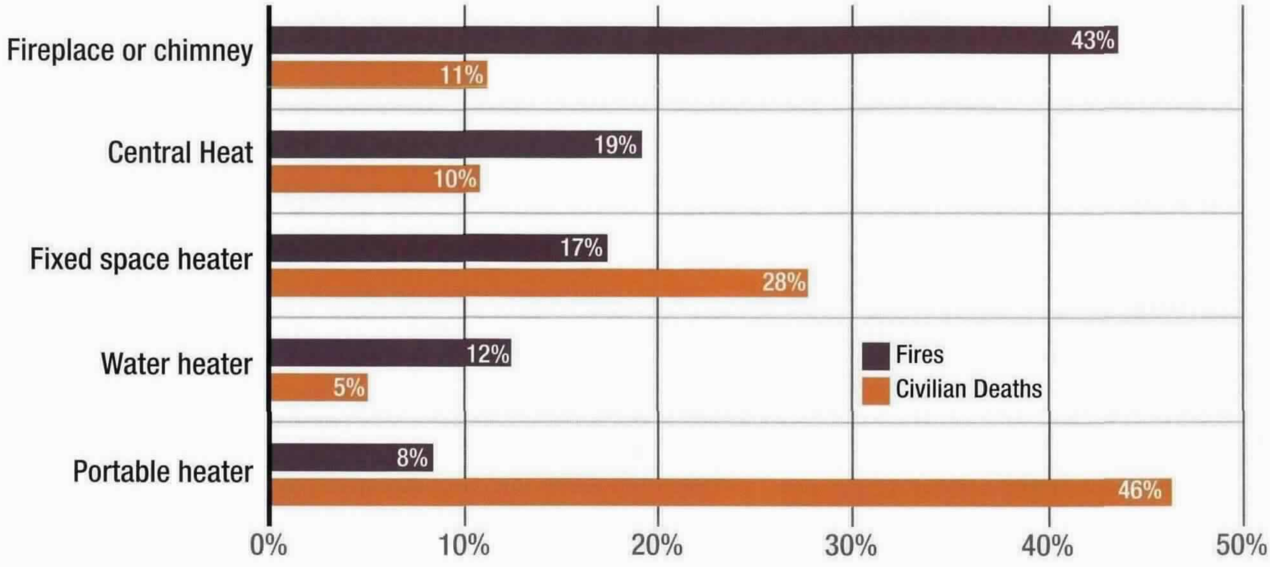
After a chimney fire, be sure to have the chimney or stove inspected for damage before using it again.

Of the five most widely used types of portable or fixed space heaters–room gas heaters, portable kerosene heaters, portable electric heaters, wood stoves or fireplaces with inserts, and built-in or other fixed electric heaters–solid-fueled space heaters, such as wood stoves, usually involve the highest risk of property damage from fire. Room gas heaters, portable kerosene heaters, and portable electric heaters present the highest risk of death and injury, including non-fire deaths due to carbon monoxide. Portable kerosene heaters present the highest risk of fire death by most measures and are illegal in some states.

### Gas- and oil-fired equipment

NFPA 54, *National Fuel Gas Code*, provides guidance for the installation of gas-fired equipment, including venting requirements. When improperly vented from a building, the products of combustion these appliances produce, including carbon monoxide (CO), can be fatal to building occupants. In addition, improper venting can result in the formation of condensation inside the vent, leading to premature failure of both the vent and hydronic equipment. The *National Fuel Gas Code* vent tables dictate the diameter of the vent based on the installation's total vent length and the equipment's total Btus. Following these and all guidelines of the *National Fuel Gas Code* and the

## Home Heating Equipment Fires by Type of Equipment Involved: 1999-2002




equipment manufacturer's installation requirements can prevent problems.

As a class, oil-fired central heating systems are very safe and cause very few incidents involving property loss or personal injury. However, these systems do involve the storage and combustion of fuel, so there is always some risk involved. This risk is magnified if the heating equipment is not properly installed and maintained during its normal life, and replaced when it is worn out.

NFPA 31, *Installation of Oil-Burning Equipment*, applies to the installation of stationary oil-burning equipment and appliances, including industrial-, commercial-, and residential-type steam, hot water, or warm air heating plants; domestic-type range burners and space heaters; and portable oil-burning equipment. Failure to conform to NFPA 31 and manufacturers' installation instruction can impair the reliability, service life, and safety of heating appliances.

**Safe operation**

Any type of heating equipment can be used safely if you follow these rules and recommendations from NFPA:

• When buying a new unit, make sure that a qualified technician installs it or checks it to see that it has been installed properly.

• Have a professional inspect the chimney, chimney connector, and other related equipment of wood or coal stoves and fireplaces every year, and have them cleaned as often as the inspections indicate.

• Keep space heaters at least 3 feet (1 meter) away from combustibles.

• Fuel portable kerosene heaters in a well-ventilated area away from flames, such as pilot lights, and other heat sources, and only when the device has cooled completely. Use only the type of kerosene specified by the manufacturer, and never use gasoline. Use portable kerosene heaters only if they are legal in your community.

• When turning a heating device on or off, follow the manufacturer's instructions. When buying heaters, choose devices with automatic shut-off features.

• Make sure any gas-fueled heating device is adequately ventilated. Unventilated gas space heaters in bedrooms and bathrooms must be small and well-mounted. Never use liquefied petroleum gas heaters with self-contained fuel supplies in the home.

• Turn portable space heaters off every time you leave a room or go to bed.

• Allow ashes to cool before disposing of them in a metal container.

JOHN NICHOLSON is executive editor of the NFPA Journal. He can be reached at jnicholson@nfpa.org.

# HOME HEATING FIRE PATTERNS AND TRENDS / EXECUTIVE SUMMARY

by **John R. Hall, Jr.,** Fire Analysis and Research Division

The estimated 54,900 home heating equipment fires in 2001 killed 220 people, the lowest death toll by far in the 22 years studied (1980 through 2001). Home heating fires in 2001 also caused 1,120 civilian injuries and $502 million dollars in direct property damage, all historic lows after adjusting damage for inflation. All of these estimates refer only to U.S. fires reported to local fire departments. The apparent jump in fires is misleading as it apparently reflects only an increase in reported, confined fires that were probably reported as non-fires under the previous, more cumbersome coding system.

Portable and fixed space heaters and related equipment, such as fireplaces, chimneys, and chimney connectors, accounted for two of every three home heating fires in 2001, or 66 percent, and two of every three associated deaths, or 67 percent. Each of these devices has a higher rate of deaths per million households using them than do the various types of central heating units, such as furnaces, or water heaters. When comparing the risk of fire relative to usage, heat transfer systems such as ducts and hot water piping, chimneys, and connectors, all are counted with the heating equipment they support.

Portable and fixed space heaters pose a greater risk because they provide so many more opportunities for error by the people using them—in installing them, maintaining them, fueling them, operating them, and arranging household contents around them. Furnaces and water heaters require—and permit—fewer interventions by occupants. Causes of fires involving furnaces or water heaters are more likely to involve mechanical or electrical failures, while the causes of fires involving portable or fixed space heaters are dominated by human errors, such as heaters too close to combustibles and lack of maintenance.

Of the five most widely used types of portable or fixed space heaters—room gas heaters, portable kerosene heaters, portable electric heaters, wood stoves or fireplaces with inserts, and built-in or other fixed electric heaters—the first three have the highest, and comparable, risk of deaths and injuries, including non-fire deaths due to carbon monoxide, while the solid-fueled fixed space heaters tend to involve the highest risk of property damage from fire. Portable kerosene heaters are illegal in some states, and they do have the highest risk of fire death by most measures.

Most home heating fires are preventable if people follow NFPA codes, standards, recommendations, and other guides to safe heating, such as advice from fire code officials and fire safety experts:

- When buying a new unit, make sure it carries the mark of an independent testing laboratory. Be sure that a qualified technician installs the unit or checks that the unit has been installed according to manufacturers' instructions and any applicable code.
- Wood and coal stoves, fireplaces, chimneys, chimney connectors, and all other solid-fueled heating equipment must be inspected annually by a professional and cleaned as often as the inspections indicate.
- Space heaters need space. With very few exceptions, home heating devices need a 36-inch clearance from combustibles. In metric terms, this can be rounded up to 1 meter, which is slightly more than 39 inches.
- A portable kerosene heater must be filled only in a well-ventilated area, free of flame and other heat sources, and only when the device has cooled completely. Use only the type of kerosene specified by the manufacturer for that device, and never use gasoline instead of kerosene. And be sure that portable kerosene heaters are legal for home use in your community.
- When turning a heating device on or off, be careful to follow the manufacturer's instructions. When buying heaters, look for devices with automatic shutoff features.
- Be sure any gas-fueled heating device is installed with proper attention to ventilation. If unvented gas space heaters are used in bedrooms or bathrooms, they must be small and well-mounted. NFPA codes prohibit the use of liquefied petroleum gas heaters with self-contained fuel supplies for home use.

There are some differences in fire-death risk among different types of central heating units, defined by type of fuel or power, but these differences do not consistently favor or disfavor any type and are dwarfed by the overall difference in risk between central heating and space heating, whether it be fixed or portable.

# Revisions

## How the NFPA standards review process helped bring a new extinguisher to market

By **Craig Voelkert**

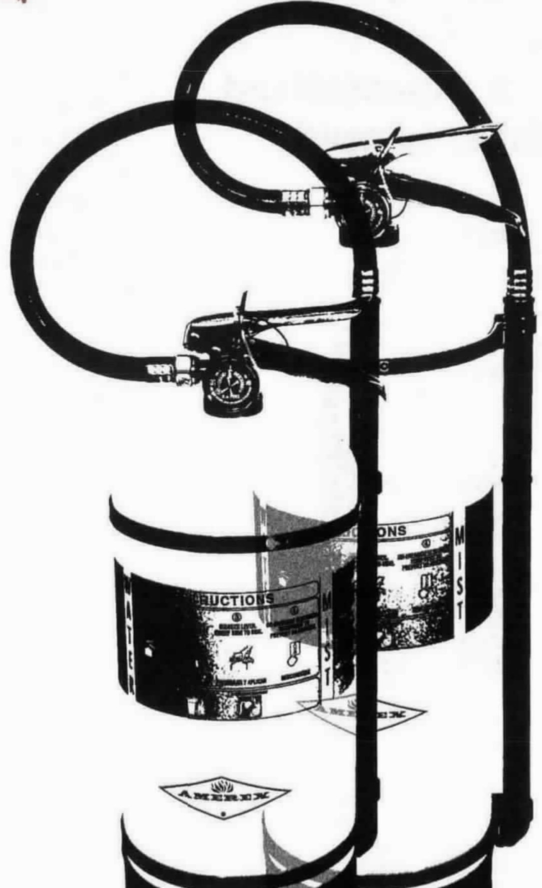
IN RESPONSE TO A HEALTH CARE INDUSTRY REQUEST, the Amerex Corporation designed a UL-listed fire extinguisher that could be used safely on a fire in an occupied operating room.

Such a request is not unusual. New technology or, in some instances, new twists on old technology are often developed to serve a particular fire protection need. In this case, it was a portable water-mist fire extinguisher.

Nor is it unusual for NFPA to revise our codes and standards to include such technology in new editions of these documents after the technology has been introduced. In the case of the water-mist fire extinguisher, the document was NFPA 10, *Portable Fire Extinguishers.*

Fires in health care facilities present a particularly difficult fire problem. Not only are such facilities full of Class A combustibles, such as mattresses, and electrical equipment of all types, from hot plates in break rooms to high-tech items in the operating room, but they are far more difficult to evacuate than many other types of occupancies. And even a small fire in a health care facility may affect the patients' care and health. >>

# for Safety



As a result, fire prevention and suppression are of the utmost importance. Preventive measures include regularly scheduled maintenance, strictly enforced lockout/tag-out policies for equipment being serviced, checklists for medical equipment to be filled out before each use or before each shift, strict smoking policies, and limited access by outside personnel.

Despite the best preventive maintenance program, however, fires do occur. The best line of defense against them is often the portable fire extinguisher, particularly in the case of a fire involving live electrical equipment in an operating room.

**Class C fires involve energized electrical equipment, such as appliances, switches, panel boxes, power tools, hot plates, and stirrers. Water is usually a dangerous extinguishing medium for Class C fires because of the risk of electrical shock unless a specialized water-mist extinguisher is used.**


### Research and examination

Before Amerex was asked to design the new fire extinguisher, it researched most of the options available, including ABC dry chemical extinguishers, which, while extremely effective, present the risk of contamination when used near a patient. Researchers also considered a carbon dioxide extinguisher. This type of extinguisher has a soft discharge pattern, and, since the gas leaves no residue, it does not contaminate surrounding areas. However, it does not have a Class A rating, and the agent is discharged at -110°F (-43°C), which can freeze exposed tissue.

Pressurized water extinguishers were ruled out because, although they have excellent Class A capability, they use a concentrated straight stream, which is strong at close range, and they do not protect the user around Class C materials. Class C fires involve energized electrical equipment, such as appliances, switches, panel boxes, power tools, hot plates, and stirrers. Water is usually a dangerous extinguishing medium for Class C fires because of the risk of electrical shock unless a specialized water-mist extinguisher is used. Also ruled out because of its strong discharge patterns were Halon 1211 and the halon substitutes, which can be cardiac sensitizers when discharged close to a patient.

In the end, Amerex decided to develop an extinguisher that had excellent Class A capability, a soft discharge pattern, and an agent that posed no thermal or toxic threat to tissue, and that could pass the American National Standards Institute (ANSI) and Underwriters Laboritories, Inc. (UL) tests to achieve a Class C rating.

After consulting with hospital personnel, Amerex decided that a water-mist extinguisher pressurized with nitrogen, filled with distilled water, and discharged through a fine spray might meet operating room needs. While the contents of the extinguisher would not be sterile, the combination of distilled water and nitrogen would inhibit bacterial growth in the extinguisher. Further discussion led to a nozzle whose grip allowed the user to apply the agent directly onto the operating table using an overhead application without having to lift the extinguisher above waist height.

An independent consulting firm was asked to design a testing protocol and conduct live-fire tests simulating actual operating room conditions. The tests used oxygen, gurneys, bedding, surgical draperies, cauterizing equipment, and other associated medical equipment. When the extinguisher's firefighting capabilities and design for safety around the live electrical equipment proved satisfactory, it was tested, listed, and rated under the appropriate ANSI/UL standards and introduced to the market.

Shortly afterward, fire equipment distributors began to place the new extinguishers into situations the manufacturer did not initially target, and end-users began to see the advantage of using them in other areas of health care facilities than the operating room. For example, an independent testing lab found them to be suited for use in MRI facilities, which require a non-magnetic extinguisher.

And because water-mist clean up is less time-consuming than it is for other traditional agents, the water-mist extinguisher was accepted as an alternative in places where "no mess" was not a requirement, but "less mess" was desirable.

**New electrical conductivity standard**

After Amerex introduced the water-mist fire extinguisher, questions about its use protecting high-voltage equipment, how it was tested under the ANSI/UL standards, and the possibility of the agent "pooling" or "puddling" during discharge arose during the ***Report on Proposals*** (ROP) and ***Report on Comments*** (ROC) stages of the NFPA 10 revision cycle. The NFPA 10 Technical Committee reviewed and acted upon questions about the extinguisher's safety and its use in inappropriate areas, such as around power-generation equipment, but it could not address the subject of puddling or pooling, since no known test exists that can examine that possibility.

As a result of the committee's actions, language was added to Paragraph 1.3.4 of the 2002 edition of NFPA 10 to ensure that any water-based agent listed for Class C hazards is tested in accordance with ASTM D 5391-93, *Standard Test for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample.* This will ensure that the agent's conductivity is no higher than 1 microsiemen/cm at 77°F (25°C), adding an extra margin of safety.

ASTM D 5391-93, *Standard Test for Electrical Conductivity and Resistivity of a Flowing High Purity Water Sample*, was also revised to incorporate the NFPA 10 committee's language.

After the NFPA Standards Council issued the 2002 edition of NFPA 10, Amerex and other manufacturers of water-mist extinguishers with Class C ratings began to equip the extinguisher with a factory-produced water charge that met the new electrical conductivity standard.

The water-mist extinguisher and the NFPA 10 Technical Committee's actions are an excellent example of the committee review process at work. Testing and rating by independent, nationally recognized test laboratories, such as UL, coupled with the work of the appropriate NFPA technical committee, means that new products developed for specific fire protection problems can be brought to market, while ensuring safeguards are in place and that questions about public safety are adequately addressed.

As with any new product, controversy on its use will continue and more data will be collected. But for now, the water-mist extinguisher and the technical committee's actions serve as a "snapshot" of how the standards review process works, and how well it works.

**CRAIG VOELKERT** is the vice-president of Sales, Special Hazards for Amerex Corporation and serves on the NFPA Technical Committee on Dry and Wet Chemical Extinguishing Equipment. He is also involved with the Fire Equipment Manufacturers' Association and the National Association of Fire Equipment Distributors.

## Smoke Detectors


The new VESDA LaserFOCUS smoke detectors take very early warning detection into smaller critical environments. Designed to protect telecommunication and utility infrastructure networks, the VESDA LaserFOCUS simplifies the design, commissioning, operation, and maintenance processes. Pre-engineered pipe network designs and automated set up features remove complexity.

**VESDA**

Circle Reader Service Card No. 101

## Pex Pipe

REHAU's PEX residential fire protection system comprised of RAUPEX® pipe and EVERLOC® fittings is UL-listed for multipurpose sprinkler systems in accordance with NFPA 13D for one- and two-family dwellings and manufactured housing. Each sprinkler is served by either 3/4-inch or 1-inch RAUPEX pipe, REHAU's cross-linked polyethylene (PEXa) pipe.

**REHAU**

Circle Reader Service Card No. 102

## Notification System

SAFEPATH4 Multi-Function supervised paging, messaging, background music, telephone zone paging, general paging and emergency voice evacuation system meet NFPA, OSHA, and ADA requirements. The SAFEPATH4 features will save significant equipment, installation, and maintenance costs by combining a general-use public address system, a background music system, a supervised fire notification system, and an emergency warning system.

**Wheelock**

Circle Reader Service Card No. 103

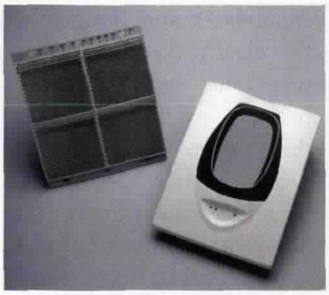
## Software

FM for Fire schedules, tracks, and documents inspection and maintenance activities on fire and life safety equipment. Packaged with pocket PCs, FM for Fire automates inspection activities and ensures data integrity by eliminating paper forms and logsheets. Assists in proving compliance with OSHA, NFPA, JCAHO, and other regulatory agencies. For more information, visit www.tiscor.com.

**TISCOR**

Circle Reader Service Card No. 104

## Beam Smoke Detector



System Sensor's single-ended, reflected-type beam smoke detectors protect open areas with high ceilings. Its 4-wire design is easy to install. The unit is aligned using an optical sight and a built-in, two-digit signal strength meter. For more information, visit our Web site at www.systemsensor.com.

**System Sensor**

Circle Reader Service Card No. 105

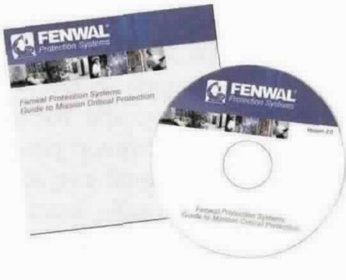
## Emergency Lighting


Concealite's 5000 Series emergency lighting is stored behind a panel in the wall or ceiling until needed to preserve architectural and interior design while meeting all national and state code requirements. The 5000 Series is designed for installation in gypsum board, plaster, concrete, brick, or acoustical tile applications. Visit www.concealite.com or call (605) 542-4444.

**Concealite**

Circle Reader Service Card No. 106

## Product Information

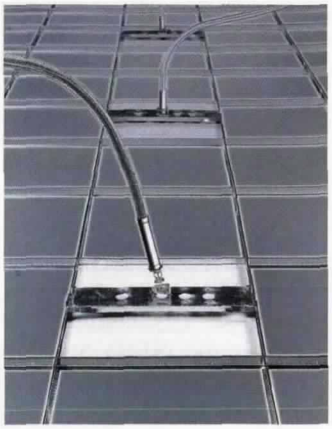



The new Fenwal Guide to Mission Critical Protection CD-ROM is a complete information source for Fenwal protection systems, including fire protection equipment, fire system controls, facility monitoring systems, and Fenwal services and training. Includes system specifications! Call 1-800-FENWAL1, ext. 2111, or log on to www.fenwalfire.com to request your free copy.

**Fenwal Protection Systems**

Circle Reader Service Card No. 107

## Flexible Sprinkler Connections



FlexHead, pioneers of flexible fire sprinkler connections, now offer the same state-of-the-art technology they invented for the semiconductor industry to the commercial market. These connections are designed for use in suspended ceilings and are fast and simple to install. Flexible connections enable engineers to specify a product that provides simplified project management, faster occupancy, and cost-effective code compliance. Call (800) 829-6975 today or go online to www.flexhead.com for more information.

**Flexhead**

Circle Reader Service Card No. 108

## In-Cabinet Fire Protection

The Kidde Fire Systems In-Cabinet System offers automatic fire protection in a compact, modular system that is designed to discharge in 10 seconds or less. The Kidde In-Cabinet System uses the world-proven FM-200® agent, which is safe for use on the sensitive equipment often found in cabinets and small enclosures. For information, call (800) 872-6527, ext. 2606.

**Kidde Fire Systems**

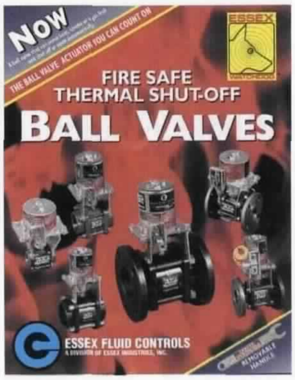
Circle Reader Service Card No. 109

## Fire-Safe Valve Actuator

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

**Essex Fluid Controls**

Circle Reader Service Card No. 110




## Solderless Fittings

Viega ProPress connections are more reliable and faster to install than solder connections. They are high-quality, high-strength, permanently water-tight sealed fittings for either for wet or dry applications, and they meet the most rigorous testing standards with the benefit no flames or soldering. To ask your Viega wholesaler for more information, call (877)-VIEGA-NA or visit www.viega.com.

**Viega**

Circle Reader Service Card No. 111

## Emergency Access Control

Click2Enter allows all public safety agencies access to automatic gates, parking arms, bollards, rollup, and standard doors with their own unmodified radio transmitter. There is no cost to public safety agencies. No modifications to existing radios are required. Just pulse the radio on a designated frequency and you're in. Many fire departments mandate the use of Click2Enter by way of standards. Call (877) 939-3800 or www.click2enter.net.

**Click2Enter**

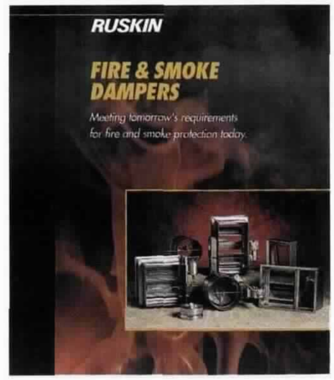
Circle Reader Service Card No. 112


## Fire & Smoke Dampers

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

**Ruskin**

Circle Reader Service Card No. 113




## Rigid Coupling

The Style 009 FireLock EZTM rigid coupling from Victaulic® is an installation-ready, revolutionary patent-pending new way to join fire protection piping systems in the quickest manner possible. The unique design permits the installer to assemble a joint without disassembly. The FireLock EZTM coupling is vailable from 1 to 4 inches.

**Victaulic**

Circle Reader Service Card No. 114

## Extraction Tool

The Dropmaster® by Gecco, distributed exclusively by Victaulic®, is a fire protection system water and odor extraction tool that saves contractors time and labor during system maintenance and servicing. The Dropmaster's unique 1-horsepower vacuum pump allows you to replace or perform maintenance on sprinklers while simultaneously disposing of trapped water.

**Victaulic**

Circle Reader Service Card No. 115

## Clean Agent

DuPont is committed to developing fire protection solutions that add value and improve safety and the quality of life for people around the world. We are the only supplier capable of providing a full range of clean agent, non-ozone depleting fire extinguishants on a global basis. Visit www.dupont.com/fire or call (800) 473-7790. Outside the U.S. and Canada, call (302) 774-1166.

**Dupont**

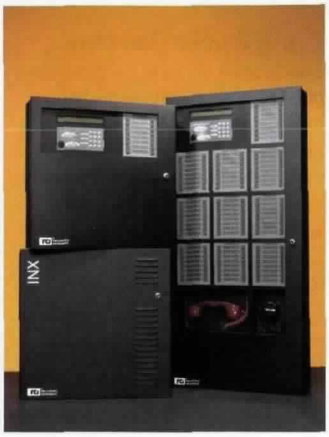
Circle Reader Service Card No. 116

## Mass Notification

Gamewell-FCI releases another innovation in life safety. The new E3 Expandable Emergency Evacuation System extends beyond basic fire protection and is proficient in emergency mass notification and evacuation. This versatile product can be configured from a small stand-alone panel to a networked broadband voice and audio solution. For more information, see us at www.firecontrolinstruments.com.

**Gamewell-FCI**

Circle Reader Service Card No. 117




## Fire Alarm Equipment

Faraday manufactures and sells automatic and manual fire alarm equipment. Faraday has introduced networking capabilities (MPC-Net2) for its MPC-6000 and MPC-7000 intelligent fire control panels. MPC-Net2 allows these panels to be connected to form a true peer-to-peer fire alarm network. For more information, go to www.faradayalarmsystems.com.

**Faraday**

Circle Reader Service Card No. 118

## Control Panel

Siemens now offers a versatile and cost-effective fire protection solution that can be employed as a stand-alone fire protection solution or as a component of a larger fire protection package. The FS-250 can be used as a stand-alone, complete fire protection solution for small to mid-sized facilities. The FS-250 provides a complete fire solution.

**Siemens**

Circle Reader Service Card No. 119


## Fiber Optic Linear Heat Detection

The new Protectowire FiberSystem 400 measures temperature by means of optical fibers. Up to 128 zones can be established on a single length of sensor cable. Zones can be defined as desired and even overlapped. Unique features include multiple alarm initiating criteria by zone, visualization of the fire size, and direction of fire spread. For more information, visit www.protectowire.com.

**Protectowire Company, Inc.**

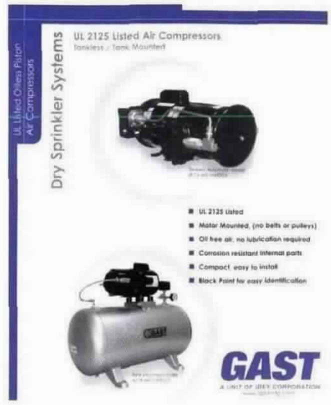
Circle Reader Service Card No. 120


## Dry-Sprinkler System

Air compressors that meet UL2125 , ***Motor-Operated Air Compressors for use in Sprinkler Systems,*** are featured in Gast Manufacturing's ***Dry Sprinkler Systems Brochure.*** Compressors are available in riser mount, horizontal, and vertical mounting, and in tank-mounted styles. All units are tested for compliance with UL 2125 and carry the UL mark. Call (800) 952-4278 or visit www.gastmfg.com/drysprinkler.html.

**Gast Manufacturing**

Circle Reader Service Card No. 121




## Spark Detection

Hansentek® features single- or multi-zone spark detection and extinguishing systems that provide fast response to sparks that can cause fires and explosions. Selectable features allow you to tailor each zone to a particular hazard. These features, such as self-testing detectors for minimal maintenance, are standard, not high-cost, options. For more information, visit Hansentek.com.

**Hansentek**

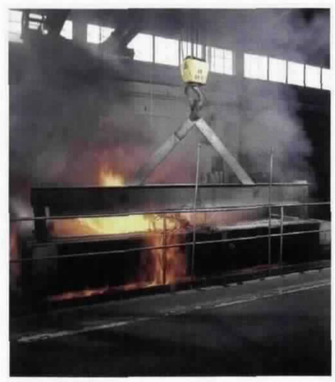
Circle Reader Service Card No. 122

## Fire Testing Services

Over 35 years of providing fast, cost-effective evaluations of materials, products, and systems for fire endurance and flame spread from the developmental stage through the certification process. Accredited lab with full-scale, floor-ceiling, and partition fire test capabilities. Acoustical testing is also available. For more information, call (716) 873-9750 or visit our web site, www.ngctestingservices.com.

**NGC Testing Services**

Circle Reader Service Card No. 123



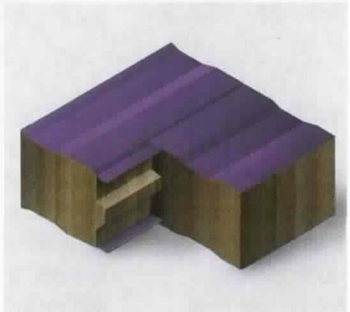
## High-Tech Glass

Robust fire-resistant material provides protection with a clear inorganic intumescent interlayer sandwiched between sheets of annealed glass in a laminate structure. In a fire, the interlayer turns opaque, absorbs heat, and intumesces to form a hard foam structure, reducing radiant heat to tolerable levels, and insulating and stabilizing the glass to protect occupants and rescuers. Visit com/fire or fireglass.com.

**Pilkington**

Circle Reader Service Card No. 124

## Fire-Resistant Panel



Metl-Span's new ThermalSafe panel has a mineral wool core that resists high temperatures and will not burn, providing excellent fire-resistive qualities. ThermalSafe combines the latest technology in panel design with advanced manufacturing expertise to create a composite panel that achieves 1- and 2-hour fire-resistive ratings under the most demanding conditions. For information, visit us at www.metlspan.com.

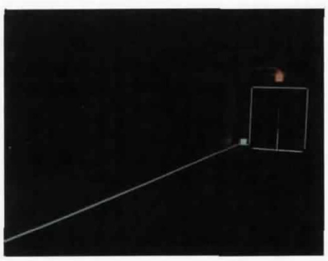
**Metl-Span**
Circle Reader Service Card No. 125

## Heat Detector

5601P is a 135°F (57°C), fixed, single-circuit, rate-of-rise heat detector without letters, numbers, or markings on the exterior. It can be used for applications where external markings on the device may compromise the visual integrity of the product and its surroundings. For more information, call (800) 736-7672 or visit www.systemsensor.com.

**System Sensor**
Circle Reader Service Card No. 126

## Emergency Egress



Egress Marking Systems' E-Lume-A-Path™ floor proximity path lighting system illuminates the path to safety using FLATLITE® electroluminescent lighting technology. Each UL-listed system runs up to 1,500 linear feet (457 meters) of lighting and is activated by any supervisory system signal or power outage with 4 hours of battery back-up. Visit www.egressmarking.com

**Egress Marking Systems**
Circle Reader Service Card No. 127

## Suppression System


Cease Fire's proprietary CFF technology combines the extinguishing power of two agents for faster suppression and greater coverage. Cease Fire offers one of the most cost-effective supression solutions available. Rated for A, B, and C class fires, Cease Fire's CFF product is appropriate for all applications where water just isn't an option. For more information, call (888) CEASEFIRE (232-7334) or visit www.ceasefire.com.

**Cease Fire**
Circle Reader Service Card No. 128

## Wash System


The Esporta Wash System is a laundering technology that cleans fire-resistant equipment without causing the fabrics to deteriorate, reducing the reflectivity of reflective material, or damaging hard goods. The use of this technology with our proprietary detergents will produce superior wash results and meet NFPA 1851 requirements. Call (800) 881-7781 or visit www.esporta.ca.

**Esporta**
Circle Reader Service Card No. 129

## Monitors, Nozzles

Quality products with competitive pricing and short, reliable lead times defines FirePro's monitors and nozzles. For additional information, log onto www.firepromonitors.com or toll-free (877) 917-5800.

**Fire Pro**
Circle Reader Service Card No. 130

## Safety Education

Robtronics is a leader in safety education products targeted at children. With interactive robotic characters and thousands of costumes, puppet programs, and educational materials, no other private organization has a greater commitment to promoting safety awareness. For information, visit www. robotronics.com.

**Robotronics**
Circle Reader Service Card No. 131

## Extinguisher

Amerex Water Mist extinguishers offer the only viable agent for health care environments. Unlike other agents, Amerex Water Mist is the safest agent for human exposure due to its unique, fine spray of de-ionized water. It is non-toxic, poses no respiratory concerns, is MRI safe, and has a Class C rating. For more information, visit www.amerex-fire.com.

**Amerex**
Circle Reader Service Card No. 132

# SECTION**NEWS**

*Stay informed of critical issues in your industry! In these pages, you'll find news and information affecting your industry and your career.*

## Architects, Engineers, and Building Officials

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

### HOT ISSUES

### Preventing Large Nightclub Fires

**by JIM ARNOLD**

The most notorious nightclub fire of the past decade occurred on February 20, 2003, at The Station in West Warwich, Rhode Island. One hundred people died, and more than 200 were injured when a pyrotechnics display ignited combustible urethane foam packaging used as soundproofing behind the stage during a crowded concert. The foam, added 18 months earlier after neighbors complained of noise, was 20 times more combustible than wood and emitted dense, toxic smoke.

Flames spread at a speed of 1 foot (0.3 meters) per second, engulfing the single-story wood-frame building in 3 minutes. As the fire grew, the lights went out, plunging the evacuating crowd into darkness as toxic smoke filled the room. Most of the victims' bodies were later found piled at front entrance; few in the crowd had used the three other fire exits.

The 60-year old structure, which had passed a fire inspection the previous New Year's Eve, had no sprinklers because the local building code exempted small buildings erected before 1974. The club had no pyrotechnics permit, and the crowd was over the legal occupant limit of 404.

This fire demonstrates a number of fire safety issues assembly occupancies, particularly nightclubs, face. For example, most nightclub fires occur in facilities that do not have an automatic sprinkler system. Thus, older nightclubs should consider retrofitting sprinklers, and sprinklers in all structures should be kept free of obstruction by interior furnishings.

Portable fire extinguishers, properly inspected and maintained, can easily save a facility at a nominal cost. Club owners should provide the specified number of extinguishers and see that their staffs are trained in their proper use. Extinguishers should be inspected monthly. Unsprinklered nightclubs should also have at least one fire hose rack or cabinet to provide extinguishing capability for fires too large to put out with a portable extinguisher.

Smoke kills many more people than flames, yet few nightclubs have modern smoke control systems. A nightclub owner wishing to provide maximum protection should consider installing a smoke control system. If this is not possible, smoke detection and fire alarm systems, smoke and fire barrier walls, and extinguishing systems should be installed and kept in good operating condition. Such systems must never be disabled, and all alarms must be investigated immediately.

Because normal lighting systems often fail early in a building fire, hindering evacuation, they must be backed up by an emergency system. Battery backup is more reliable than an emergency generator. The batteries should be replaced and the emergency lighting system checked periodically.

All exits should be well marked by emergency lighting, unblocked, and open outward. The death toll in many nightclub fires has been significantly increased by exits locked to prevent unauthorized entrance. Choosing the number of entrances is best left to the facility manager, so that he or she can control crowd capacity, but all exits must be available whenever the facility is open to the public. No doors or windows in a public assembly area should be blocked by physical barriers.

Unauthorized entry can be prevented by alarming exits and placing security in the area. Alarmed exits should have warning signs, and signs can warn patrons that they will be removed from the premises if they open an alarmed exit. Revolving doors must be supplemented by panel doors.

In buildings with long, confusing exit corridors, signs must be posted to keep crowds moving toward the exits. Exit corridors must be of noncombustible material, and corridors and stairways must be kept free of combustibles. The exit path outside a nightclub must also be clear enough to allow the crowd to move away from the building, and all exterior fire escapes, including walkways, stairways, and ladders, must be operable and accessible.

Additions to the building's electrical system must be properly designed and installed by a licensed electrician. Substandard wiring is often brought into nightclubs by temporary shows.

#### Interior furnishings

As was the case in The Station fire, interior finishings may be replaced by materials that do not meet the code requirements for the original facility, resulting in a fire that burns faster or hotter than anyone could imagine and emits toxic smoke that kills patrons before they can escape.

Synthetic materials such as nylon, rayon, polyethylene, polypropylene, polyvinylchloride, and polyurethane foam are particularly dangerous. These materials ignite easily, usually sustain a fire once ignited, allow flames to spread quickly, and emit toxic fumes. Gaseous byproducts of combustion from such materials can accumulate in a room and flash over before a crowd can exit. This is particularly dangerous in buildings with low ceilings.

Materials that are difficult to ignite or that do not smolder or burn should be used. Modern materials with low flame- and smoke-spread ratings can duplicate any architectural finish required.

Interior ignition sources such as hot lighting, flame effects, cooking fires, pyrotechnics, and hot plates should be eliminated or kept to a minimum and protected by automatic extinguishing systems.
All interior ignition sources should be kept away from combustible interior furnishings.

#### Crowd control

Crowds that exceed the rated capacity are a recurring theme in large nightclub fires. The number of exits in new buildings is usually the minimum required to safely evacuate a rated-capacity crowd. Facility managers must ensure that the occupants do not exceed the legal rated-capacity limit, which should be clearly posted. Any modification that decreases the number of exits should result in a decrease in the facility's rated capacity.

During an emergency, most people move toward the exit they used to enter the building. This usually results in an overloaded exit since building codes typically require buildings to provide only 50 percent exit capacity through the main entrance. Emergency instructions should direct patrons to use all available exits.

Although some crowds will disregard danger until it is too late, others will respond to any warning with a panicked exit. Many crowds disregard audio instructions to leave an area. Since 9/11, however, a crowd can be expected to disregard audio instructions to remain in an area while an alarm is investigated.

Alcohol consumption may render patrons unable to perform a normal exit. Response times will be slower, movement may be uncoordinated, people will be less inclined to obey instructions, the crowd may be more susceptible to panic, and patrons may be hostile to emergency responders. Add to this the special effects many acts use, and the crowd may become disoriented. All special effects should be disabled as soon as a fire alarm sounds.

### The codes

A number of nightclub fires occur in unlicensed facilities that can spring up almost anywhere at any time. Raves and other illegal clubs, some of which are set up overnight in unoccupied buildings or in buildings intended for a different use are a growing problem local fire departments find difficult to monitor. These facilities almost certainly contain code violations.

Building and fire codes establish minimum requirements to ensure safe exiting for rated capacity crowds, provided all systems work as designed, including active mechanical and electrical systems. Because systems are often modified throughout the life of a building, however, they are almost never in the condition they were designed for the occupancy. A building owner can supplement the building's safety by installing new or additional alarm, suppression, or smoke control systems, even if they are not mandated by the existing codes. Such systems can lower insurance premiums and ensure that the building will not have to be replaced after a serious incident.

Some jurisdictions have roving patrols of fire inspectors to ensure code compliance at nightclubs, particularly with regard to maximum occupancy, emergency egress, combustibility of interior furnishings, and status of alarm and sprinkler systems.

All jurisdiction should examine their nightclub inspection programs. The most effective way to do this is to act as though your jurisdiction has just had a fatal nightclub fire and start inspecting facilities in which the most people would be exposed first. Once you start an inspection program that includes unannounced weekend visits, word will travel fast to the shoddy clubs.

### Failure to comply

The severity of most recent nightclub fires is a result of failure to comply with existing building and fire codes. In the wake of The Station fire, NFPA revised its codes to recommend sprinklers in new clubs with a capacity of 50 or more occupants and in existing clubs with a capacity of 100 or more occupants.

Rhode Island adopted new regulations banning indoor pyrotechnic displays in assembly occupancies with occupancy limits under 1,000 people. The state also required that nightclubs accommodating more than 300 occupants be sprinklered by July 1, 2005; nightclubs with more than 150 occupants must install sprinklers by July 1, 2006. All Rhode Island nightclubs must install low-level exit signage by 2006. In addition, the state eliminated the grandfather clause exempting older buildings from complying with new code requirements and gave local fire officials the authority to inspect nightclubs during operating hours and close those violating fire codes.
The state also filed charges of 200 counts of involuntary manslaughter against the band's manager and the club owners.

Many other states also began extensive nightclub inspections, and eight tightened their indoor pyrotechnic regulations. Boston banned indoor fireworks altogether.


*Jim Arnold is an associate engineer in the Building Division of the Clark County, Nevada, Department of Development Services.*

**HOW TO REACH US: Allan Fraser, Executive Secretary, (617) 984-7411, afraser@nfpa.org**


## Aviation

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

### HOT ISSUES

#### Committee Welcomes New Chair

The NFPA Technical Committee on Aircraft Rescue and Fire Fighting (ARFF) met in Las Vegas, Nevada, from October 25 to 27.

The first order of business was to welcome the new committee chairman, Larry Powers, deputy chief of the Massachusetts Port Authority fire department at Logan International Airport in Boston. On behalf of the committee, Powers then presented outgoing Chairman Brian Boucher, an A-340 pilot for Air Canada, with a plaque commemorating his 10 years of service as committee chairman. Powers had many words of praise for Boucher, finishing with "I hope I can live up to the standards that you have set and inspire this group to continue the shared vision and direction to continually improve aircraft rescue and firefighting." Captain Boucher will continue to serve on the committee, of which he's been a member since 1986.

At the meeting, the committee finished revising NFPA 414, *Aircraft Rescue and Fire Fighting Vehicles*. One item under consideration was the need to address vehicles firefighters use to access aircraft, including the new double-decker Airbus A-380. The committee looked at performance-based criteria, such as basing the vehicle recommendation on exit sill heights of the aircraft depending on the particular airport rather than prescriptively detailing the exact height. The new edition of NFPA 414 will be available in September 2006.

Chairman Powers appointed two task groups to begin reviewing and recommend changes to NFPA 402, *Aircraft Rescue and Fire Fighting Operations*, and NFPA 424, *Airport Community Planning*. Both documents are in the June 2007 revision cycle.

**HOW TO REACH US: Mark Conroy, Executive Secretary, (617) 984-7410, mconroy@nfpa.org**

## Building Fire Safety Systems

**WEB SITE**: www.nfpa.org/bfss
**CHAIR**: Neal Krantz, LCV Technologies, Inc.

**HOT ISSUES**

**False Alarms and Ground Transients**

Recent NFPA reports indicate that U.S. fire departments responded to 2.2 million false alarms in 2004. The culprit in most of the alarms may have been ground transients, a hypothesis suggested by the fact that NFPA data also suggest that 36 percent of false alarms can be attributed to "system malfunctions, which can result from mechanical failure or from improper installation or maintenance."

Ground transients are destructive pulses, introduced into buildings through ground electrical systems, that are caused by external factors such as lightning strikes and utility switching. Nearly 75 percent of all ground transients in a building are generated when inductive loads, such as transformers, are switched, producing a sudden dissipation of stored magnetic energy into the rest of the system.

Without proper protection, electronic fire alarm and security systems are vulnerable to ground transients. Today's surge protection protects line-to-line and line-to-neutral entry points, but transients can travel freely through ground lines and interrupt semiconductors on fire and security systems.

Recently, PVA and Harmonie Technologies conducted tests in accordance with IEC 61000-4-5 and IEEE/ANSI C62.41, 42, and 45 verifying that traditional surge protection products, be they surge strips or uninterruptible power supplies (UPS), do not protect alarm systems from ground transients. In each test, a surge generator was used to produce significant transients that were fed through two different electrical systems. An oscilloscope measured and monitored the surge voltage and surge currents, and showed the amplitude of the voltage.

In the first test, a fire alarm panel and a security access panel were hooked up to a standard UPS, and voltage surges of 1,000 volts were sent to each system. At 2,000 volts, the UPS-protected systems experienced false alarms. Once the generator ramped up to 5,000 volts, both the UPS and the fire and access panels connected to it were blown and caught fire.

**HOW TO REACH US: David Hague, Executive Secretary, (617) 984-7452, dhague@nfpa.org**

## Education

**WEB SITE**: www.nfpa.org/edsection
**CHAIR**: Paul Schwartzman

**HOW TO REACH US: Judy Comoletti, Executive Secretary, (617) 984-7287, jcomoletti@nfpa.org**

## Electrical

**WEB SITE**: www.nfpa.org/electrical
**CHAIR**: Paul Dobrowsky, Innovative Technology Services

**HOT ISSUES**

**States Adopt 2005 *NEC***

Since NFPA issued the 50th edition of NFPA 70, *National Electrical Code® (NEC®)*, 14 states have adopted it for use statewide. Many state and local governments update their own electrical codes in conjunction with the three-year *NEC* revision cycle.

"The quality of the 2005 *NEC* is what led us to make this decision," said Don Offerdahl, executive director of North Dakota's Electrical Board. "We know that the provisions in the 2005 *NEC* have strengthened public safety in our state."

"Our focus is on providing the safest electrical requirements possible," said Bill Laidler of the Massachusetts Board of Fire Prevention Regulations. "The fact is the 2005 *NEC* provides the best set of safety requirements ever found in an electrical code."

Joining North Dakota and Massachusetts in adopting the 2005 *NEC* are Colorado, Idaho, Nebraska, New Hampshire, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, Texas, Washington, and Wyoming. Many other states have already started the process of updating their current *NEC* adoption to include the 2005 edition.

"We wanted to have those and other electrical safety provisions in place in our state, and that is why we worked quickly to adopt and begin using the 2005 *NEC*," said Offerdahl.

**HOW TO REACH US: Jeff Sargent, Executive Secretary, (617) 984-7442, jsargent@nfpa.org**

## Fire Service

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

**HOT ISSUES**

**2003 Assistance to Firefighters Grant**

On September 30, the U.S. Department of Homeland Security's (DHS) Assistance to Firefighters Grant (AFG) program announced the availability of the FY 2003 AFG Program Summary Report.

The AFG awards one-year grants to support fire departments that lack the tools and resources necessary to protect the public and firefighting personnel from fire and fire-related hazards. From its FY 2003 two-year appropriation, AFG awarded more than 8,760 grants totalling more than $700 million.

The program is conducted by the DHS's Office for State and Local Government Coordination and Preparedness (SLGCP) in cooperation with the United States Fire Administration (USFA). SLGCP is responsible for preparing the United States to deal with acts of terrorism. This includes coordinating preparedness efforts at the federal level and working with state, local, tribal, parish, and private-sector emergency responders on all matters pertaining to combating terrorism, including training, exercises, and equipment support.

To see the program report, please visit www.firegrantsupport.com/afg/reports.

**HOW TO REACH US: Gary Tokle, Executive Secretary, (617) 984-7490, gtokle@nfpa.org**

## Fire Science and Technology Educators

**WEB SITE**: www.nfpa.org/firescience
**CHAIR**: Patrick Kennedy, John A. Kennedy & Associates

**HOT ISSUES**

**Higher Education for Emergency and Fire Services**

by PATRICK M. KENNEDY

The Consortium of Higher Education for Emergency and Fire Services represents seven U.S. colleges and universities that offer certificates and associate's and bachelor's degrees for the fire and emergency services community through the U.S. Fire Administration National Fire Academy's (NFA) Degrees at a Distance Program (DDP), previously called the Open Learning for the Fire Service Program. DDP provides fire service personnel with an alternative means of pursuing college-level learning without attending classes on campus.

This independent-study program, managed by the NFA, has concentrations in fire science, fire administration/management, and fire prevention technology. Participating schools emphasize faculty-student interaction through written, online, and telephone contact. Students receive detailed guidance and feedback on the required assignments and take proctored final exams at hometown locations.

Because DDP courses are junior- and senior-level courses, the program is perfect for those who already have an associate's degree. NFA awards certificates for the successful completion of six courses. Students who simply wish to upgrade their professional skills may take individual courses for credit.

The goals of the DDP curriculum are to prepare graduates for professional and allied service positions in all levels of government, business, and industry; give graduates the knowledge and skills necessary to apply the theories and practices of fire administration and prevention technology effectively; and enable graduates to provide leadership in the preservation of life and property resulting from all types of emergencies and disasters.

DDP courses include:

- Advanced Fire Administration: Organization and management techniques required in fire service administration.
- Applications of Fire Research: Understanding fire research programs and the implications of research results for fire prevention and protection programs.
- Fire Dynamics: The study of the fluid mechanics and thermodynamic principles of fire propagation.
- Personnel Management for the Fire Service: Personnel management procedures and problems in the fire service.
- Analytical Approaches to Public Fire Protection: An introduction to analytical procedures and applications in community fire protection.
- Community and Fire Threat: The sociological, economic, and political characteristics of communities and their effect on the fire problem.
- Disaster and Fire Defense Planning: The concepts and

principles of fire risk assessment.
- Fire Prevention Organization and Management: An overview of the techniques, procedures, programs, and agencies involved in fire prevention.
- Fire Protection Structures and Systems Design: Design principles in structural fire protection with empirical or analytical tests and prediction procedures.
- Fire-Related Human Behavior: Human behavior before, during, and after fire and emergencies.
- Incendiary Fire Analysis and Investigation: A management approach to the arson problem.
- Managerial Issues in Hazardous Materials: The issues that confront hazardous materials program managers.
- Political and Legal Foundations of Fire Protection: The legal aspects of the fire department's role in public safety.

For more information, visit www.usfa.fema.gov/training/nfa.

**HOW TO REACH US: Frank Florence, Executive Secretary, (617) 984-7480, fflorence@nfpa.org**

## Health Care

**WEB SITE**: www.nfpa.org/healthcare
**CHAIR**: Susan McLaughlin, SBM Consulting

### HOT ISSUES

#### Chair's Corner

For the past year, the Health Care Section has explored the possibility of presenting an award to an individual or a health-care organization for outstanding achievements in fire safety or emergency management. A task force made up of Skip Gregory, Dean Menken, Max Hauth, and I drafted proposed criteria that were accepted by the executive board and the section at the World Safety Conference & Exposition® (WSC&E®) in Las Vegas.

We determined that award recipients could demonstrate achievement in one of three general categories: fire safety training, emergency management, or community outreach. Each category will contain suggestions for areas of achievement that are meant to spark the imagination of anyone considering a submission. Submissions themselves will consist of an essay of 1,000 words or fewer and must include supporting data whenever possible. Litigation scenarios will not be accepted.

We anticipate that the award will be presented annually at the WSC&E, and we hope to be able to present the first award in 2007. NFPA will provide a single recipient with a complimentary WSC&E program registration each year, and we hope to be able to provide transportation and travel expenses, which we anticipate will come to about $1,500. The Health Care Section is seeking sponsors whom we will recognize at the time the award is presented.

The section believes that this award will serve to highlight the important issues of fire safety and emergency management in health-care organizations. In addition, NFPA will benefit from the increased interest and awareness, as will the section itself.

If you or your company would consider sponsoring the Health Care Section award, please contact me at sbmconsult@ameritech.net.

#### Planning Today for Tomorrow's Disasters

by MAX HAUTH, N.H.A.

Planning and preparing for tomorrow's disasters have become major concerns in the United States. In 2001, terrorists attacked the World Trade Center. In 2004, four hurricanes devastated Florida. And in 2005, Hurricane Katrina nearly destroyed New Orleans. These events have made us acutely aware of how important workable emergency management plans are, particularly for our health-care facilities.

Recently, the Joint Commission for Accreditation of Health Care Organizations (JACHO) and the federal government's Center for Medicare and Medicaid (CMS) adopted NFPA 99, *Health Care Facilities*, which defines and establishes the minimum requirements for disaster preparedness for health-care facilities, as a required standard for licensing health-care facilities. As part of this standard, the federal government requires a written disaster/emergency management plan for all medical facilities, including nursing centers, ambulatory surgical centers, and hospitals. These plans are approved by the local Office of Emergency Planning or the authority having jurisdiction (AHJ) and verified by federal, state, and local officials and by JACHO with each licensing survey.

Nonetheless, experience has taught us that disaster management plans may not take into consideration the fact that patients or residents may have to be taken some distance away from their current location or that their needs must be continuously met until they return. It has also taught us that suppliers and other medical support companies may not understand the roles they are expected to play in the event of a disaster, that new managers may not be familiar with the emergency plans or personnel needed during an emergency, and that the local emergency management office may not know who is in charge of the facility or what its emergency plans are.

Chapter 12.3.3.9 of NFPA 99 clearly states that "Each organizational entity shall implement one or more specific responses of the emergency management plan at least semiannually. At least one semiannual drill shall rehearse mass casualty response for health-care facilities with emergency services, disaster receiving stations, or both." Both CMS and JACHO have made have noted that they will enforce the required drills and disaster plans during surveys.

As recent tragedies have made clear, effective disaster planning is essential in saving lives and property during emergencies.

**HOW TO REACH US: Rich Bielen, Executive Secretary, (617) 984-7279, rbielen@nfpa.org**

## Industrial Fire Protection

**WEB SITE**: www.nfpa.org/industrial
**CHAIR**: Mike Snyder, Dow Corning Corporation

### HOT ISSUES

#### Chair's Corner

Recent hurricanes and flooding along the U.S. Gulf Coast are again providing fertile learning opportunities for emergency planning, preparedness, response, and recovery professionals in the industrial and commercial sector, whose jobs include the management of natural and man-made hazards affecting the industrial community.

As members of the Industrial Fire Protection Section (IFPS), we need to be open to the lessons arising from these tragedies, making a personal commitment to use them in our organizations. Among the specific challenges are:

- Occupant and employee understanding of the actions required to protect them during non-fire-related events, particularly weather emergencies. NFPA's Web site has a variety of resources to help promote awareness of, and preparedness for, natural disasters among children through the Risk Watch® Program. Visit www.nfpa.org/riskwatch/RWND/. FEMA offers an in-depth guide to citizen emergency preparedness at www.fema.gov/areyouready/.
- Community and regional command and control of massive disaster scenes, with particular emphasis on understanding the National Incident Management System (NIMS) and the National Response Plan (NRP). NIMS enables government, private-sector, and nongovernment organizations nationwide to work together during domestic incidents. You can find detailed information about NIMS at www.fema.gov/nims/. The NRP specifies how the resources of the federal government will work with state, local, and tribal governments and the private sector to respond to incidents of national significance. For detailed information visit www.dhs.gov/nationalresponseplan. IFEMA provides excellent awareness training on these two topics at www.training.fema.gov/EMIWeb/IS/crslist.asp.
- Business continuity and recovery from large-scale disasters. NFPA provides a number of resources to aid in emergency management programs, including NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs.*

I hope we can publicize and share the lessons learned from these events in future NFPA educational sessions. If your organization has identified effective solutions, the IFPS would appreciate hearing from you so we may find ways to share them with other NFPA members.

Remember, our preparedness efforts make a huge difference. When we prepare for disasters, the results will be improved outcomes for all involved.

#### Further Reflection on Hurricane Katrina's Aftermath

Hurricane Katrina is forecast to be the costliest natural disaster ever to hit the United States, with insured loss reportedly as high as $60 billion and a total economic loss of twice that amount. These insured losses from Katrina are compounded by losses resulting from a number of other catastrophes outside the United States, such as Storm Erwin in Europe last January; floods in Austria, Switzerland, and Germany in August; recent typhoons in Japan; and flooding in the south of France.

Insurers are facing massive pay-outs that will have big implications for their balance sheets, and a hardening of the North American commercial property insurance market is probably inevitable. Industrial fire protection professionals who wear risk management hats should anticipate changes in future pricing, terms, and conditions of their property insurance programs. Some companies' capacity to continue underwriting may be suspended, especially those whose books are heavily CAT-exposed.

In many instances, industrial fire protection professionals have data that can supplement the overall quality of the property insurance submittal. Underwriters will seek more in-depth information on risks pertaining to location, construction details, and existing protection. Providing accurate, detailed data for your portfolio of locations can make a remarkable difference in how the various proprietary and in-house catastrophe models estimate your natural hazard exposure and how the property insurance marketplace perceives your risk.

Details on business continuity efforts will also be a premium. A disaster and emergency management and business continuity program modeled after NFPA 1600 will allow you to negotiate from a position of strength and help you effectively communicate your ability to maintain operations and conduct business in the wake of a major disaster.

### Chapter News

More than 50 people attended the Niagara Frontier Chapter's 2005 Fall Seminar on October 5 at the Main Transit Fire Hall in Amherst, New York.

The morning topics were fire alarm commissioning, presented by Mike DeVore of State Farm Insurance, and NICET history and fields of specialization, presented by Paul Stockman, NICET Administrator for fire protection programs. Afternoon topics covered dry-chemical system applications and standards, as well as changes in the 2002 edition of NFPA 25, *Inspection, Testing, and Maintenance of Water-Based Extinguishing Systems.*

All sessions were certified for New York State code enforcement in-service training credits and by PIE for New York State P.E. professional development hours.

It has been several years since the Niagara Frontier Chapter held a full-day seminar, and chapter members are considering offering training seminars more often to expand the chapter membership.

The Illiana Chapter announced its officers for the 2005-6 season:

**President:** Todd Schumann, GE GAPS (retired); 3044 W. 100th Street, Evergreen Park, IL 60805; (708) 423-7066; tschum3063@aol.com

**Vice President:** Joe Schmitt, Alsip Fire Department, Fire Station 2; 11946 S. Laramie, Alsip, IL 60803; (708) 385-6902, ext. 237; afd3074@aol.com

**Secretary:** Ted Main, HSB Professional Loss Control; 5 South 661, Buttonwood Court, Naperville, IL 60540; (630) 416-3952; theodore_main@hsb.com

**Treasurer:** Bob Pikula, Reliable Fire Equipment Co.; 12845 S. Cicero Ave, Alsip, IL 60803; (708) 597-5077; rpikula@reliablefire.com

The chapter also scheduled its bi-monthly meetings for November 30, 2005, and for January 25, March 19, and May 31, 2006.

### New Board Members

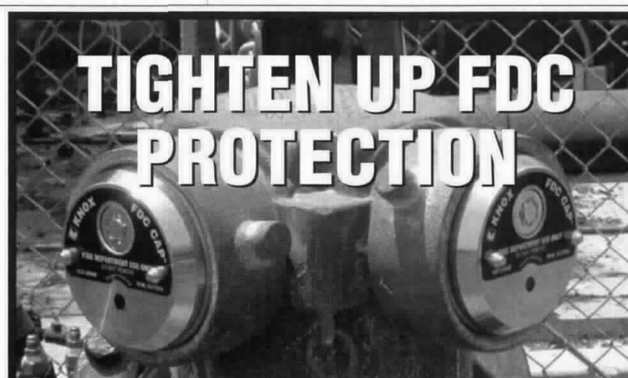
IFPS is pleased to welcome two new Board members, Danny P. Miller, senior manager for Security and Fire Protection at The Boeing Company in St. Louis, Missouri, and Arie Go, principal fire protection and principal mechanical engineer for Bechtel Corporation.

Miller was appointed to his post in 2004. As a member of the Boeing Strategy Council, he recently developed the Boeing Risk Assessment system used at all Boeing sites across the enterprise. He previously served as battalion fire chief at the Boeing Fabrication Division Auburn, Washington, where he led disaster preparedness activities and the emergency operations team. He was also a member of the threat-of-violence response team and was the Boeing Seattle 911 communications manager, successfully reorganizing, staffing, and training the Puget Sound Dispatch Center.

Miller began his Boeing career in 1987 as a firefighter after completing his four-year enlistment as a fire protection specialist in the United States Air Force. He has held every rated position in the fire department from firefighter to chief.

Arie Go has been an engineering specialist in fire protection and mechanical engineering








with Bechtel for more than 30 years. As a registered professional engineer in both fire protection and mechanical engineering, he has led numerous projects around the globe involving detailed engineering analysis for nuclear, petrochemical, and other industrial facilities. He has also assessed fire and life safety provisions for several major airports.

Go currently serves on the NFPA Technical Committee on Nuclear Facilities.

**HOW TO REACH US: Guy Colonna, Executive Secretary, (617) 984-7435, gcolonna@nfpa.org**

## International Fire Marshals Association

**WEB SITE**: www.nfpa.org/ifma
**CHAIR**: Fire Marshal Scott Adams, Park City, Utah, Fire District

**HOT ISSUES**

**IFMA Participates in PARADE Conference**

IFMA representatives, along with state and metro fire marshals, participated in the third annual PARADE (Prevention, Advocacy Resources and Data Exchange) Conference held at the U.S. Fire Administration from November 13 to 16. This is an excellent opportunity for state, metro, and IFMA representatives to share fire prevention, fire safety, and life safety programs.

**Professional development**

The International Fire Marshals Association Fire Protection Institute Management Institute for Fire Prevention is being offered from December 5 to 7, 2005, in Gleneden Beach, Oregon. For information, visit www.ofma.net. Anyone interested in attending or sponsoring a program may contact Section Executive Secretary Steven F. Sawyer at (617) 984-7423 or ssawyer@nfpa.org. Check www.nfpa.org/ifma for details.

**Web board**

Anyone interested can post news or information on educational offerings and employment opportunities on IFMA's Web board at www.nfpa.org/ifma.

**And don't forget...**

IFMA is in the final planning stages for our 100th anniversary celebration at the 2006 NFPA World Safety Conference & Exposition® in Orlando, Florida, to be held from June 4 to 9, 2006. See you there.

**HOW TO REACH US: Steven Sawyer, Executive Secretary, (617) 984-7423, ssawyer@nfpa.org**

## Latin American

**WEB SITE**: http://www.nfpa.org/latinamerican
**CHAIR**: José Figueroa, FM Global

**HOT ISSUES**

**NFPA Signs Agreement with Grupo CIPA**

On July 20, NFPA and Grupo CIPA, one of the biggest magazine publishers and event organizers in Brazil, signed an agreement that will allow CIPA to print and distribute the *NFPA Journal Latinoamericano* in Brazil, where it has a circulation of approximately 4,500. The agreement is the first in a series of that will enable NFPA and CIPA to combine their fire and life safety efforts in Brazil.

The agreement was signed during the Americas' Fire & Security Expo in Miami. Present at the signing were NFPA Executive Vice-President Arthur Cote, CIPA Executive Director José Roberto Sevieri, NFPA's Director for Global Operations Olga Caledonia, NFPA Global Communications Specialist Gabriela Portillo Mazal, and Walter D. Grijalvo, editor of *NFPA Journal Latinoamericano*. CIPA will publish its first issue in December.

NFPA's joint efforts with CIPA will focus on making NFPA's codes, standards, and training and professional certification materials available in Portuguese. They will also bring conventions and trade shows, local chapters, and membership benefits to the area.

**Fire, Security, and Electrical Safety Show in Mexico**

NFPA will hold its third annual Fire and Security Expo Mexico in Mexico City in November 2006. The expo will feature exhibitors offering products and services for all aspects of fire protection, life, security, and electrical safety, including access control, building materials, extinguishing equipment, and sprinkler systems.

Presented by internationally recognized experts, the conference program will address a variety of topics, such as detection and suppression systems, storage tanks protection, hazmat and detoxification, aircraft fires, high-rise fires, and life safety.

In addition to the exposition, NFPA will hold an *NEC* Forum. PROY-NOM-001-SEDE-2003, Mexico's new electrical installations standard based on the 1999 edition of the *National Electrical Code®* (*NEC®*), went into effect this year, making the *NEC* Forum a vital conference for the industry. The forum will focus on the use of electrical equipment and materials required by the PROY-NOM-001-SEDE-2003 and the *NEC*.

**HOW TO REACH US: Olga Caledonia, Executive Secretary, (617) 984-7231, ocaledonia@nfpa.org**

## Lodging Industry

**WEB SITE**: http://www.nfpa.org/lodging
**CHAIR**: Richard Anderson, Chimney Hill Farm Inn

**HOT ISSUES**

**Fire and Emergency Response for Hospitality Properties**

**by CHIEF (RET) RICHARD R. ANDERSON, C.F.P.S.**

In my role as a fire safety advocate/consultant for the Professional Association of Inn Keepers, I was asked to provide a guideline that bed-and-breakfast owners and innkeepers can use to develop fire and emergency response plans.

In my search, I came across information developed to help businesses in the Australian hospitality industry manage the Australian Occupational Health, Safety and Welfare Regulations 1995 and all relevant codes of practice. It was developed using the combined experience of many other businesses to satisfy the requirements of the Occupational Health, Safety and Welfare Act 1986.

The approach uses the SAFE system: See, Assess, Fix, and Evaluate. Using the SAFE system approach and key principles from NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs*, I developed the following guideline.

**See it**

In the event of an emergency, the building owner or occupier a must make sure the occupants can get out safely. The level of emergency response will depend on the size and nature of the facility, and the level of emergency response preparedness will depend on the type of emergency and the level of risk it poses. In the hospitality industry, we have to consider not only employees but also guests and visitors.

The first step is to consider the magnitude of potential emergencies that would require an emphasis on occupant safety. These include high winds, power failures, elevator emergencies, natural or propane gas leaks, fire, explosions, floods, hazardous material releases, tornadoes, earthquakes, bomb threats, structural collapse, and armed robbery or workplace violence with a weapon. Terrorist attacks could also result in an explosion, fire, or hazardous materials release.

Things to consider when developing a preparedness plan include determining who is at risk. Customers? Staff? Both? Customers are sometimes harder to protect because they do not know the risks. You must also determine the probable severity of the damage and decide on an acceptable outcome.

**Assess it**

When assessing the risks, look at how likely it is that someone will get hurt, how badly they will be hurt, and how likely it is that injuries will occur.

**Fix it**

The next step is to outline and clearly communicate the employees' roles and responsibilities, and determine how their actions will integrate with those of the emergency services. This should include employees' roles in the incident management system of the responsible agency. You should be able to direct, control, and coordinate response and recovery operations.

Evacuation plans must be posted where guests and employees can see them. All emergency exits should be clearly marked, and exits and paths of egress must be clear of obstructions.

The staff should be trained to respond and told what to do when dealing with specific types of emergencies. Adequate and appropriate fire or other emergency response equipment must be available and ready for use at all times.

Finally, all emergency contact details should be up to date.

**Evaluate it**

Finally, you must develop a self-audit program to answer the following questions:

- Have evacuation plans been posted, and are they clearly visible?
- Are all exits are clearly marked and clear of obstructions?
- Do we conduct drills to determine whether staffers understands their roles and responsibilities in an emergency?
- Has the fire detection and suppression equipment been inspected, maintained, and tested to verify that it operates?
- Are all deficiencies documented, and is there an action plan to correct the deficiencies and track them to completion? The action plan should identify the deficiencies, recommend corrections, note when they will be fixed. I suggest giving the general manager quarterly updates of the action plan to ensure that corrections are completed in a timely manger.

*Chief Anderson, managing director of Anderson Risk Consultants, chairs the NFPA Executive Committee Lodging Industry Section.*

**HOW TO REACH US: Greg Harrington, Executive Secretary, (617) 984-7471, gharrington@nfpa.org**

## Metropolitan Fire Chiefs

**WEB SITE**: http://www.nfpa.org/metro
**CHAIR**: Fire Chief Kelvin Cochran, Shreveport, Louisiana

**HOT ISSUES**

**Metro Chiefs' DHS Recommendations**

The Metro Section executive board serves as the core of the NFPA Urban Fire Forum, which met from September 22 to 24 at NFPA headquarters to finalize the Metro strategic plan and the Metro/Urban Fire Forum's position on the Department of Homeland Security (DHS), the Federal Emergency Management Agency (FEMA), and the United States Fire Administration (USFA). Among the participants were fire chiefs from Shreveport, Louisiana; Miami and Fort Lauderdale, Florida; Cobb County, Georgia; Chicago, Illinois; Charlotte, North Carolina; Los Angeles, San Diego, Contra Costa County, Alameda County, and Fairfield, California; Las Vegas, Nevada; Milwaukee, Wisconsin; Boston and Worcester, Massachusetts; Philadelphia, Pennsylvania; Minneapolis, Minnesota; and Toronto, Canada.

After reviewing the preparedness, response, and aftermath of Hurricanes Katrina and Rita, the Urban Fire Forum recommends using the National Incident Management System (NIMS) to coordinate preparedness, response, and recovery for all incidents. The implementation of NIMS must be accelerated and enforced at all levels of government without exception.

The forum also recommends elevating the director of FEMA to a Cabinet-level position to ensure that prevention, response, mitigation, and recovery efforts for disasters and other emergencies will receive appropriate support. The posts of FEMA director, undersecretary for Preparedness, and USFA administrator should be held by qualified individuals with fire service and emergency management experience.

Further, the fire service must be given a leadership role in emergency response and public safety through appointments to key DHS and FEMA positions. The U.S. fire service developed the incident management system and has experience in emergency preparedness, response, and recovery.

As the federal government re-evaluates the responsibilities of federal agencies responding to natural disasters and acts of terrorism, the Metro Chiefs offer our experience and resources to help with the re-structuring efforts. As a first step, we will work with NFPA, the International Association of Fire Chiefs, and the International Association of Fire Fighters to develop a list of individuals qualified for key DHS and FEMA positions.

For further information, contact Chief Kelvin Cochran at (318) 763-6655 or CochranSFD@mycingular.blackberry.net, or Russ Sanders, executive secretary, at (502) 894-0411 or rsanders@nfpa.org.

**HOW TO REACH US: Russ Sanders, Executive Secretary, (502) 894-0411, rsanders@nfpa.org**

## Rail Transportation Systems

**WEB SITE**: www.nfpa.org/rail
**CHAIR**: James Gourley, Fire Protection Engineer

**HOW TO REACH US: Jim Lake, Executive Secretary, (617) 984-7470, jlake@nfpa.org**

## Research

**WEB SITE**: www.nfpa.org/researchsection
**CHAIR**: Daniel Madrzykowski, NIST

**HOT ISSUES**

### Web portal launched

The National Science Foundation, National Institute of Standards and Technology, and Worcester Polytechnic Institute have formed a partnership to create a digital library for the building and fire science communities. This digital library, launched in August and known as FABERC, will consist of online resources accessible through a portal that will be widely available, easily accessed, and broadly indexed

FABERC, which stands for Fire and Building Education Resource Collection will be a clearinghouse of collections, with partners developing, contributing, and maintaining their own collections, all accessible and searchable under the FABERC umbrella.

FABERC will lead the user to information of which he or she might not otherwise be aware. While search engines deliver links but little assessment of applicability to a specific field, online portals enhance search capabilities, provide an evaluation of content quality, aggregate results, and enable browsing by categories.

The National Science Foundation, through its National Science Digital Library (NSDL) program, provides funding for interlinked digital libraries in diverse technical areas. FABERC will add to the collection.

You are invited to join the FABERC effort by participating in collection development, governance structure, policy selection and application, and accession of existing resources. The audience for FABERC will include architects, engineers, manufacturers, authorities having jurisdiction, contractors, owners, fire investigators, and educators. For more information, go to www.faberc.org.

### Firefighter Forcible Entry Research

Many government facilities have blast-, hurricane-, and ballistic-resistant windows designed to protect occupants from glass fragments and debris that result from explosions, high winds, gunshots, and other severe events. The windows are harder to break than typical windows, which may cause difficulties for unsuspecting occupants or firefighters trying to vent the building or clear a window during an emergency.

The U.S. General Services Administration (GSA) Public Building Service sponsored the development of data intended to inform occupants and emergency responders of the windows' characteristics and to provide Web-based training in proper methods of entering or leaving through such windows. The training presents information on the windows, along with methods for, and issues associated with, clearing them.

The training is available to the public at www.oca.gsa.gov/firefighter/index.php. The report and a training manual are downloadable from the site.

Students may evaluate their knowledge by taking an examination, and they are eligible for a certificate of training if they pass the test. Since the site was introduced last July, several hundred people have taken the course and successfully passed the exam.

For more information, contact Steven Smith at stevenc.smith@gsa.gov or Willie Hirano at willie.hirano@gsa.gov.

**HOW TO REACH US: Rita Fahy, Executive Secretary, (617) 984-7469,rfahy@nfpa.org**

## Wildland Fire Management

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

**HOT ISSUES**

### Wildland Fire Management Section

The Wildland Fire Management Section will host a membership meeting in conjunction with the Ninth Wildland Fire Safety Summit to be held in Pasadena, California, from April 25 to 27. The meeting will include a program session on two educational topics and a business session.

The first educational session is *Meeting Training Needs for Rural and Volunteer Fire Fighters*, presented by Kelly Hawk, a community protection specialist at the Bureau of Land Management. She will discuss the role of local, rural, and volunteer fire departments in wildland fire initial attack activities. Efforts are underway to make better use of local suppression resources, but many rural and volunteer fire departments in the United States lack basic wildland fire suppression training and equipment.

The second session will be a *Preview of Section-Sponsored Education Sessions* at the NFPA World Safety Conference & Exposition® to be held in Orlando, Florida, from June 4 to 9, 2006.

Registration for the summit begins December 1. Watch for updates on www.iawfonline.org.

**HOW TO REACH US: Jim Smalley, Executive Secretary, (617) 984-7483, jsmalley@nfpa.org**

United States Postal Service

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