2003 U.S. Reports: Large-loss Fires · Firefighter Injuries · Fire Loss

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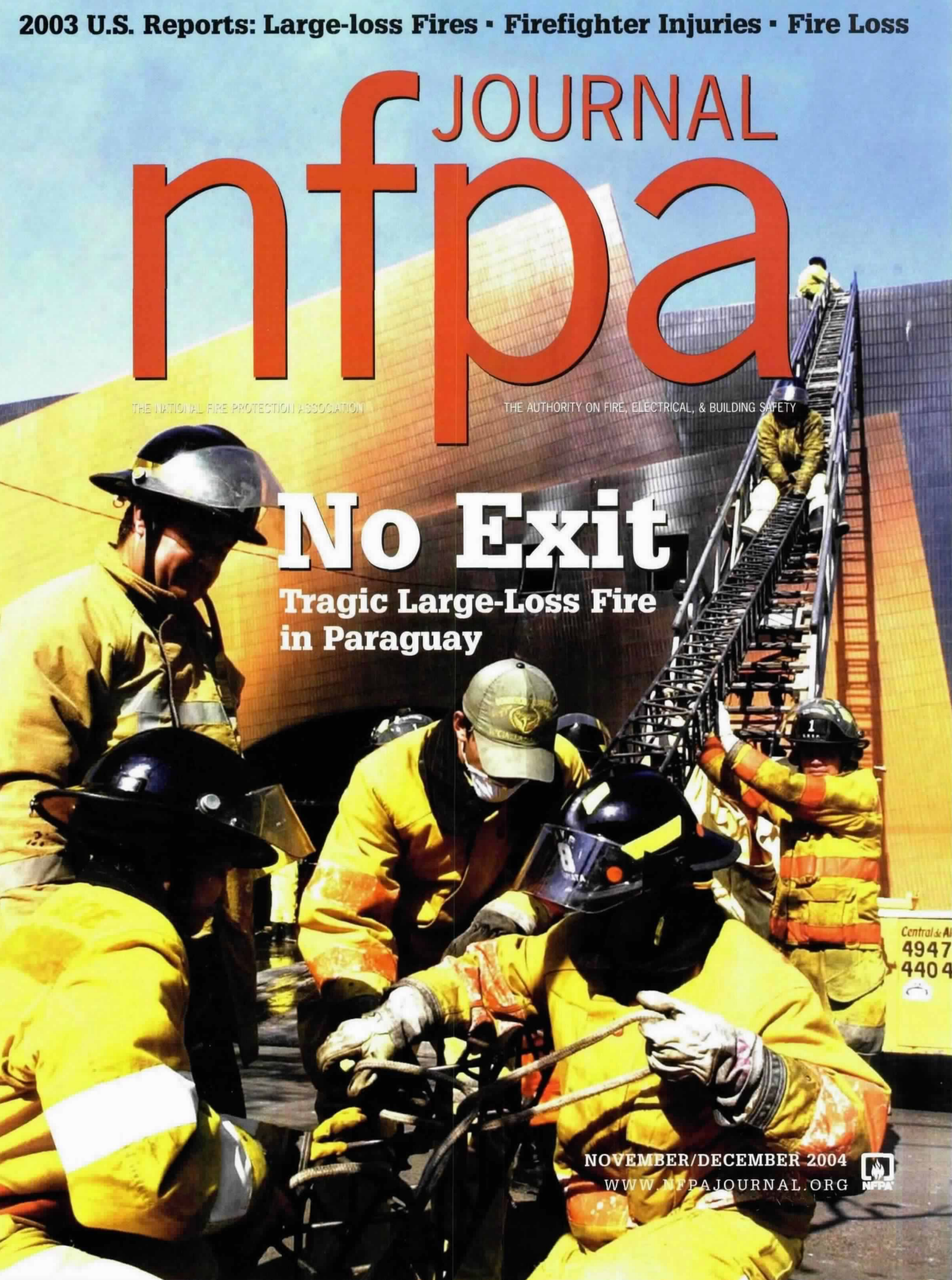
No Exit

Tragic Large-Loss Fire in Paraguay



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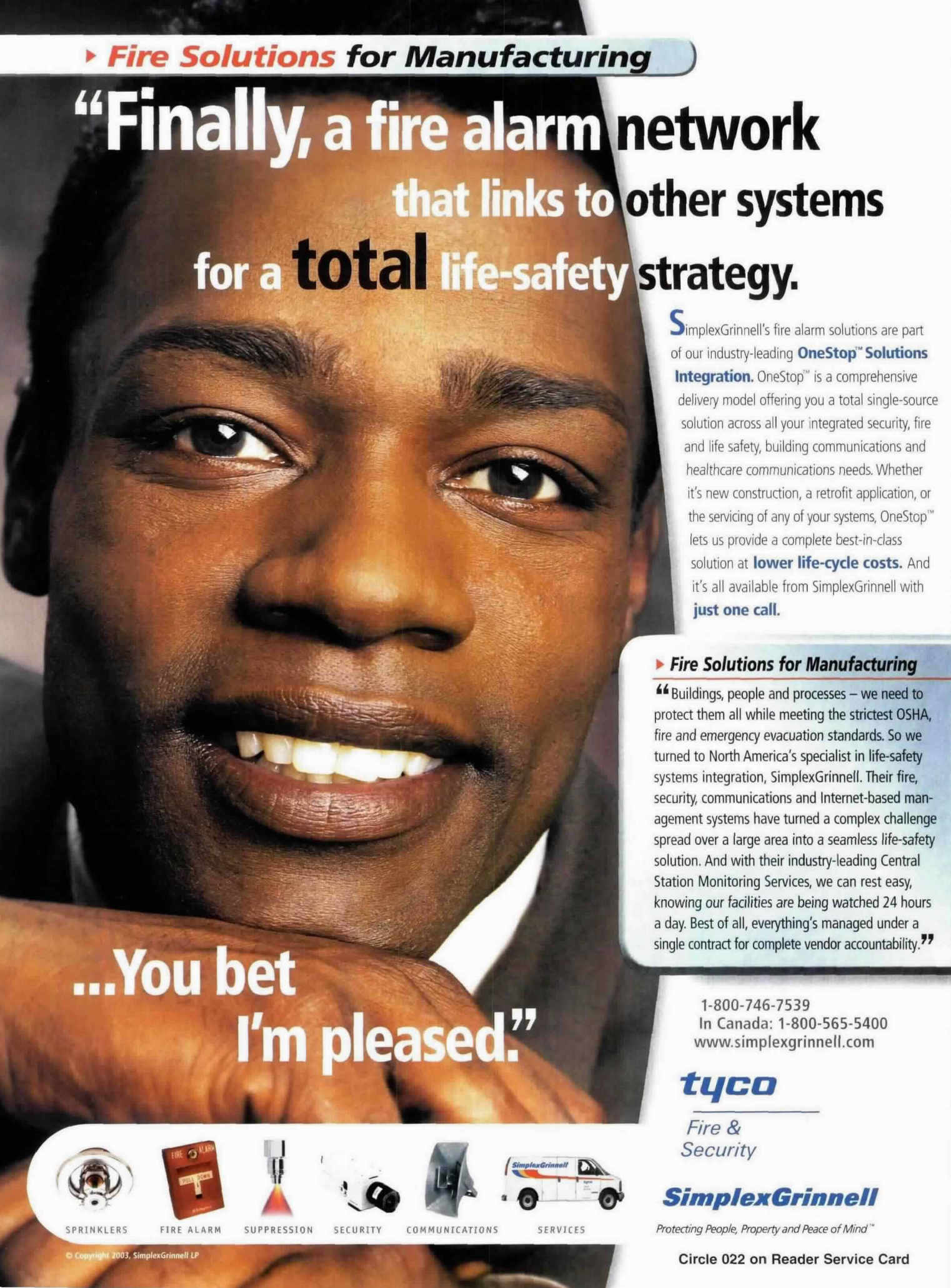

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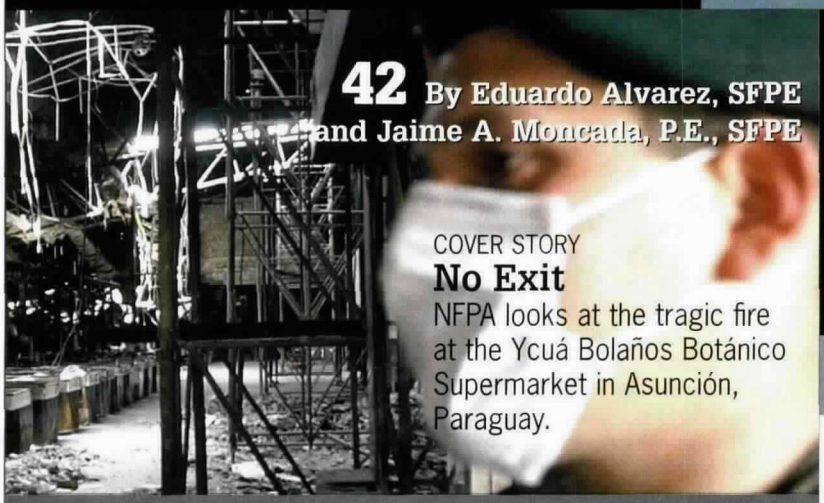

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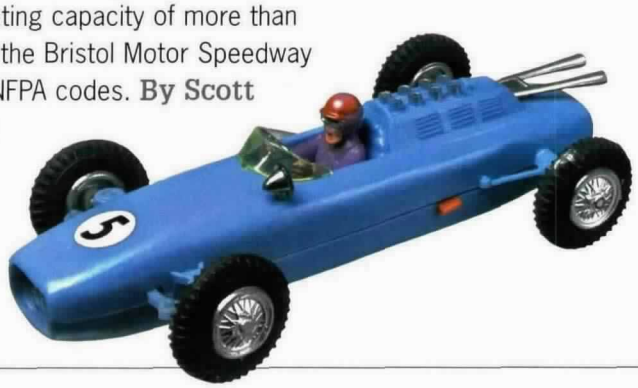
FEATURES



COLUMNS & DEPARTMENTS

ON THE COVER: Paraguayan firefighters get ready to hoist a steel support over the roof and into the burned out Ycua Bolanos supermarket to search for more victims of the August 1 fire that left hundreds dead and injured, in Asuncion, August 3, 2004.

COVER PHOTO: **CORBIS**

 NFPA Journal (ISSN 1054-8793) is a membership magazine published bimonthly, plus a Buyers' Guide annually in February, by NFPA, One Batterymarch Park, Quincy, MA 02269-9101. NFPA annual dues: members, $135 (includes $40.50 subscription to *NFPA Journal*), organization membership, $500. Periodicals postage rates paid at Boston, MA, and at additional mailing offices. POSTMASTER: Send address changes to NFPA Journal, NFPA, P.O. Box 9101, Quincy, MA 02269-9101. All issues of *NFPA Journal* are available in microfilm from University Microfilms, International, 300 North Zeeb Road, Ann Arbor, Michigan 48106.

nfpa JOURNAL®

Volume 98/Number 6

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 nonprofit organization is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating scientifically-based consensus codes and standards, research, training, and education.

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Membership in NFPA gives you access to the most current fire and life safety research, professional contacts and code updates you need in your job. *Benefits include:*

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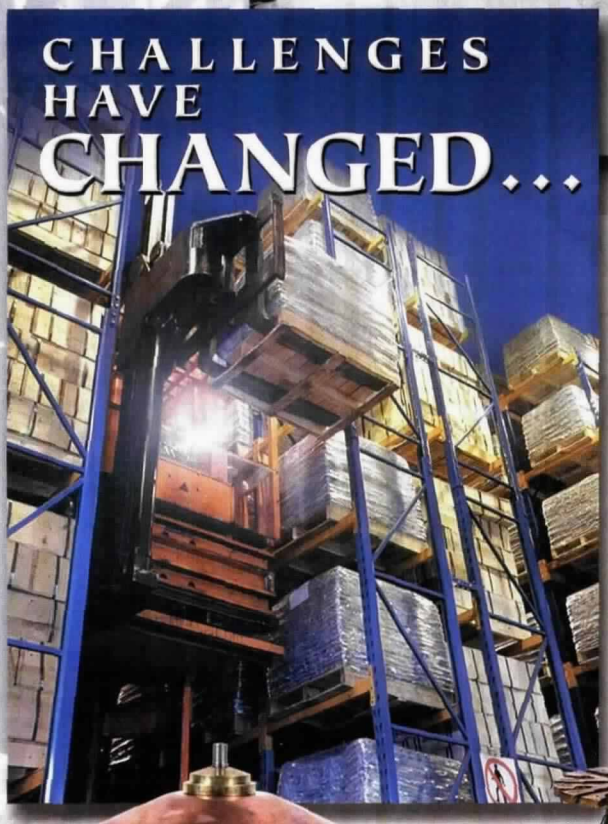

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BY JAMES M. SHANNON

NFPA's reputation for professional integrity

IN OCTOBER, I was the keynote speaker at China Fire 2004 in Beijing, where and I discussed our codes and standards. This meeting, which is held every two years, brings together leaders in fire protection and the fire service from China and from all over Asia. I also signed, on behalf of NFPA, an agreement with China's National Technical Committee for Fire Protection Standardization that will result in the translation of more than 30 NFPA codes and standards into Chinese.

A week later, I went to Buenos Aires to inaugurate NFPA's new Argentinian chapter meeting dedicated life-safety professionals from Argentina and throughout Latin America. Together with the Dominican Republic and Puerto Rico, our chapter in Argentina joins those in Mexico and Colombia. And in response to Latin America's demand for our information, we are quickly moving ahead with the Spanish translation of NFPA codes and standards.

You already know that NFPA is an international organization. We produce codes and standards that are used globally, and our influence in other countries is growing. I also want you to know why those working so hard to make their countries safer want to associate themselves with NFPA. They want to use our codes and standards and to avail themselves of our educational opportunities because of our reputation for integrity.

In China, I spoke with a senior member of the fire service. He told me that many years ago, when he was a fire chief in a city far from Beijing, he needed an answer to a technical question involving fire protection in a local factory. He was unsure where to get the information, but found the answer in an NFPA handbook. He had learned through his career what NFPA was, and he knew that our information was reliable.

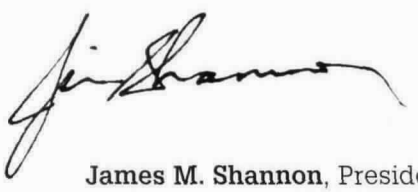
NFPA is influential in the United States and Canada, but in recent years, we have seen our influence expand to new places. International leaders in fire safety follow what we have to say because we bring together knowledgeable people to tackle problems in a balanced, open, and transparent process. Nobody gets to rig the game. Anybody who is unhappy with the result can appeal. Decisions are made on the technical merits of the issues.

Around the world, even where there is not always a detailed understanding of how our process works, there is an understanding that NFPA's code and standards are the product of an honest process committed to achieving consensus on the right answers to fire-safety problems.

I have written before about the Internet's threat to NFPA. We are concerned that the ability to rapidly disseminate our information will erode our revenue base. But we also see the Internet as a fantastic way of fulfilling our mission. After all, our mission is all about getting important life-saving information into the hands of those who can put it to use.

The Internet has already provided NFPA with the means for people who can't attend our meetings or participate on our technical committees to learn more about who we are and how we operate. They can follow our process as documents are developed. They can submit comments and proposals in a timely fashion, and they can join a community committed to the same safety mission.

It's clear that the more people who are given the opportunity to witness our process, the more NFPA will be recognized for its professional integrity. And everything we do to advance NFPA's safety mission, from the promotion of our codes and standards to our professional development and public education programs, depends on maintaining that reputation in everything we do.



James M. Shannon, President and CEO
NFPA

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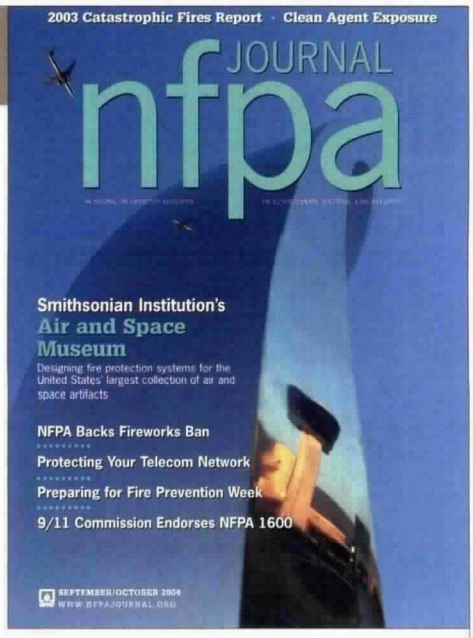


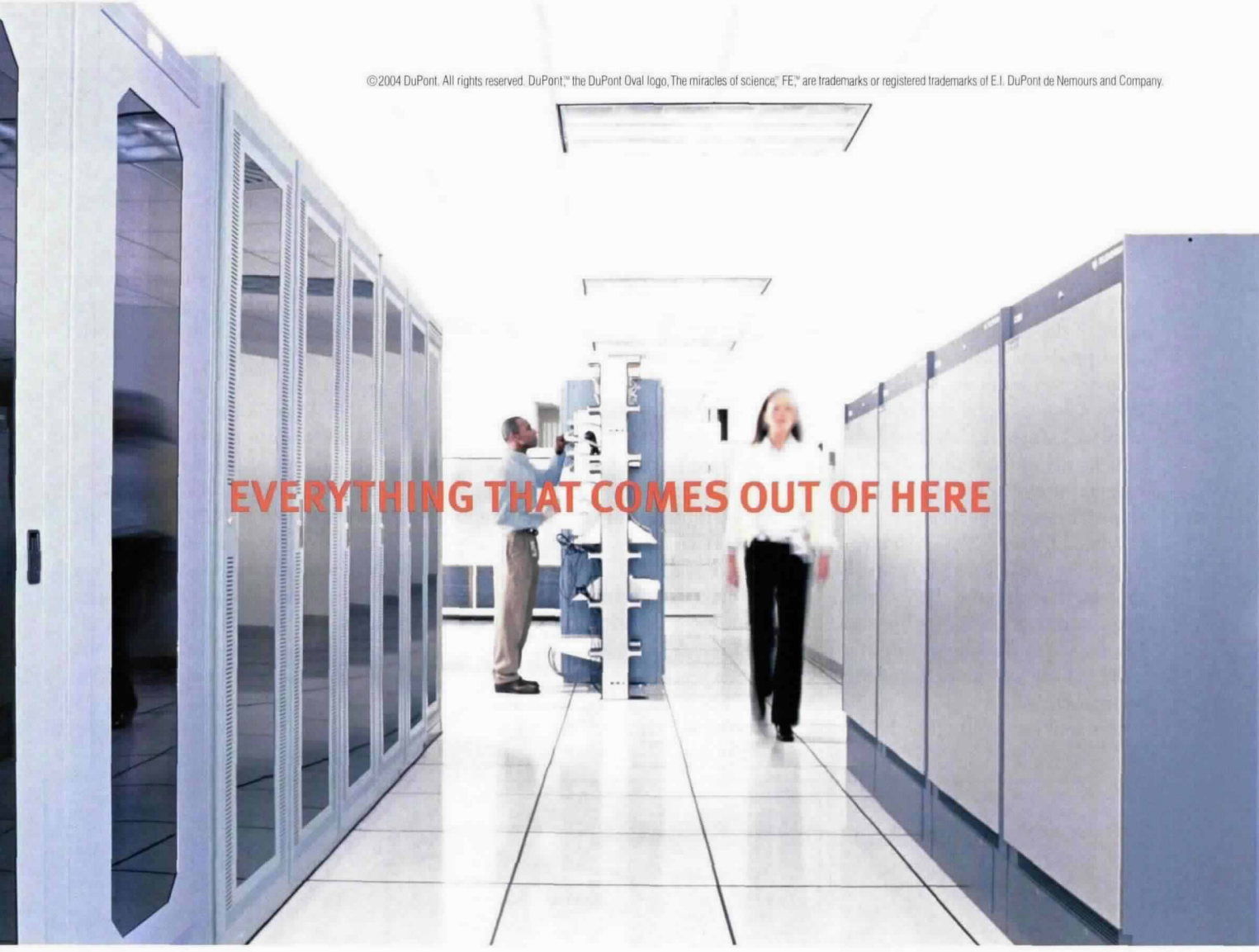
REVIEWING THE FACTS

This letter is in response to the article entitled "A Long Road Back," subtitled, "A Story About Consumer Fireworks," that appeared in the September/October 2004 edition of the *NFPA Journal®*, by Margie Coloian, Director of NFPA's Public Affairs Division.

As a long-standing member of the NFPA Technical Committee on Pyrotechnics, and as the executive director of the leading trade and safety association of the fireworks industry, I was appalled by NFPA's gross misrepresentation that Ms. Stacy Miller's unfortunate and devastating injuries were characterized as caused by "consumer" fireworks.

While you may not have the personal expertise to know first-hand what fireworks devices are consumer vs. professional display fireworks, I know for a fact that NFPA staff does have this expertise and it is unconscionable that the Director of NFPA's Public Affairs Division would characterize a 9-inch professional mortar shell as a "consumer fireworks device." Even if your staff lacked the expertise to understand the type of device involved, the answer to that question is and would be readily available via the U.S. Consumer Product Safety Commission (CPSC).

As a trade association executive, I can appreciate the fact that NFPA wants to promote its agenda and public relations campaign to its membership. Promoting NFPA's anti-consumer fireworks message is one thing, but to flagrantly mislead your members by distorting the facts about Ms. Miller's injuries is another, wreaking of poor, biased



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journalism, with the intent to harm the legitimate consumer fireworks industry.

The firework-related injury rate is at an all time low, due to the work of the CPSC's import surveillance program and work of the industry to ensure that only the safest products enter the U.S. marketplace. Moreover, 43 states plus the District of Columbia allow the sale and use of some types of consumer fireworks, stringently regulated by the CPSC. And, consumer fireworks usage is at an all time high, with more than 196 million pounds of consumer fireworks being used in the United States in 2003. Those are the undisputed, recognized facts.

It is well known that the NFPA has been losing ground for many years in its effort to call for a ban on consumer fireworks. However, NFPA's recent tactic to completely mislead its members and the general public to believe that Ms. Miller was injured by a consumer fireworks device to add merit to your position, reaches a new low for the NFPA in trying to gain support for its 94-year-old mission and media campaign. The NFPA should be ashamed of resorting to such vicious untruths and step up to the plate and set the record straight with regard to the article that was published.

I met Ms. Stacy Miller in July 2002 when she participated in the CPSC press conference orchestrated by former CPSC Chair Ann Brown. During Ms. Miller's statement and follow-up press questions, Ms. Miller was quite explicit in her statements that the device which struck her was a professional display firework (9 inch aerial shell) used by a non-professional.

NFPA could have used Ms. Miller's story to promote the importance of following NFPA 1123 for outdoor professional fireworks displays. NFPA 1123 sets forth requirements for properly using display fireworks, including a table of distance to protect spectators. Ms. Miller's injury resulted when professional fireworks were discharged by a non-professional who had no regard for NFPA 1123

>>CONTINUED ON PAGE 93

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

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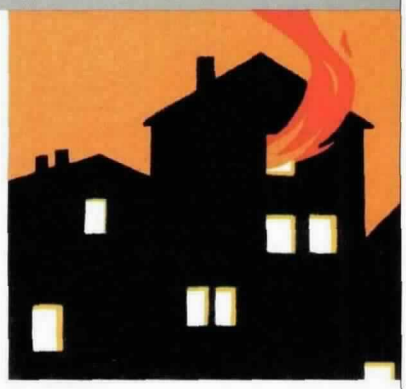
SURVEY

Americans underestimate their risk of fire



A NEW SURVEY from NFPA has found that Americans underestimate their risk of fire. Choosing from a list of disasters, 31 percent of those surveyed said they felt most at risk of experiencing a tornado, while only 27 percent named fire as their highest risk. Hurricanes followed at 14 percent, earthquakes and floods at 9 percent each, and terrorist attacks at 5 percent.

Among all those disasters, fires are actually more common and many times more deadly. In 2003, for example, U.S. fire departments responded to 1.6 million fires that killed 3,925 people, most of them in the home. Tornadoes kill an average of 70 people a year.

Fires also cause significant property damage, especially when compared with other disasters. In recent years, property damage from tornadoes averaged just over $1 billion, while damage caused by from hurricanes averaged just under $3 billion. The cost of fire damage? More than $12 billion in 2003, up 19 percent from the previous year, due primarily to the $2 billion in losses in the southern California wildfires.

NFPA commissioned the survey on the eve Fire Prevention Week, the theme of which emphasizes testing smoke alarms. Most people do not test their alarms as often as they should, and one out of five home smoke alarms does not work as a result.

To conduct the survey, Harris Interactive questioned a representative sampling of 1,014 adults by telephone from September 9 to September 12 and asked what type of disaster they felt best prepared for. The highest percentage of respondents—31 percent—said they felt best prepared for fire.

Their answers to other survey questions suggest they are prepared, but not prepared enough. Ninety-six percent said they had smoke alarms, a new high for the nation. But only a quarter said they had developed and rehearsed a plan to escape from their homes during a fire, one of the primary goals of public fire-safety education efforts such as FPW.

The survey also points to other challenges. Small communities, poorer households, and less-educated households had lower rates of smoke alarm ownership. Only 8 percent of those whose smoke alarms sounded responded by leaving the house immediately as recommended. If people do not practice their escape plans and do not react to their fire alarm by escaping immediately, many will not escape at all.

"Fire remains a major cause of death, injury, and property damage in this country," said NFPA President James M. Shannon. "We can prevent many of these losses. It's not enough to have a smoke alarm. You should make sure it's working, and you should be prepared to get outside fast if it sounds."

ONLINE

The redesigned NFPA Web site provides easier access for visitors

A MONTH'S-LONG effort to upgrade the usability of NFPA's Web site and online catalog has been completed.

Following comprehensive usability testing with members and customers, the redesigned www.nfpa.org and www.nfpacatalog.org include many new features designed to enhance the online experience for all visitors. This includes pull-down navigation menus, "printer friendly" pages, the ability to easily e-mail content to friends or colleagues, a streamlined ordering process, and reorganized product detail pages.

For more information, visit the new site at www.nfpa.org.

NEW PRODUCT

Three technical committee projects reorganized

THREE TECHNICAL COMMITTEE projects reorganized At its January 2005 meeting, the NFPA Standards Council Council will merge the three technical committees responsible for NFPA 12, *Carbon Dioxide Extinguishing Systems*; NFPA 12A, *Halon 1301 Fire Extinguishing Systems*; and NFPA 2001, *Clean Agent Fire Extinguishing Systems*, into one new technical committee.

Current members of these three committees are being urged to apply to the new committee, as well as anyone with expertise in this area, said NFPA Staff Liaison Mark Conroy in a letter to the committee members.

The revised version of NFPA 12 is up for adoption at the Fall Education Conference in Miami this November.

For more information on the committee, contact Mark Conroy at mconroy@nfpa.org.

ILLUSTRATION: VEER

WORKSHOPS

As interest in NFPA 1600 rises, workshops planned

AS INTEREST IN NFPA 1600 rises, workshops planned.

To date, NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs*, has been downloaded from NFPA's Web site more than 40,000 times.

The standard, available free of charge in PDF format, establishes common criteria for disaster management, emergency management, and business continuity programs. In addition, it provides a list of resource organizations in the fields of disaster recovery, emergency management, and business continuity planning.

NFPA will hold workshops to explain NFPA 1600 to facility emergency managers in 12 major cities throughout the United States over the next several months, beginning in Miami this November.

These workshops are sponsored in part by the Department of Homeland Security in support of the Report of the 9/11 Commission, which recommends that U.S. businesses use NFPA 1600 to help plan their emergency responses.

"NFPA applauds the Department of Homeland Security, Secretary Ridge, and the other partners of the America Prepared Campaign for their commitment to make our nation stronger, starting this month," said James M. Shannon, NFPA president. "NFPA's role in keeping the private sector prepared is crucial, seeing that it is the private sector that controls 85 percent of our nation's infrastructure."

For more information on this and other seminars, visit NFPA's Professional Development at www.nfpa.org/professionaldevelopment.

PARTNERSHIP

Joint research between NFPA and IEEE

NFPA AND THE Institute of Electrical and Electronics Engineers (IEEE) have agreed to work on an initiative to fund and support research and testing to increase our understanding of the arc-flash phenomena. The results of this project will provide information to enhance electrical safety standards that predict the hazard and provide practical safeguards for employees in the workplace. The agreement is expected to be finalized soon.

"It's logical that both organizations join forces to pursue potential fundraising for research and testing that can expand the knowledge and information on arc flash," said Art Cote, NFPA's executive vice-president and chief engineer.

Arc flash is an electric current that passes through air when insulation or the physical space between electrified conductors is no longer sufficient to withstand the applied voltage. The flash is immediate and can cause severe injuries, including burns. Each year, more than 2,000 people are treated in burn centers with severe arc-flash injuries.

NFPA 70E, Electrical Safety Requirements for Employee Workplaces, addresses practical measures one should take to safeguard employees. The standard covers installation, safe work practices and procedures, and safety-related maintenance requirements, as well as safe installation and work practices for special electrical equipment.

"Combining the expertise of both organizations with additional research will result in the expansion of the engineering and technical information," says NFPA's Cote.

NIOSH

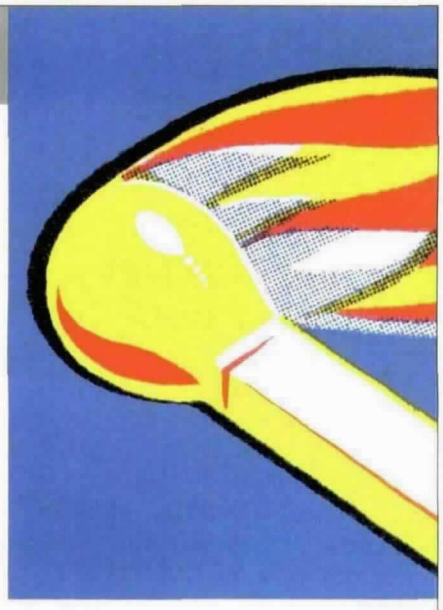
Firefighter fatality report

THE FOLLOWING IS a summary of a firefighter fatality investigated by the National Institute for Occupational Safety and Health (NIOSH), which conducts the Firefighter Fatality Investigation and Prevention Program.

On January 13, 2003, a 46-year-old female career firefighter/emergency medical technician died of injuries she received after falling from a moving, open-cab engine in California. The engine was being used as a relief piece while the regularly assigned engine was in the shop for maintenance. Most of the department's relief engines are the open-cab style and were familiar to the victim.

The engine was responding to a reported airport emergency with an officer and a firefighter/driver in the cab. A firefighter/paramedic and the victim were seated in the open-cab jump seats. The firefighters wore hearing protection, which is required due to noise from the engine and the proximity of the open-cab seats to the motor housing.

At some point after boarding the engine, the victim is believed to have placed her earmuffs onto a railing above the motor housing near her seat, and the movement of the engine may have caused them to slide down the railing out of her reach. The victim is thought to have released her seat belt to retrieve the earmuffs just as the engine rounded a bend and accelerated up a slight grade to enter a highway. She lost her balance and fell from the apparatus onto the road.



STUDIES

NFPA study shows a 15 percent increase in home candle fires

NFPA STUDY SHOWS a 15 percent increase in home candle fires

IN 2001, THE last year for which NFPA has statistics, candles started fires in 18,000 U.S. homes, killing an estimated 190 civilians, injuring 1,450, and causing $265 million in property damage This is a 15 percent increase in fires from 2000, and more than triple the number of candle fires in 1990. After declining from 1980 to 1990, candle-related home fires began to increase in 1991, and every year since 1995, fires blamed on candles have reached a new high.

Even as candle-caused fires increased, the number of home fires dropped, thus increasing the proportion of home fires related to candles, according to the NFPA study. In 2001, candle fires accounted for 4.7 percent of home fires, compared to 1.1 percent in the early 1980s.

What underlies this increase?

First, candles have become more popular; according to the National Candle Association, seven out of 10 households now use candles. And many people don't realize how quickly something can go wrong if they don't follow the rules for safe candle use. A third of these fires occurred when candles were left unattended, were abandoned, or were inadequately controlled. A quarter occurred when combustible material came too close to the flame. And 6 percent occurred when people—usually children—were playing with a candle.

A third important factor may be poverty. As many as one-third of people killed in candle fires were using candles for light because their power had been shut off.

Four out of 10 home candle fires start in the bedroom, and one in six starts in common rooms, living rooms, family rooms, or dens. Nearly half the people killed by candle fires in the home were under 20; children ages 5 to 9 accounted for a disproportionate share of the victims, with a candle-fire death rate 2.5 times higher than that of the general population.

Candle fires are most common in December, perhaps because candles are frequently used as a part of holiday decorating and rituals.

CODE ADOPTIONS

Maine code adoptions

Effective August 9, 2004, Maine adopted the 2003 editions of NFPA 1, *Uniform Fire Code*™ (UFC), and NFPA 101®, *Life Safety Code*®, statewide.

"Working together, the Maine Department of Public Safety and the State Fire Marshal's Office are committed to protecting the lives of people living in and visiting our great state," said Maine State Fire Marshal John C. Dean.

"Adopting the 2003 editions of NFPA's fire prevention and life safety codes is just the latest step in increasing public safety. In addition to these, Maine has adopted and is enforcing more than 50 NFPA codes and standards," he said.

Several communities in Maine have adopted other NFPA codes, as well. Among them is the town of Pittsfield, which adopted NFPA 5000®, *Building Construction and Safety Code*®, earlier this year.

"We carefully evaluated the available model building codes, and it was clear that NFPA 5000 placed the greatest emphasis on safety," said Claude E. Rounds, code enforcement officer for Pittsfield.

"The NFPA code is also coordinated with other codes adopted by the state fire marshal that are critical to public safety," he said.

Illinois code adoptions

In Illinois, the North Maine Fire Protection District, serving approximately 30,000 residents in unincorporated Cook County in Maine Township, a suburban area northwest of Chicago, has adopted the 2003 editions of NFPA 1, the 2002 edition of NFPA 72®, *National Fire Alarm Code*®, and the 2002 edition of NFPA 13, *Installation of Sprinkler Systems*, as part of its fire prevention codes.

The district also has chosen to reference a chapter of NFPA 5000.

"The safety of our citizens is our biggest priority, and we feel that these codes are the best choice to ensure that safety," said Arnold Witzke, fire marshal of the North Maine Fire Protection District.

"NFPA codes are the most comprehensive available, and the newly adopted codes will do the most to protect our community," Witzke said.

ILLUSTRATION: VEER

AROUND NFPA

ANSI award

ANSI RECOGNIZES NFPA staff
The American National Standards Institute (ANSI) has awarded Casey Grant, NFPA assistant vice-president for Codes and Standards Administration, an ANSI Meritorious Service Award for his contributions to ANSI and the voluntary standardization community. The presentation was made in October.

Library donation appeal

NFPA'S CHARLES S. MORGAN Technical Library seeks older editions of NFPA and NBFU publications and Sparky® and Fire Prevention Week items to complete our archival collection. If you have NFPA materials you would like to donate to the archives, please contact us at (617) 984-7445. Please remember the library.

Call for applications

NFPA IS SEEKING applications for the 2005 Rolf H. Jensen Memorial Public Education Award. Funded by the RJA Group, the award provides a grant annually to a local fire department in the United States implementing a fire and life safety education program or campaign. Visit www.nfpa.org/Education/Scholarships/Awards/Jensen/Jensen.asp. The application deadline is February 11, 2005.

Symposium planned

THE FIRE PROTECTION Research Foundation of NFPA will hold its ninth annual Fire Suppression & Detection Research Application Symposium on January 26-28, 2005. The symposium is geared to fire protection engineers, fire safety managers, code enforcers, and others from the fire safety industry.

AMENDMENT ADOPTIONS

Proposed amendments to NFPA Bylaws

IN ACCORDANCE WITH the provisions of Article 11.1 of NFPA's Bylaws, the Board of Directors has unanimously recommended the adoption of the following amendments to the Bylaws.

A vote by the membership at a meeting to be held on November 15 during the Fall Education Conference at the Fontainebleau Hilton Hotel in Miami Beach, Florida.

Language to be deleted is shown below in stricken text; new or replacement language is underlined.

"I. Amend Article 5 to clarify that officers elected at the Annual Meeting shall take office at the close of that Annual Meeting. The additional change is to clarify that terms of less than three years are at the recommendation of the Nominating Committee.

"Article 5

"Section 5.2 Elected Directors. Directors shall be elected by the Membership of the Association at the Annual Meeting acting either on the recommendation of the Nominating Committee or by such other nominations as are allowed by these Bylaws. Directors shall have skills and background as necessary to govern the affairs of the Association. Directors shall be elected to terms of up to three years, staggered as determined at the Annual Meeting on a recommendation of the ~~Board of Directors~~ Nominating Committee. No elected Director shall serve for more than two successive three-year terms. All Directors or Officers of the Association shall be from among the members of the Association.

"Such Directors elected by the members shall take office ~~seven days after~~ at the close of that Annual Meeting.

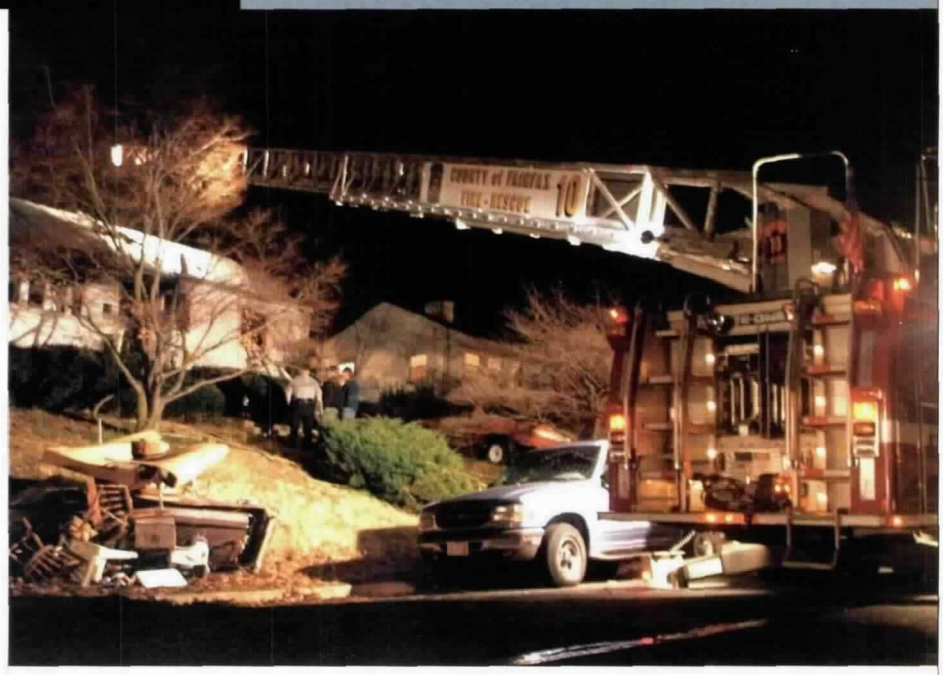
"II. Amend Article 6 to clarify that Directors elected at the Annual Meeting shall take office at the close of that Annual Meeting. An editorial change is made to the listing of officers to note more than one Vice-Chair, as is done in the remainder of the Section where the Officers are listed.

"Article 6

"Section 6.2 Election and Qualification. The President shall be elected by the Board of Directors and shall serve at the will and pleasure of the Board. The Chair, Vice-Chairs, Treasurer, and Secretary of the Association shall be elected by the members at the Annual Meeting of the Association from among those nominated pursuant to Paragraph 6.15 of this Article. Such officers elected by the member shall take office ~~7 days after~~ at the close of that Annual Meeting. The term of office for the Chair, the Vice-Chairs, the Secretary, and the Treasurer shall be one year or until their successors are elected and qualified. The Chair, the First Vice-Chair, and the Second Vice-Chair shall not serve more than two consecutive terms in any one elective office. The Secretary shall not serve more than four and the Treasurer shall serve not more than six terms in that office."

FIREWATCH

BY KENNETH J. TREMBLAY



Three died in this one-story home when fire swept through their living room.

RESIDENTIAL

Ashes destroy home

MARYLAND – Ashes from a fireplace discarded in a screened-in porch started a fire that destroyed a two-story, single-family, wood-frame home. A delay in notifying the fire department, unsuccessful efforts to control the fire, and a limited water supply contributed to the loss. A fire detection system was monitored by a central station alarm company, but the type of detectors and their coverage weren't reported. The house had no sprinklers.

The ashes had been put on the wood floor of the porch next to the exterior of the home while they were still smoldering from the evening's fire. Eventually, heat from the ash pile ignited combustibles on the porch, and the fire spread to the home's exterior wall. Twenty-two minutes later, the fire spread to the interior.

A house cleaner, who was the only person in the home at the time, tried to control the fire before smoke activated the alarm, which the fire department received at 1:30 p.m.

Arriving firefighters found the house heavily involved, but a lack of hydrants delayed their efforts to deliver the large volume of water needed to control the fire and the house soon began to collapse.

The home and contents, valued at $500,000, were a total loss. There were no injuries.

Flames spread through dormitory

WASHINGTON – A fire in concealed wall and ceiling spaces heavily damaged a wood-frame private-school dormitory. Fortunately, staff and students were able to evacuate when the fire alarm system activated.

The three-story, brick-veenered building measured 150 feet (45 meters) by 50 feet (15 meters). A central station alarm company monitored interconnected smoke detectors in the common hallways and manual pull stations near the doorways. There were no sprinklers.

The fire began in a wall void on the first floor between a mechanical and exercise room near the electrical service panel. It spread horizontally along a suspended ceiling and vertically by way of pipe and vent chases. Some delay in detection occurred, but the smoke detectors eventually alerted the occupants and firefighters at 5:24 p.m.

Investigators determined that the electrical service wasn't adequately grounded and that it overheated, igniting the wood sheathing behind the electrical panel. From there, the fire spread to other wood components and combustibles.

The building, valued at $3.2 million, and its contents, valued at $300,000, were destroyed. There were no injuries.

Electrical fire in Christmas tree kills three

VIRGINIA – Three people died when a fire in a live Christmas tree quickly spread to other combustibles in their single-family home. A fire a month earlier had damaged the smoke alarm on the floor of origin, and it had never been replaced. The ranch-style, wood-frame house measured 24 feet (7 meters) by 24 feet (7 meters) with a full basement. The first-floor smoke alarm had been disconnected, but there was a working smoke alarm in the basement. There were no sprinklers.

At the time of the fire, a family of four lived in the basement, and another family of four lived on the first floor, where a single person also rented a room. The earlier fire had displaced the two children who lived on the first floor from their bedroom, forcing the daughter to sleep on the floor of her parents' room and the son to sleep in the living room.

Shortly after 2 a.m., the son awoke to find a fire in the living room and alerted his parents. The father broke a window in the bedroom and forced his wife out, but he and the two children remained in the house. The renter on the first floor also awoke to find flames burning through the top of her bedroom door. She escaped through the sliding glass door in her room and met another occupant who was going to a neighbor's house to call

911. It wasn't reported how the tenants in the basement apartment were alerted, but witnesses saw them escape through windows.

The fire department received the 911 call at 2:24 a.m. and arrived to find the house in flames. The officer checking all four sides of the building found fire shooting from the double-glass door of the dining room and ordered his crew to position a 1-3/4-inch hose line at the front door. Firefighters forced entry and searched for the trapped civilians. By this time, flames had ignited nearly everything in the front rooms, and the crew discovered the bodies, two in one bedroom and the third in a second.

Investigators discovered that the holiday lights on the Christmas tree had been left operating. They were connected to two extension cords, and it appears that resistance heating on the lights ignited the tree, which was quickly was consumed. Flames ignited contents of the living room and spread down the hallway, trapping the victims.

The house, valued at $225,000, suffered an estimated fire loss of $60,000, and its contents, valued at $50,000, suffered a $40,000 loss. The 48-year-old father, his 25-year-old son, and his 14-year-old daughter all died.

Sprinklers extinguish fire in home oxygen unit

ARIZONA – Careless disposal of smoking materials contributed to the smoke-inhalation death of a woman in her single-family home, despite the activation of two sprinklers that extinguished the flames.

The single-story, wood-frame house, which measured 50 feet (15 meters) by 40 feet (12 meters), had a stucco exterior and a tile roof. The home had a wet-pipe residential sprinkler system and a local smoke alarm, but neither system was monitored, and the smoke alarm may not have activated during the fire.

Investigators believe that smoking materials carelessly disposed of in a wastebasket ignited paper. When the occupant discovered the fire, she moved the wastebasket to the sink to extinguish it, but not before the fire burned through plastic oxygen tubing running under the basket. Flames spread along the oxygen-enriched tubing, igniting an upholstered stool and the oxygen generator in the first-floor living room. The fire was finally extinguished by two sprinklers, which operated above each burning item.

Water flowing from under the garage alerted a neighbor, who called the fire department at 9:30 a.m. Responding firefighters discovered the woman in the bathroom, where she had succumbed to smoke inhalation.

The house and its contents, valued at $200,000, suffered an estimated loss of $40,000

Candles suspected in deadly blaze

FLORIDA – A fire that may have been started by candles burning unattended in the living room claimed the lives of two people in a manufactured home. The single-family, one-story home measured 22 feet (6 meters) by 54 feet (16 meters) and was constructed of wood framing over a steel frame covered with metal siding and and a metal roof. There were no smoke alarms or sprinklers.

The only surviving family member, a 9-year-old boy, told firefighters that his mother woke him up and told him the house was on fire. The 41-year-old woman rescued her son, then reentered the burning home in search of her 3-year-old son. Before she could do so, however, they both succumbed to the smoke and heat.

The fire department received a 911 call from a neighbor at 2:37 a.m., and firefighters arrived to find heavy fire and smoke filling the home. Neighbors told firefighters that two people were still trapped in the house, but unstable flooring and the partial collapse of the roof prevented rescue. As conditions improved, firefighters found the mother and son in a bedroom.

Investigators determined that the fire started in the living room near an area where the woman had left approximately 20 candles burning unattended. The candles ignited nearby combustibles, and the fire spread undetected through the rest of the house.

The home, valued at $60,000, and its contents, valued at $20,000, were a total loss.

Lack of smoke alarms allows fire spread

TEXAS – A 37-year-old father and his two daughters, ages 7 and 5, died in a fire when other residents of their two-story, single-family home delayed calling the fire department while they tried to find the source of the smoke. The wood-frame house, which had a brick veneer, measured 40 feet (12 meters) by 40 feet (12 meters). It had no fire detection equipment or sprinklers.

Three residents were awakened shortly after 2 a.m. by the odor of smoke and spent the next 20 minutes trying to determine its source, rather than alerting the rest of the sleeping occupants. Once the fire broke out, they left the house, banging on the ceiling in attempt to wake the those still asleep on the second floor.

A neighbor noticed flames coming from the house and called 911 at 2:51 a.m. Firefighters arriving two minutes later saw heavy flames on all floors. When told that there were children trapped on the second floor, crews advanced a 1-3/4-inch hose line into the home in an effort to rescue them. However, severe heat and fire prevented them from reaching the second floor, and the incident commander ordered everyone from the home, which was nearly engulfed in fire.

Once the fire was brought under control, firefighters found the two children and their father on a landing on

the stairs to the upper floor.

The fire started in the exterior-mounted electrical box at the rear of the house and traveled up the exterior wall, into the attic and second floor. A lack of smoke alarms prevented the victims from awaking in time to escape.

The home, valued at $50,000, and its contents, valued at $25,000, were destroyed.

ASSEMBLY

Undetected fire spreads through voids

MAINE – Fire and smoke spread undetected through a National Guard armory for approximately 90 minutes before it broke out of the building through the roof and was seen by a neighbor. The building, which was closed for the evening, had no fire detection or suppression equipment.

The combination one- and two-story structure measured 180 feet (54 meters) by 100 feet (30 meters) with a section that created a second floor measuring 100 feet (30 meters) by 75 feet (22 meters). Steel with heavy-timber framing formed the floors and roof, and brick covered the exterior walls. For the most part, the armory's roof was flat and covered by a rubber membrane, although one section of it was topped by a pitched wooden false roof that created a void over a leaking portion of the flat roof. There were no sprinklers.

The fire is thought to have begun when cardboard boxes stored in a first-floor kitchen next to a propane-fired gas grill top came in contact with the grill's standing pilot and ignited. The fire spread through the drop ceiling in the kitchen, then into a second-floor gym and offices. It also spread into the pitched roof and other voids in the building before it was detected.

The building, valued at $525,000, and its contents, valued at $300,000, suffered damages of $200,000 and $100,000, respectively. There were no injuries.

Smoking materials ignite club fire

MASSACHUSETTS – A private fraternal club was heavily damaged when smoking materials, disposed of in a plastic waste barrel, ignited. The fire spread undetected until it breached an exterior wall and was seen by a neighbor.

The single-story building measured 172 feet (52 meters) by 100 feet (30 meters) and was constructed of steel

trusses and concrete block walls with a brick veneer. It contained a function hall, a members' lounge, and several offices. The building, which was unoccupied at the time of the fire, had no fire detection or suppression equipment.

The neighbor called 911 at 1:22 a.m., and firefighters arrived five minutes later to find heavy fire showing from two sides of the building. Their initial attempts to fight the blaze from the interior were unsuccessful, and the incident commander ordered all companies out of the building at 1:35 a.m. A defensive attack by several mutual-aid ladder and engine companies brought the blaze under control two hours later.

Investigators interviewed the members' lounge bartender, who was the last to leave. She told them that she routinely empties the ashtrays into a plastic waste barrel under the bar, which was found to be the point of origin. While doing other chores before leaving, she said, she noticed a "plastic" smell, but couldn't locate its source. She left the club at about 12:45 a.m.

The building was heavily damaged with losses estimated at $1.5 million. There were no injuries.

Fire spreads in wall voids of church

NEW HAMPSHIRE – A church was heavily damaged by fire when flames spread from the basement to the attic through voids in the wall minutes after the fire department arrived.

The unsprinklered balloon-framed structure was two and a half stories high and measured 68 feet (20 meters) by 40 feet (12 meters). Its bell tower contained a 1,700-pound (771-kilogram) bell dating back to the 1800s. Exposures to the rear and one side of the church were only 10 feet (3 meters) from church walls. The smoke alarms in the fellowship hall provided the only local alarm. Hearing what sounded like an explosion from the basement furnace room, an occupant of the church found smoke coming from the room and a nearby kitchen and called 911 at 7:15 a.m. Initially, firefighters, who were on scene within three minutes, didn't find any exterior signs of a fire or smoke. Once they entered the church, however, they saw smoke filling the area and noticed that a fire behind an oil-fired boiler was spreading to wall voids.

The incident commander called in the first of four alarms and ordered five ladder companies to set up around the building. He also ordered an unmanned monitor nozzle to be placed at the front door to spray water through to the rear of the church. The strategy quickly turned defensive, however, and nearly five hours elapsed before the fire was brought under control. The bell tower eventually collapsed.

Investigators determined that a vent pipe between an operating oil-fired burner and chimney had deteriorated, allowing products of combustion to ignite common combustibles. The church and its contents, valued at $572,000, were a total loss.

MERCANTILE

Sprinkler douses arson fire

ARIZONA – A single sprinkler doused a fire that had been intentionally set in the employees' locker room of a retail store.

The fire occurred in a single-story building that contained a mezzanine constructed of wood roof trusses and concrete-block walls. The building, covering 42,000 square feet (3,901 square meters), had a built-up roof. A water flow switch monitored a wet-pipe sprinkler system that provided full coverage. The store was open for business at the time of the fire.

The store's occupants heard the water flow alarm activate and left the building, but the central station alarm company wasn't operating the day of the incident, so the first indication of trouble the fire department received washe a 3:45 p.m. 911 call from a store employee reporting the local alarm activation.

Responding firefighters noticed water coming through the ceiling below the mezzanine and, in searching for its source, found the fire's origin in the store's male locker room. They also found that a sprinkler had already extinguished the fire.

Investigators determined that someone intentionally doused a number of coats on a coat rack with charcoal lighter fluid, then ignited it with a lighter. Heat from the fire activated the sprinkler, limiting fire damage to the immediate area.

The multi-million-dollar property suffered about $100 in damages. There were no injuries.

MANUFACTURING

Explosions kill one and injure others at plant

INDIANA – Aluminum dust ignited explosively at a wheel manufacturing plant, killing one employee and injuring seven others.

The single-story, steel-frame building had a concrete floor, metal walls, and a metal roof. A fire detection system only covered part of the building. A wet-pipe sprinkler system also didn't cover the furnace area where the incident occurred.

The explosion occurred at 8:25 p.m. near a furnace used to melt the aluminum chips that are a byproduct of machining auto wheels cast in the plant. The force of the blast blew off a section of the roof and created secondary explosions in dust collection equipment, which ignited other combustibles.

Investigators determined that a fire in the chip-dryer ductwork that began earlier in the day hadn't been completely extinguished and might have re-ignited aluminum dust once production restarted.

Damage to the building was estimated at $100,000, and damage to its contents at $100,000.

STORAGE

Stable fire kills 22 horses

KENTUCKY – Twenty-two thoroughbred horses were killed and their stable destroyed when a fire spread through the building during an early morning fire. Fortunately, firefighters were able to keep the flames from reaching other stables on either side.

The single-story wood- and steel-frame building had a panelized roof and wall components and measured 120 feet (36 meters) by 50 feet (15 meters). There was no detection or suppression equipment.

A passerby saw the fire and called 911 at 4:17 a.m., sending four fire departments with seven pieces of apparatus to the scene. Using large-diameter deck guns, monitor nozzles, and hose lines, firefighters protected the exposures and extinguished the blaze.

Investigators determined that an electric heat lamp came in contact with straw and feed, which then ignited. A set of double doors at one end of the building had been left open, allowing wind to spread the fire rapidly through the stable.

BONNIE MANLEY AND TIM HAWTHORNE

NFPA 150: New life for an old document

THE NFPA 150 technical committee recently asked the Standards Council to authorize the expansion of NFPA 150, *Racetrack Stables*, to include life and fire safety requirements for both humans and animals in all types of animal housing facilities. The request is based on the *National Fire Codes*® (NFC®) classification of buildings that house animals as "storage occupancies," a designation that places kennels, zoos, and barns in the same category as warehouses. At its July 2004 meeting, the Standards Council approved the expansion for both the committee and NFPA 150, and it changed the name of the committee to the Technical Committee on Animal Housing Facilities to better reflect its new assignment.

The following questions explore the current state and future plans for animal housing facilities in the NFC set.

Currently, how is a barn, kennel, or zoo classified in the NFC set?

Three of NFPA's major documents, NFPA 1, *Uniform Fire Code*™, NFPA 101®, *Life Safety Code*®, and NFPA 5000®, *Building Construction and Safety Code*®, classify any type of animal housing facility as a storage occupancy, defined as an "occupancy used primarily for the storage or sheltering of goods, merchandise, products, vehicles, or animals."

A storage occupancy is typically characterized by the presence of few people, usually only owners and employees. If members of the public enter the building, the building can no longer be considered simply a storage occupancy.

Depending upon the number of people, it may qualify as a "mixed occupancy" between storage and assembly or storage and business.

The three NFC documents define assembly occupancies as those "used for a gathering of 50 or more persons for deliberation, worship, entertainment, eating, drinking, amusement, awaiting transportation, or similar uses," or "as a special amusement building, regardless of occupant load." They define business occupancies as those "used for account and record-keeping or the transaction of business other than mercantile."

Once a facility meets the requirements for mixed occupancy, it must also meet the most restrictive fire- and life-safety requirements for those occupancies.

Why doesn't classification as a "storage occupancy" or "mixed occupancy" work for animal housing facilities?

While the distinction between storage and business or assembly occupancies sounds relatively simple, it can lead to an enforcement dilemma.

Consider, for instance, a single-family home with a 14,400-square-foot (1,337-square-meter) barn. This barn has 35 stalls, and the owner plans to open a private horse breeding facility. The only people allowed inside the barn will be the barn's owner and his employees. According to the NFC, this barn can be classified as a storage occupancy. Consider the same home and barn as a board-and-care facility for horses, where people will come to the barn to ride their horses. While the horse owners clearly don't fall into the category of barn owners or employees, they do have a certain familiarity with the facility. In this situation, would the barn still qualify as only a storage occupancy?

Now consider the fact that trainers, veterinarians, and farriers will use the barn, albeit less frequently than the owner, employee, or riders. Does the barn still qualify as a storage occupancy? Or would it now be a mixed business and storage occupancy? Where does the line between the two occupancies fall? Should additional issues be considered? After all, horses require a higher level of human interaction than boxes in a warehouse, especially during an emergency.

Currently, these decisions are left to the local authority having jurisdiction (AHJ), which unfortunately results in an inconsistent treatment of of such facilities from jurisdiction to jurisdiction.

The Technical Committee on Animal Housing Facilities believes that the NFC can and should provide better guidance to AHJs in these situations and that the best way to do this is to expand NFPA 150 to address all types of animal-housing facilities.

How will NFPA 150 work within the existing NFC set?

A primary goal of the Technical Committee on Animal Housing Facilities is to see that NFPA 150 is referenced in NFPA 1, NFPA 101, and NFPA 5000. The committee plans to work toward this goal by following the NFPA Manual of Style and referencing or extracting from other NFPA documents. In addition, the committee will develop provisions specific to animal housing facilities.

>>CONTINUED ON PAGE 94

Charlotte Facility Safety Compliance Conference

NFPA IS PLEASED to be bringing our one-day Facility Safety Compliance Conference to Charlotte, North Carolina on November 19. This conference will provide you with practical information that will help you make informed safety decisions for your facility. Among the many topics to be covered are: emergency evacuation plans, effective fire safety inspections, fire protection systems, and meeting fire safety maintenance requirements. Our experts will provide you with the answers you need in order to develop and implement effective fire and life safety programs.

Two concurrent tracks will be offered in order to best meet your educational goals. Track one will serve professionals whose primary responsibility is for ensuring the right programs are in place and that they are effectively managed. Track two will serve professionals whose primary responsibility is to implement the fire safety plan. With two distinct tracks, both the people responsible for facility and safety management and the people responsible for taking care of facility safety systems will benefit from attending.

For more details regarding this information packed event, or to register, call (800) 344-3555 or log onto www.nfpalearn.org..

NFPA offers expert training on the National Fire Alarm Code

NFPA offers two separate seminars focused on NFPA 72®, *National Fire Alarm Code®*. The first, entitled: "Understanding Today's National Fire Alarm Code," is designed to get you up to speed on the provisions found in this life saving document. You will learn how to choose the right type of alarm system for a specific occupancy, how to define system objectives and establish specifications, and how to work with AHJs. You will also learn about system installation, and the important role of system documentation. After attending this seminar, you will be better able to avoid installation errors, failed inspections, and false alarms.

NFPA's seminar entitled: "Fire Alarm Inspection, Testing and Maintenance" reinforces the notion that the best way to assure the long-term operational reliability of a fire alarm system is with a rigorous inspection, testing and maintenance program. In this seminar, our expert instructors use interactive learning sessions to help you dissect the code to determine proper inspection, testing, and maintenance practices. You will learn about the key inspection, testing, and maintenance elements that are required to achieve fire protection objectives for any facility.

Take advantage of 2004 seminar pricing by registering for any of NFPA's professional development seminars before January 1, 2005. Don't delay, register for an NFPA seminar today by calling (800) 344-3555 or log onto www.nfpalearn.org.

NFPA Fall Education Conference

Attending the NFPA Fall Education Conference isn't merely time away from work, it's time well spent! As you know, this year's conference is being held November 14-17 at the Fontainebleau Hilton in Miami Beach, Florida. Even though pre-registration for this event has closed, you still have the ability to register for this event at the conference itself.

The NFPA Fall Education Conference is a fantastic venue for connecting with your peers to share ideas and discuss compliance issues. You also have the opportunity to gather valuable insight from industry experts that are presenting more than 70 education sessions. By participating in this event, you are sure to expand your understanding of code specifications, changes and interpretations. Most importantly, with hundreds of other fire and life safety professionals in attendance, you will broaden your network of contacts. A downloadable version of the conference brochure is available at www.nfpa.org/meetings.

We look forward to seeing you at the conference.

The NFPA documents considered at this conference include:
NFPA 12, *Carbon Dioxide Extinguishing Systems;*
NFPA 720, *Recommended Practice for the Installation of Household Carbon Monoxide (CO) Warning Equipment;*
NFPA 909, *Protection of Cultural Resources;*
NFPA 850, *Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations;*
NFPA 851, *Recommended Practice for Fire Protection for Hydroelectric Generating Plants;*
Emergency Power Supplies;
NFPA 110, *Emergency and Standby Power Systems;*
NFPA 111, *Stored Electrical Energy Emergency and Standby Power Systems*
NFPA 1991, *Vapor-Protective Ensembles for Hazardous Materials Emergencies;*

>>CONTINUED ON PAGE 94

RUSSELL P. FLEMING, P.E.

30 years of international sprinkler product standards

IN 1974, WEST Germany submitted a draft document to the International Standards Organization (ISO) as the basis of a proposed international standard addressing performance requirements and test procedures for automatic sprinklers. An international working group was formed and met in London in January 1975. The meeting of ISO Technical Committee 21 Subcommittee 5 on sprinkler and water spray extinguishing systems taking place in Berlin this November marks the 30th anniversary of this effort.

The international standards effort focuses on sprinklers and 12 other areas that include wet alarm valves and water motor alarms, dry-pipe valves, deluge valves, early suppression fast response (ESFR) sprinklers, "preaction dry alarm" valves, water-mist nozzles, residential sprinklers, and extended-coverage sprinklers. Documents have been balloted as draft international standards in all of these areas, with full international standards produced in about half. Work on standards in additional areas is getting under way.

Few countries adopt and implement these ISO standards exactly as published, but the standards serve as an important underpinning for the world's product-testing laboratories. Underwriters Laboratories (UL) and FM Global have been stalwart participants for the full 30 years. The ISO standards formed the basis of most of the newly developed European (CEN) product standards.

ISO's work in this area is compatible with the NFPA standards-development process because it focuses only on product standards. The international sprinkler community deliberately avoids installation standards such as NFPA 13, *Installation of Sprinkler Systems*. Compatible product standards help promote world trade, and installation standards will differ mainly on the basis of risk-based decisions and the jurisdiction's ability to adapt to new technology, an area in which NFPA 13 is outstanding. As a result, NFPA 13 is used around the world by many organizations and industries and officially adopted in a number of countries.

In some ways, the ISO standards present a new perspective on existing products. The proposed extended-coverage sprinkler standard, for example, requires that all sprinklers covering an equivalent protection area be used with the same specified minimum flow rate. In North America, manufacturers compete for lower flow rates.

Not all ISO standards have existing UL and FM counterparts. The preaction dry alarm valve is used primarily in Europe in systems that essentially fall under NFPA 13's definition of non-interlocking preaction systems. The valve opens to flow water in the event of a sprinkler operation, regardless of whether the supplemental detection system is operational. In North America, some sprinkler system component manufacturers offer this operational characteristic using special trim arrangements.

One reason some countries are reluctant to adopt the basic sprinkler product standard is that it contains the wood crib fire test long used by UL and FM as the basis for evaluating the fire control capability of a water spray. This has led the Loss Prevention Certification Board in the United Kingdom to develop an alternative test, using ADD apparatus similar to that used to test ESFR sprinklers. The proposed new test protocol has, in turn, led to a proposal for a new type of standard sprinkler, which is being called the "enhanced protection extended coverage (EPEC) sprinkler," with slightly larger protection areas than standard spray sprinklers.

As demonstrated by this proposed new sprinkler, international cooperation is sometimes difficult to predict but generally worthwhile. The past 30 years have shaped sprinkler technology, and efforts to address specialty products such as the residential sprinkler have led to a growing acceptance of automatic fire sprinklers as an important tool for life safety and property protection.

RUSS FLEMING is the executive vice-president of the National Fire Sprinkler Association in Patterson, New York, and a member of the NFPA Board of Directors.

ILLUSTRATION: JACK DESROCHER

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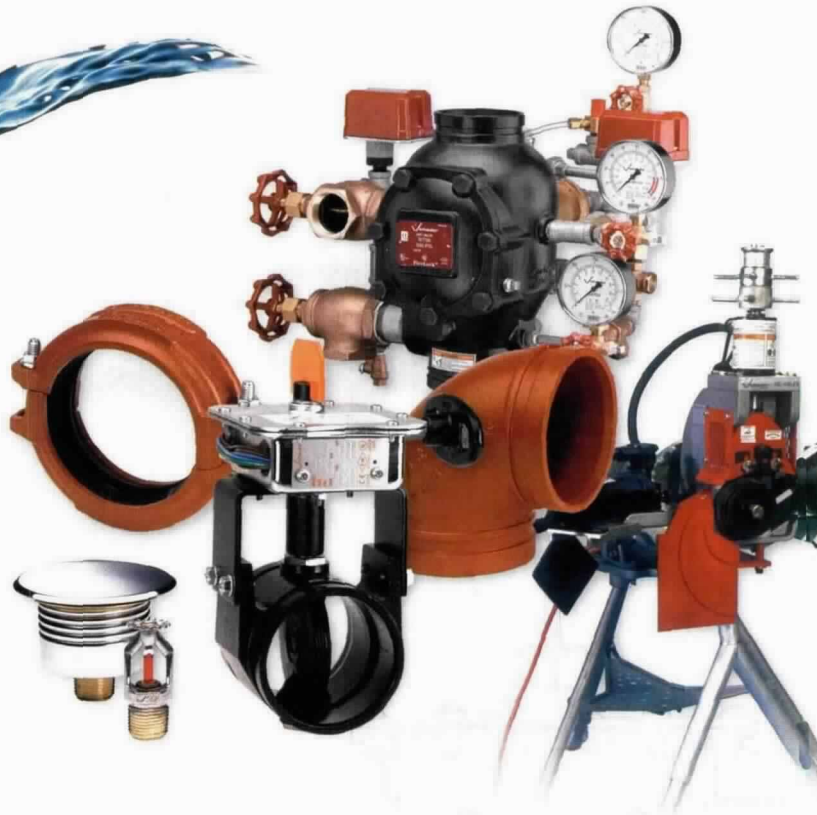

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BEN KLAENE & RUSS SANDERS

Risk versus benefit analysis

TOO MANY FIREFIGHTERS are killed and injured every year fighting fires in structures that are destined for total destruction. One way to reduce these injuries and deaths is a risk-versus-benefit analysis to decide which type of attack to undertake when confronted with a working structure fire.

The first major decision any incident commander (IC) must make is whether to begin an offensive or defensive operation. Heavy fire in an unoccupied building may result in a defensive decision, while a fire in the same building, if occupied, may justify an offensive attack. Deciding which type of attack to mount is based primarily on a risk-versus-benefit analysis, where "risk" relates to the hazards facing firefighters and "benefit" pertains to saving lives or property.

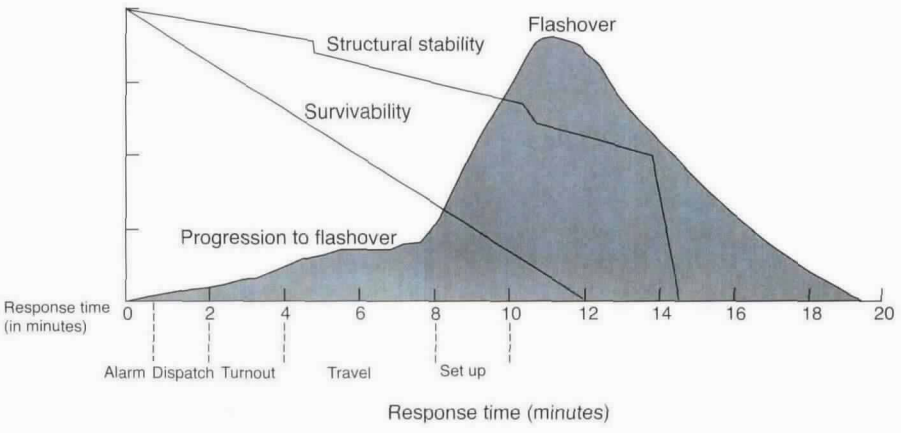
The 2002 edition of NFPA 1500, *Fire Department Occupational Safety and Health Programs*, uses risk management in outlining the "rules of engagement" for firefighters during emergency operations. According to NFPA 1500, activities presenting a significant risk to firefighters' safety should be limited to situations in which firefighters may be able to save endangered lives. Activities routinely done to protect property are also inherently risky, and actions should be taken to reduce or avoid these risks. Thus, "No risk to the safety of members is acceptable when there is no possibility of saving lives or property."

Many departments have implemented programs to reinforce these simple, yet critically important, rules of engagement.

For instance, the Louisville, Kentucky, Fire Department implemented a policy in 1986 requiring all firefighters on duty to carry a business-size, laminated pocket card stating "We accept great personal risk to save another person's life. We accept moderate personal risk to save another person's property. We accept no personal risk to save what is already lost."

During size-up, it is essential that the IC continually weigh the potential benefit to life and property against the risk to firefighters, as the risk generally increases with time, unless the fire is controlled, while the benefit to occupants tends to decrease. As the probability of saving lives and property drops, the degree of acceptable risk should also be reduced.

Each fire and structure is different, but the concept of diminishing benefits and increasing risk is a consistent and valid concept. The interval from ignition to flashover is dependent on many variables including available fuel, fuel configuration, size of the compartment, ventilation and other factors. These same factors tend to affect survivability within the area. The type of construction, structural protective elements, structural problems, and fire intensity determine the time until structural collapse.



The chart shows how a fire progresses from ignition through flashover to control by an extinguishing agent discharged from an automatic suppression system or by the fire department. On the chart, flashover occurs at approximately 11 minutes, just after firefighters enter the compartment with a fire line. The structural stability and survivability lines start at 100 percent, when the building is at maximum strength and the occupants have the best chance of escape. As the survivability line moves to the horizontal axis, the chance of survival nears zero, as the structure loses strength and proceeds toward catastrophic collapse. An experienced IC will recognize changing conditions as indicators that a change in strategy might be needed.

It's essential that company and chief officers are proficient in applying risk-versus-benefit principles. These skills can be practiced when evaluating fire reports and by developing scenarios based on buildings in their jurisdictions.

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

ILLUSTRATION: NFPA

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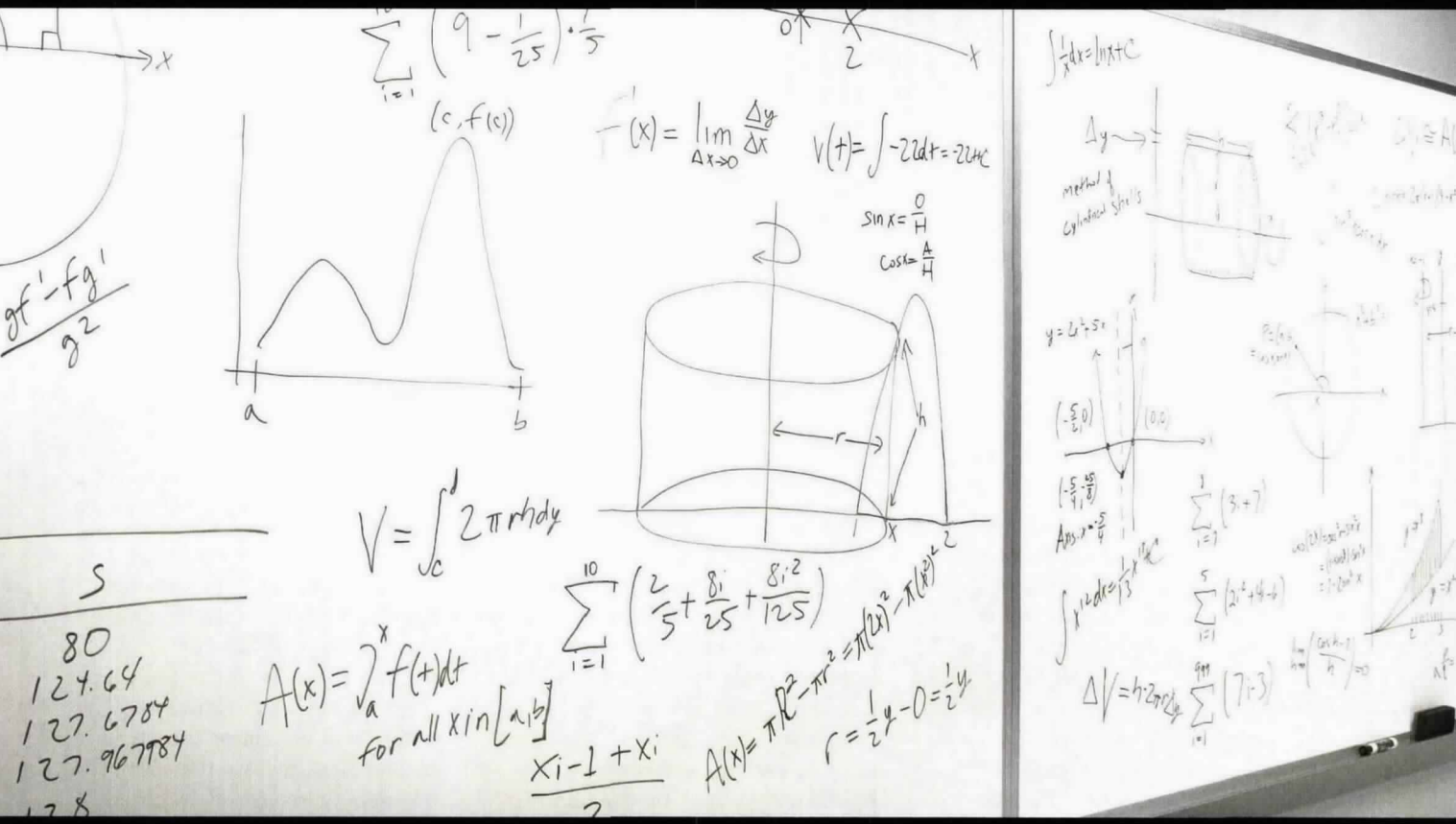

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CHIP CARSON, P.E.

Alarm system acceptance testing

I HAVE WORKED in the fire protection industry for many years now and have made some observations about fire alarm systems. These observations may not be universally true, but they are true in my experience.

Observation One: "Fire alarm systems do not work perfectly at the acceptance test!" I have yet to go to an acceptance test and have the fire alarm system work properly the first time. During the acceptance test, there are always problems with the system. This is why a comprehensive acceptance test is necessary. NFPA 72®, *National Fire Alarm Code®*, specifies acceptance tests in Chapter 10, Section 10.4.1.1 "Initial Acceptance Testing." Table 10.4.3 "Testing Frequencies" includes a long list of all the tests to be performed at acceptance. Every device and every function of the system is to be tested and verified that it works properly. This table also includes the frequency for periodic testing during the life of the system.

Table 10.4.2.2 "Test Methods" includes the methods for testing each device or function. Performing all of these tests will take some time. These tests are critical to assure the system is working properly and to reduce future problems with the system.

One typical problem with acceptance testing is the system installation is incomplete and the contractor wants the test anyway. Designers can put language in the specifications that require the contractor to perform initial tests and to submit a report before final acceptance testing. Of course, the problem is that the job is behind schedule and people want to move in the building immediately. Don't skimp on the acceptance testing.

If the system does not function properly and repairs are required, then a retest will be necessary. Remember, the retest may require some retesting of circuits or functions already tested as the repair work may have affected those devices or circuits. This will obviously affect devices added, but should also include those devices moved, devices given new addresses, circuits where devices were deleted, and changes to site software will require testing of the associated functions and devices. NFPA 72, Section 10.4.1.2 includes some information on "Reacceptance Testing."

According to Annex 10.4.1.2, "Reacceptance testing is performed to verify the proper operation of added or replaced devices, appliances, fire safety control function devices, control equipment, and so forth. It is not the intent of the committee to unduly burden the owner with increased costs for repeated testing of devices not directly affected by the replacement of devices with like devices.

"For example, if a 2-amp fuse is replaced with another 2-amp fuse in the control unit, verification of the circuit(s) served by the fused supply is required, but it would not be necessary to test 10 percent of initiating devices not directly affected by replacing the fuse. Likewise, it is not necessary to test all these initiating devices whenever a smoke detector is replaced with a like smoke detector.

"When wiring changes are made to correct improperly supervised circuits, a test of the affected device or appliance is required, but not a test of 10 percent of initiating devices not directly affected."

Observation Two: "It is difficult to determine the exact location of all required visual notification appliances (flashing lights) and sometimes-audible notification appliances on the design drawings." The difficulty of visualizing the site lines by looking at the two dimensional drawings or changes during construction may result in additional notification appliances being needed.

ILLUSTRATION: DAVE EMBER

Initial acceptance testing is critical to assure the original system is installed in accordance with code and functions as intended. Of course, subsequent testing, inspection, and maintenance are also important to assure the system continues to function properly and provide the intended safety for the building occupants.

Remember inspection, testing, and maintenance are critical so the fire safety systems will "Work the First Time, Every Time!"

CHIP CARSON is owner and president of Carson Associates, Inc., a fire protection engineering and code consulting firm in Virginia.

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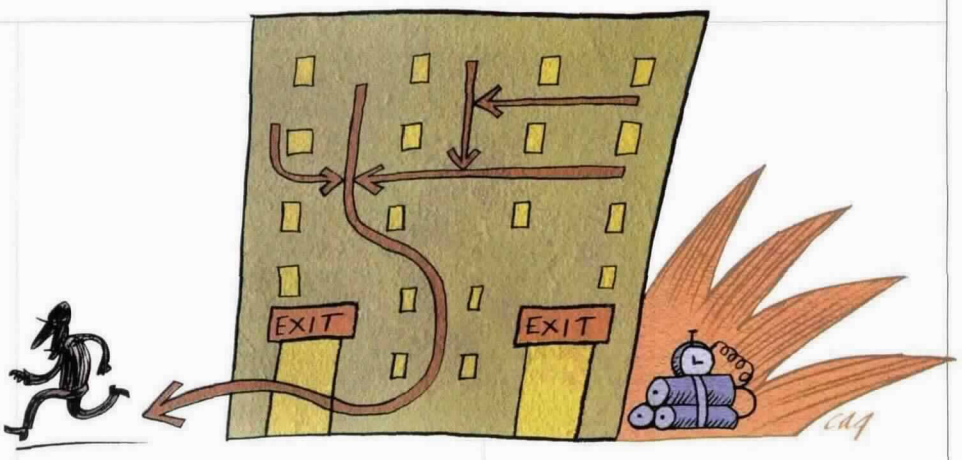
WAYNE D. MOORE, P.E., FSFPE

NFPA 72® and homeland security issues



NFPA 72®, *NATIONAL Fire Alarm Code®*, is currently in a revision cycle, and one of the Technical Correlating Committee's major undertakings has been to establish a task group to incorporate material accommodating mass notification systems (MNS) in a proposed annex, Annex G.

MNS, which are being introduced into many government and military installations throughout the country, are used "to provide information and instructions to people, in a building, area, site, or other space, using intelligible voice communications and possibly including visible signals, text, graphics, tactile, or other communications methods."

As stated in the proposed Annex G, an MNS "is designed to alert and protect people. The desirable system provides protected personnel with concise, accurate, timely, and well-directed messages that communicate how they should behave during a variety of emergency situations. Such emergencies include in-progress or impending terrorist attacks, other man-made dangerous situations, accidents, and natural disasters. If messages are to be delivered from a control station, secure communication that would withstand hostile eavesdropping and interference should be used."

The proposed annex does not try to address all equipment, methods, and recommendations that might be necessary or advantageous during emergency and non-emergency situations, but it does provide minimum guidelines to help designers, installers, and operators apply MNS. These recommendations apply to installations in buildings and outdoors.

If trained personnel are to make decisions in real-time, they must be able to receive clear messages from emergency services personnel who are not located in the general building, area, space, campus, or region in which the emergency is occurring. During any emergency, especially a terrorist incident, the dissemination of accurate information to the right people, at the right place, at the right time is essential to mitigating the threat and its consequences.

"Quite often," the annex explains, "the instructions provided to personnel in affected areas pertain to acting in specific defensive ways so as not to expose them to danger." In the case of a chemical or biological agent attack, for example, the correct response is to head to a secure area in a building, seal doors and windows, and shut down air intakes, "rather than leaving the building and be exposed to the attacking agent." In the case of a bomb threat, on the other hand, directions for evacuation are to be given, where specific information is available, and these directions must be more specific than simply "evacuate the building." The evacuation route might depend on threat intelligence and is likely to be different than that specified in a fire evacuation plan. Most people can tell where a fire is, but they don't always know where a bomb is, and "automatic evacuation of a building, a common procedure in case of a fire, is to be avoided, since it might expose personnel to even greater danger."

The main impetus for the development of mass notification systems was terrorism. Thus, the design of these systems will differ, depending on the anticipated threats.

The proposed annex material for the *National Fire Alarm Code* is designed to make users of NFPA 72 aware of mass notification systems, especially fire alarm voice communication systems, so that they can integrate them into their fire alarm systems to provide live and prerecorded localized messaging.

As outlined in the proposed Annex G, "MNSs can consist of fully independent systems with minimal or no interface with the building fire alarm system, systems that report trouble and supervisory signals through the fire alarm system, systems that share audible and visible notification circuits and appliances with the fire alarm system, or combination mass notification and fire alarm systems." The *National Fire Alarm Code* technical committees look forward to receiving comments on this subject.

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JENNA PADULA

NFPA 1600 compliance workshops

A NEW SERIES of workshops aims to ease the private sector's anxiety about NFPA 1600 compliance.

In response to the support the National Commission on Terrorist Attacks upon the United States (9/11 Commission) gave NFPA 1600, *Disaster/Emergency Management and Business Continuity Programs*, NFPA is launching a series of workshops for the private sector. The two-day class, "The New National Preparedness Standard for Private Sector Disaster/Emergency Management and Business Continuity Programs," is an introduction to concepts with which the public sector has already been working.

Through its Emergency Management Accreditation Program (EMAP), the Federal Emergency Management Agency (FEMA), has assessed states' emergency preparedness on a volunteer basis for years. FEMA used NFPA 1600 as the basis of the EMAP standard, which, according to FEMA, "establishes criteria for the structure and components of a viable emergency management program, including criteria for resources management; emergency management plans; direction, control, and coordination; operational plans and procedures; communications; logistics; public information; and more."

Through this program, emergency managers at the state, county, and municipal level ask a team, drawn from a pool of 100 trained, independent peer assessors, to evaluate their emergency readiness plans. To date, more than 20 states have begun the EMAP assessment process.While the EMAP program focuses on municipalities, individuals can obtain accreditation through the International Association of Emergency Managers' (IAEM) Certified Emergency Manager program. Like EMAP's, this assessment is peer-reviewed.

If the 9/11 Commission's recommendations were to become law, the private sector would have to develop emergency and business continuity plans and undergo similar assessments. Convincing businesses that developing the plans up front is in their best interest can be challenging, however. With the private sector focused on the bottom line, the idea of spending resources now for some unlikely event in the future can be a hard sell. Enter the new NFPA workshops, aimed at easing anxieties about compliance.

The first of the workshops is scheduled for NFPA's Fall Education Conference in Miami Beach in November. The idea was to offer the workshops to NFPA members first and see incorporate their feedback in future seminars in other cities.

Workshop instructor Bill Raisch is the director of the Emergency Corps Programs and an advisor to the 9/11 Commission. Raisch is also an NFPA 1600 committee member and has run similar workshops for nearly a year, without a direct connection to NFPA.. NFPA's Professional Development staff attended Raisch's workshop in New York City last January and decided to collaborate with him to develop NFPA's workshops.

NFPA 1600 isn't hard to teach; in fact, the standard is only three and a half pages long. The tricky part is applying it. The workshops, tailored to facility emergency managers, will teach attendees "to use a standardized process to mitigate and prepare for disasters and emergency situations, while developing response and recovery plans." They focus first on the text of the standard, then move on to examples and exercises that show how to execute the plan. Time will tell what will eventually convince business leaders that compliance with NFPA 1600 is a good idea. Maybe it will be better insurance rates, tax breaks, or mandated compliance at the state level. Whatever the impetus for compliance, the new workshops will help lessen the burden.

To register for "The New National Preparedness Standard for Private-Sector Disaster/Emergency Management and Business Continuity Programs," contact NFPA's Professional Development Department at (800) 344-3555 or visit www.nfpa.org.

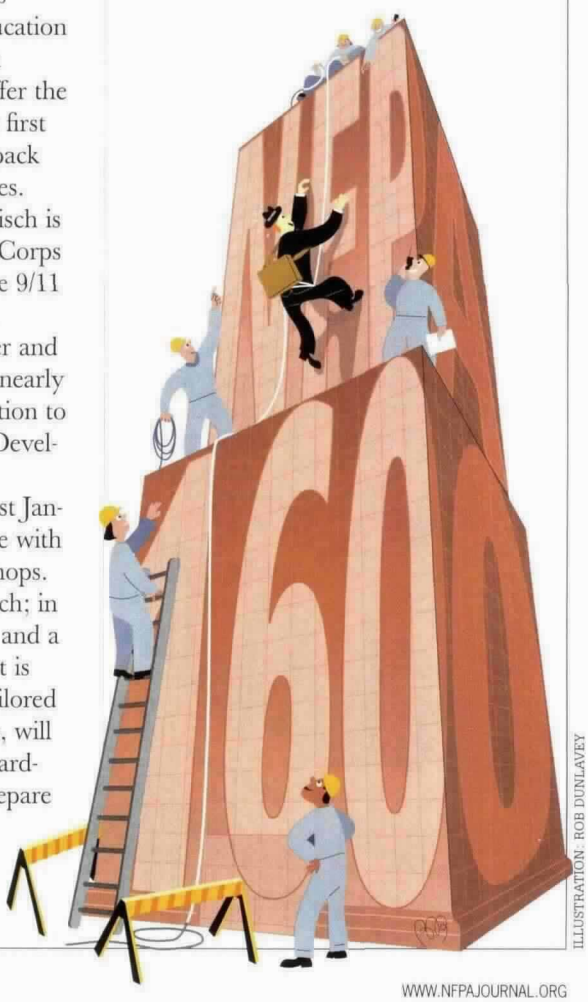

ILLUSTRATION: ROB DUNLAVEY

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SHARON GAMACHE

Addressing everyone's life-safety needs

IN ONE OF NFPA's Center for High-Risk Outreach give-away programs to fire departments and other organizations, recipients were required to fill out an application for a free copy of the *Remembering When: A Fire and Fall Prevention Program for Older Adults*™ program. On the form, we asked, "What new programs should NFPA develop?" One of the most frequent answers was, "Develop fire-safety education programs that fire departments can use to serve people with disabilities."

Leaders of organizations that represent people with disabilities have also expressed concern that there aren't enough relevant programs for their constituents.

To close this gap in programs, NFPA's Center for High-Risk Outreach organized a Task Force on Public Education Needs for People with Disabilities, chaired by Michael Collins, executive director of the California State Independent Living Center, and made up of leaders of organizations advocating for people with various disabilties.The task force identified goals for public education and related issues, including researching fire-safety behaviors; advocating for engineering changes, improved smoke alarm features, and the use of residential sprinklers; and improving the database on fire deaths and injuries among people with disabilities.

The task force also looked at alternatives to "Stop, Drop, and Roll" for those with disabilities.

At its latest meeting, coordinated by NFPA and the Oklahoma State University Fire Protection and Safety Technology school, the task force reviewed NFPA brochures, public education curricula, and educational materials posted on NFPA's Web site with an eye toward making them more usable by people with disabilities. Among the task force's recommendations were to make the design of these materials accessible to all audiences by providing them in alternate formats, such as Braille, and on audio cassette.

The task force also suggested making the materials more sensitive to all areas of diversity, including socio-economic, ability, culture, and living situation, in part by integrating messages and pictures of people with disabilities into general fire-safety brochures.

Another step to making the materials more useful is to make them more understandable by illustrating them with photos or drawings and providing clear and simple explanations of pictures for people who are blind. The task force also suggested captioning pictures. Of course, all this information should be technically accurate, reflect a variety of living situations, and be compelling, convincing, and motivating.

Experts in a variety of disabilities should be included in the design and review of all materials, too.

"Just as people with disabilities should be involved in all phases of escape planning and practice that involve them, it's imperative that people with disabilities be involved in all phases of developing educational materials," said task force member Bill Scott, president of Abilities Unlimited. "They are the people who know whether advice is practical and sensitive to the audience NFPA is trying to reach."

Since the group met, NFPA has revamped our Fire Safety for People with Disabilities brochure to incorporate its input and has posted educational materials about such items as smoke alarms with special features on our Web site. Several task force members have made presentations at NFPA conferences and other national meetings, and we're planning changes to other NFPA educational brochures and programs, including the training and practice of escape planning in the home.

"This is a challenge for individuals and families that have a person with disabilities as a member," said William G. Swenson, of the Disability Preparedness Center in Washington, D.C. "Practicing is what is needed, just like everyone in all households."

The task force has a big job ahead, but it is up to the task. Because its members have had to deal with problems and barriers every day, they are able to work with the fire-safety experts to come up with practical solutions.

SHARON GAMACHE is the executive director of the Center for High-Risk Outreach.

ILLUSTRATION: CYNDY PATRICK

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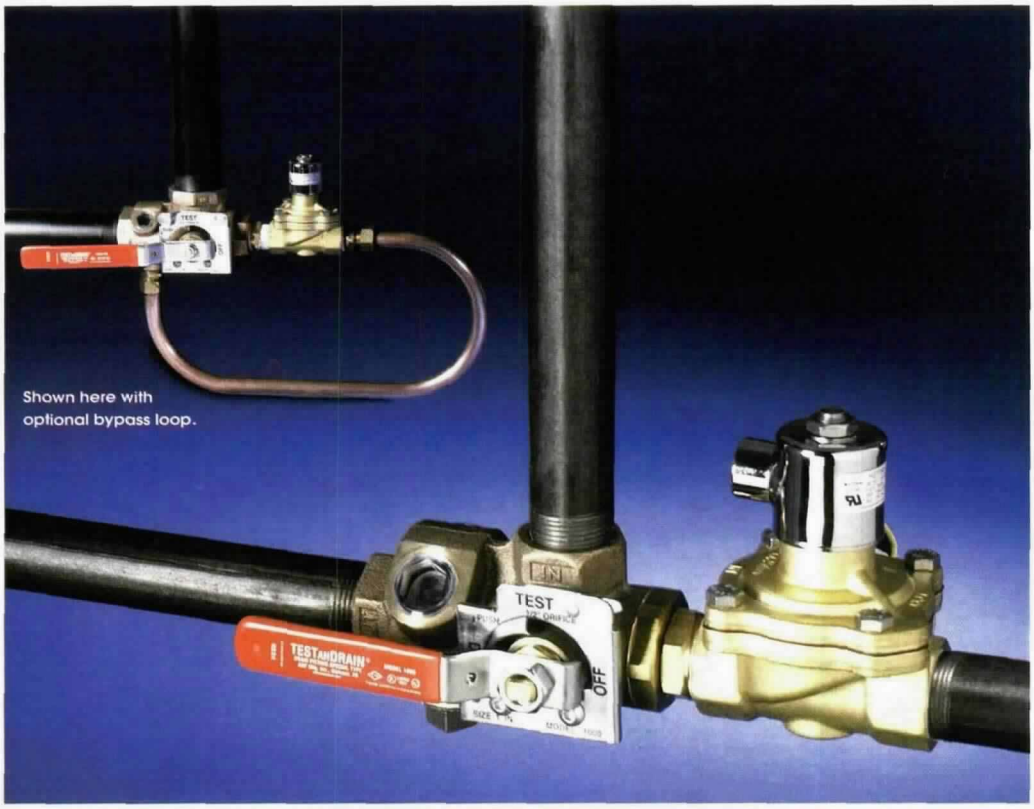

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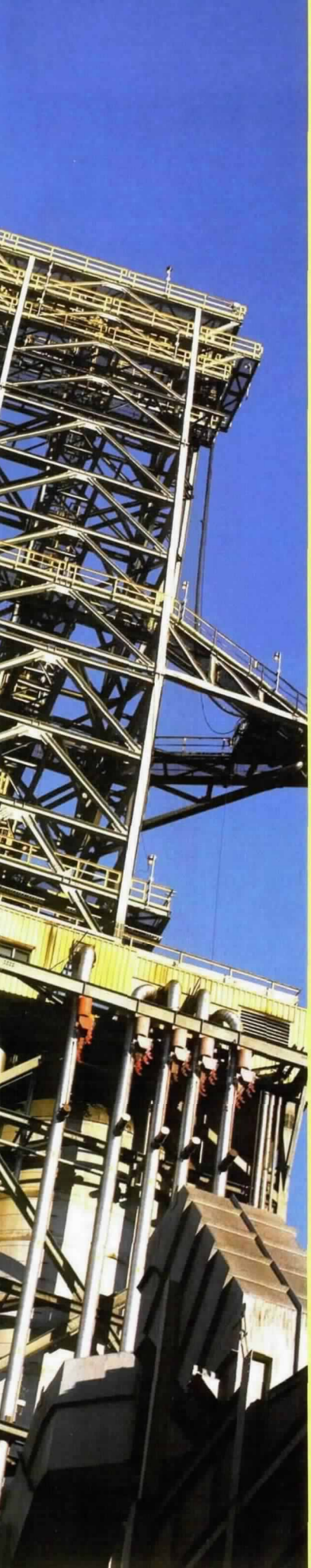

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Suncor's oil sands operation in Fort McMurray, Alberta, prepares for unprecedented growth with a decade of investment in fire prevention technology.

By **Gordon Clayton**

Towering Challenge

ALL EYES ARE ON NORTHWESTERN CANADA as the oil industry's next production frontier. The region's oil sands naturally occurring mixtures of bitumen, water, sand, and clay that are found mainly in Alberta.

A sample might contain about 12 percent bitumen by weight. Bitumen is a thick, sticky form of crude oil. At room temperature, it is like cold molasses. It must be heated before it will flow from a well or through a pipeline. Reserves are more plentiful than those in Kuwait or Iraq and second only to Saudi Arabia. But the oil sands crude is difficult to extract, with production costs as high as $11 to $14 Canadian per barrel more than those of conventional crude, and profit margins can vary. In this environment, there's little tolerance for lost production time or product and a fire can lead to both. >>

A Suncor coker tower.

Clockwise from left: Oil sands truck; coker towers; a handful of bitumen.

Near Fort McMurray in northern Alberta, Suncor Energy Inc. recovers bitumen–a dense, heavy oil–from oil sand and upgrades it to refinery-ready feedstock (the raw crude oil fed to refineries for processing into transportation fuels and lubricants) and diesel fuel. Suncor, an integrated energy company, pioneered the world's first commercially successful oil sands operation in 1967. Today, with total production nearing the one billion barrel mark and enough reserves to sustain production for the next 50 years, the company remains a leader in oil sands development.

In 2001, Suncor expanded its mining and upgrading facilities to a production rate of 225,000 barrels of oil per day, and construction is underway for the next phase of growth, which is expected to deliver production capacity of 260,000 barrels per day in 2005. The ultimate goal is the production of up to 550,000 barrels per day between 2010 to 2012.

The Wild, Wild Northwest

Maintaining production and preventing fires at the Suncor oil sands facility is challenging due to the nature of the mining and refining processes, the size and complexity of the facility, and the region's climate.

Suncor's main plant site sits on a footprint of roughly 2 square miles (5 square kilometers), but the central fire alarm system extends across a 15-mile span (24 kilometers) to ore preparation plants, extraction plants, bitumen upgraders, maintenance shops, offices, warehouses, and tailings pond barges. The operation encompasses more than 500 square miles (1,295 square kilometers) of terrain.

The climate also pushes technology and metallurgy to its limits, with temperatures that can vary from –50°F (-45°C) to 110°F (43°C) from season to season, and as much as 60 degrees in a 24-hour period.

The major fire hazards associated with processing of oil sands into refinery feedstocks and transportation fuels include those normally found in the oil- and gas-refining industry, including hydrocarbon spill and pressure fires, storage tank fires, vapor cloud explosions, flammable gas fires, runaway exothermic reactions, and coke and sulphur fires. In addition, Suncor must address the fire potential of natural gas- and coke-fired electricity/steam generating plants; a large fleet of mining equipment; ore-processing and oil-extraction plants; multi-story office buildings; fleets of tank trucks carrying combustible and hazardous commodities; and the wildlands and boreal forests that surround the facility.

The rapid growth of the oil sands industry and the resulting construction require Suncor to closely evaluate new and accepted practices that address life safety issues in an industrial environment. Suncor must also integrate into its plant design features and systems that minimize the possibility of fires and explosions and the damage that results when they do occur.

Furthermore, Suncor is bound by Canadian national and provincial fire and building codes that reference more than 20 NFPA codes and standards, including

NFPA 11, *Low-, Medium-, and High-Expansion Foam Systems*; NFPA 13, *Installation of Sprinkler Systems*; NFPA 72®, *National Fire Alarm Code®*; NFPA 750, *Water Mist Fire Protection Systems*; and NFPA 2001, *Clean Agent Fire Extinguishing Systems*.

Many of Suncor's corporate and Emergency Services Department standards also refer to NFPA standards, including NFPA 472, *Professional Competence of Responders to Hazardous Materials Incidents*; NFPA 1001, *Fire Fighter Professional Qualifications*; NFPA 1002, *Fire Department Vehicle Driver/Operator Professional Qualifications*; and NFPA 1021, *Fire Officer Professional Qualifications*.

Investing in an Expandable Central System

Like many oil-mining operations, Suncor's oil sands business has struggled against fire, particularly in the facility's early days. In the fall of 1987, a major fire that shut down the extraction facility and affected production for weeks triggered a site-wide review of fire protection systems, from fire trucks to sprinkler systems to the central alarm system.

In particular, the central alarm system was found to need vast improvements. As it then stood, the central fire alarm panel supplied minimal information and no electronic archiving. Maintenance costs were rising, in part because system isolations were time-consuming and difficult.

The complexity of the sprawling site cried out for an early warning fire detection system that could provide accurate alarm information and initiate controlled evacuation in certain areas.

In 1991, a fully networked Honeywell fire alarm system communicating on a fiber optic backbone was installed to replace the obsolete central alarm panel in the fire hall with a PC and report printer. Honeywell's proposal also outlined a long-term plan to systematically migrate all existing remote fire alarm panels to newer addressable panels that would provide detailed zone and device information. The plan also allowed Suncor to isolate the detection system for plant maintenance work from one central location controlled and monitored by the facility's Emergency Services Department.

This investment has contributed to a 90 percent reduction in fire-loss costs. Furthermore, the system has expanded and grown along with the facility. The central alarm system, which originally monitored a few hundred fire alarms, now monitors more than 15,000 alarms. Nearly all occupied buildings and plant process facilities, including the heavy-oil upgraders and extraction plants that pose such a high hazard potential, are connected to the central alarm system by a detection device, a pull station, or fire suppression system flow and status alarms.

Currently, 116 separate alarm systems report through the Honeywell Enterprise Buildings Integrator (EBI) Graphic Central. Fifty panels are Honeywell XLS, 10 are

INVESTING IN THE OIL SANDS

PART OF SUNCOR'S COMMITMENT to northern Alberta's oil fields is its investment in fire protection personnel and technology. A number of initiatives have been undertaken to prevent and fight fires and to protect employees. For example, Suncor has replaced 1960s vintage carbon steel piping for its fire protection water supply with high-density polyethylene piping and added a pumphouse fed from a large reservoir rather than a storage tank, creating a virtually unlimited supply of water. It has added or upgraded the automatic fire suppression and detection systems in older parts of the plant and installed a central fire alarm system that integrates the facility's life safety and security systems and pinpoints the location of fires for improved response.

Many new water monitors have been installed at both ground level and elevated positions, and the erosion and corrosion of process piping has been more closely monitored. When needed, upgraded metallurgy has been undertaken, The pump seal design on units handling hydrocarbons above their ignition temperature has been improved, and key isolation and process control valves that can be activated from plant control rooms have been motorized.

Suncor has also improved the fire-safe design of new process facilities, considering spatial separation from other hazardous plants and process, installing automated and remotely controlled isolation valves, initiating emergency isolation and process shutdown, designing access routes for emergency crews, and improving firefighting apparatus and appliances. A new main fire hall, which is centrally located yet not exposed to process hazards, has been built, as have satellite fire halls for new facilities remote from the main plant site.

The company has also trained back-up emergency response crews working in the oil processing units to a higher level, so that they can now initiate fire attack water flows from fixed monitors at the outset of a fire. And finally, Suncor has developed a closer, more comprehensive relationship with its mutual-aid partners for emergency response strategies, training, and major equipment purchases.

Honeywell FS90, and the remaining 56 are conventional fire alarm panels. The automatic fire-suppression system includes water and foam deluge sprinklers, water mist sprinklers, wet– and dry-pipe sprinklers, pre-action sprinklers, clean agent devices, dry chemical extinguishers, and high- and low-pressure CO_2 extinguishers. All these systems were designed in accordance with NFPA 750, NFPA 2001, NFPA 13, and NFPA 16, *Installation of Foam-Water Sprinkler and Foam-Water Spray Systems.*

The central fire alarm system features addressable technology that pinpoints the exact location of a fire, allowing the fire response team additional time to evacuate personnel and fight the fire. The system also provides a graphic display of all building and facility layouts, which serves as a teaching tool for team members and provides hazmat information as needed. The EBI system integrates life safety and security functions through a centralized interface.

Using Honeywell, Suncor has been able to incorporate and manage the substantial growth of our operation over the past 10 years, during which the facility has increased synthetic (a blend of hydrocarbons similar to light crude oil produced by processing bitumen or heavy oil at an upgrader) crude oil production from 80,000 barrels a day to more than 225,000 barrels a day. Honeywell has expanded its coverage of the facility to include security, card access, and building HVAC control systems, as well as digital video systems for ore-preparation plants.

In addition to its detection systems, Suncor has an Emergency Services Department with three fire prevention personnel who are registered with the provincial government as fire codes officers.

Reducing Risk with Specialized Systems

Special detection and control systems are also a key component of Suncor's risk-mitigation strategy, since its upgraders and service buildings are within the confines of the Athabasca River valley. This requires Suncor to use early detection, automatic suppression, and extensive alarm and evacuation systems to minimize and localize fire exposure and address the safety of personnel.

The potential for a release of toxic hydrogen sulphide sulphur dioxide gases from the upgraders also creates a need to link the gas-detection systems and the fire- and life-safety systems of the facility's service buildings, in accordance with NFPA 69, *Explosion Prevention Systems.* When the system detects toxic gas, it can shut down the heating and ventilation systems, or initiate re-circulation to keep the gas from entering a building, while the fire alarm system's voice communication component directs occupants to remain in place or evacuate once the atmosphere is cleared, in compliance with NFPA 72.

The wide range of flammable liquids and gases processed in the same plants or buildings at the operation, create some challenging fire detection situations. Heavy crudes, processed at 900°F (482°C), produce vastly different light and heat signatures than light solvents and hydrogen or natural gas, and this difference must be taken into account when designing fire protection systems in accordance with NFPA 30, *Flammable and Combustible Liquids Code.*

Suncor has developed strategies that combine heat, smoke, ultra-violet, infrared (IR), triple IR, beam detectors, and air-sampling systems to minimize false alarms, prevent unwarranted process shutdowns, and avoid detection system isolation during process system maintenance.

A City-Sized Fire Department

In addition to its automatic detection and suppression systems, Suncor has an Emergency Services Department with three fire prevention personnel who are registered with the provincial government as fire codes officers. They report to the manager of Emergency Services and are responsible for Suncor's compliance with provincial fire codes. They also act as liaisons between the corporation and its insurance brokers and underwriters.

These fire prevention personnel are supported by on-duty firefighters, who perform routine fire inspections and preliminary activities related to fire investigations. Numerous trades people and engineers, both on staff and on contract, also support the maintenance and renovation of existing fire protection systems and help design, install, and commission new ones.

Suncor maintains an industrial fire department of 46 at its oil sands operation, responding from two fire halls, one at the main plant site and the other next to the mine headquarters across the Athabasca River. This group is responsible for emergency response to all fire, rescue, medical, and hazardous materials incidents.

Suncor's current response fleet consists of three industrial foam pumpers, all equipped with 105-foot (32-meter) aerial ladders, that provide 1,250 to 1,500 US gallons (4,731 to 5,678 liters) of extinguishing agent per minute, as well as an aircraft rescue and firefighting 8x8 vehicle that has been modified for use as a mine response vehicle and carries 3,000 gallons (11,356 liters) of water, 200 gallons (757 liters) of foam, 500 pounds (226 kilograms) of dry chemical, and a 50-foot multi-

agent aerial. The fleet also includes three ambulances; a 3,000-gallon foam tanker; an 8,000-gallon (30,282-liter) foam trailer; 6,000-gallon-per-minute (gpm) (22,712-liter-per-minute [lpm]) foam nozzle; and a 2,000-gpm (7,570-lpm) hydro-chem nozzle.

The Emergency Services Department is part of a mutual-aid group with the city of Fort McMurray, 15 miles (24 kilometers) to the south, and two other oil sands operations 5 and 25 miles (8 and 40 kilometers) to the north.

Four crews, each composed of seven firefighters, all of whom are paramedics or emergency medical technicians, and a registered nurse, work 12-hour shift rotations. Each crew is assisted by 25 volunteers, trained in accordance with NFPA 1081, *Industrial Firefighter*, from the operations and maintenance staff.

Emergency response assistance is also available from Emergency Services' maintenance technicians, who service the site's portable extinguishers, dry-chemical systems, and breathing apparatus. Three maintenance technicians, also trained to NFPA 1081, are on site 12 hours a day, 7 days a week.

Senior department staff consists of an Emergency Services manager, a deputy chief, and two training coordinators, as well as three fire prevention officers.

Preparing for the Next Growth Spurt

The fire prevention group has expanded from one to three officers to meet the demands of a growing and aging oil-sands operation. A senior fire prevention specialist works directly with Suncor's Major Projects Group, which handles ventures in excess of C$20 million, to help design, construct, commission, and start up new growth projects.

Suncor is currently experiencing approximately C$1 billion to C$1.5 billion of construction per year, which includes the development of a second oil-sands production operation 30 miles (48 kilometers) northeast of the existing plant. This project, called "Firebag," uses onsite recovery of the oil from the sand using a process known as "steam-assisted gravity drainage." The bitumen it produces is cleaned of water, solids, and gas, then diluted with naphtha and sent by pipeline to the upgraders at the main plant site. The Firebag Project is expected to produce more than 400,000 barrels per day by 2014.

A second senior fire prevention specialist handles oil sands projects of less than C$20 million and oversees renovations, refits, repairs, and maintenance to existing fire protection systems. The main oil sands plant and its assets are protected by three separate fire-protection water systems, the largest of which has a capacity of more than 20,000 gpm (75,706 lpm). Suncor now has more than 250 fire suppression systems, creating a substantial workload for those who operate, maintain, and inspect them.

The third member of the fire prevention team is the fire prevention coordinator, who manages fire inspections, evacuation drills, and fire warden training, and is accountable for site-wide emergency preparedness.

The System at Work

The best example of Suncor's detection and suppression systems working in unison would be water deluge on high-temperature hydrocarbon pumps. Some of these pumps operate in excess of 3,000 gpm (11,356 lpm) above 700°F (371°C), and a pump seal failure can quickly create a large pressure fire and spill fire. Heat detectors mounted at the pump seals initiate deluge water flow to encapsulate the pump and its base, confining heat exposure to adjacent pumps or structural steel, while simultaneously notifying emergency services and the control room operators.

Another example is the "wet gas" or hydrogen compressor buildings, where units of as much as 15,000 horsepower process gases at rates as high as 46,000 standard cubic feet per minute. A combination of ultraviolet and infrared detection allows Suncor to recognize a clean-burning hydrogen fire from a compressor leak or a low-light emission fire from a lube oil leak in the same space and activate the deluge systems to minimize fire damage and transmit alarm signals to the emergency response crews.

Since most of Suncor's pumps, compressors, and heat tracing systems are powered by electricity, the facility needs large, elaborate electric motor control centers and electrical substations. The deployment of air-sampling detection systems in these enclosures works well with clean agent fire suppression systems and early recognition of overheated electrical circuits.

Beyond Common Experience

As Suncor's oil sands business grows, the company finds itself facing challenges beyond industry norms. The size and scope of the bitumen extraction plants and heavy-oil upgraders are driving Suncor to fire protection systems and fire safe designs on a scale that exceeds common experience, and the company often finds itself breaking new ground.

To assess fire hazard conditions properly and develop mitigation strategies, Suncor consults technical experts and colleagues throughout the oil and petrochemical industry, as well as its insurance brokers and underwriters, to help determine sound, effective, and affordable fire protection measures and strategies.

Suncor also reviews common industry practices and standards, using NFPA codes and standards as a key resource.

GORDON CLAYTON is senior fire prevention specialist for Suncor Energy Inc. Oil Sands in Fort McMurray, Alberta. He has more than 28 years of experience as an oil field and industrial fire, life safety, and emergency-response specialist.

By **Eduardo Alvarez, SFPE** and
Jaime A. Moncada, P.E., SFPE

Tragic fire at the Ycuá Bolaños Botánico Supermarket in Asunción, Paraguay

NO EXIT

PHOTOGRAPH: CORBIS

AN AUGUST 1 FIRE in a two-story, unsprinklered Paraguayan supermarket that killed more than 400 people[1] and injured more than 360 people, has highlighted the problem of building modern, sophisticated structures in emerging nations without following the fire protection and life safety measures those buildings have in the developed world.

Perhaps the most important observation about this fire is that it happened in a new building, in which the application of internationally accepted regulations such as NFPA codes and standards could have prevented or limited the loss of life.>>

Although NFPA wasn't officially invited to investigate this fire, the authors visited the scene, conducted interviews, and collected information available at the time, some of it from newspaper sources and conversations with witnesses. We also reviewed the U.S. Department of Justice's International Response Team's (IRT) cause-and-origin report. This team, which is part of the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), investigated the fire at the request of Paraguayan authorities through the U.S. Embassy in Asunción. Unanswered questions about this fire remain, and we've identified those issues we couldn't corroborate.

Aerial view of Ycuá Bolaños Botánico

Building Location and Description

Asunción, the capital of Paraguay, has 513,000 inhabitants, making it one of the most important cities in the country. The Ycuá Bolaños Botánico Supermarket was located near the Asunción Botanical Gardens in a district known as Santísima Trinidad, which consists of single-family dwellings and a few retail shops. It was a part of a chain that includes two other stores.

The two floors of the supermarket, which opened in 2001, each had approximately 43,000 square feet (4,000 square meters) of floor area, and the ground-floor included covered parking areas. There was also an open-air parking area. The sales area, the food court, the food court kitchen, storage areas, and other service areas were on the second floor, and mezzanines on the south and north sides of the building contained the administrative offices and an additional area for the food court, respectively. The food court, which sat 324 on both levels, was separated from the sales area by glass walls. The sales area, covering 34,000 square feet (3,152 square meters), had an estimated occupant load of 1,126. It appears that the building had no firewalls.

The building was constructed of cement-block masonry walls, concrete floors, and a sloped steel-truss, metal-clad roof supported by metal joists and, in some areas, metal reticulated beams. The roof's corrugated metal deck was coated with sprayed-on polyurethane foam between 1 and 10 inches (25 and 250 millimeters) thick. It was not fireproofed.

Most shoppers entered the building through the two vehicle accesses, next to one of which was an open stair and ramp for supermarket carts.

A suspended ceiling approximately 18 feet, 4 inches (5.6 meters) above the floor separated the roof from the sales area and the food court. The ceiling was covered in polystyrene tiles measuring 4 feet (1.2 meters) by 2 feet (0.6 meters), sandwiched between two layers of plasterboard and supported by a light-metal grid attached to the roof joists with metal cables. Air conditioning ductwork passed over the sales area and food court above the suspended ceiling.

Also passing above the suspended ceiling was the chimney of the food court kitchen's charcoal grill, which crossed over the food court mezzanine and through the roof deck, where an electric extractor was located. It's reported that in at least one, and possibly two, locations, the chimney had horizontal transitions to avoid structural elements. The stoves in the food court kitchen were fueled by gas from two propane-butane tanks in the service area, and the remaining cooking systems, including the bakery ovens, were electric.

The building's pedestrian entrance connected through an open stairwell with the sales area on the second level, where a door led to the food court. Another open stairway led from the food court to the mezzanine, where there were additional tables. However, most shoppers entered the building through the two vehicle accesses, next to one of which was an open stair and a ramp for supermarket carts. The ramp and stair connected the parking area with the sales area on the upper level. Neither the stair nor the ramp was enclosed by fire-resistant partitions.

A loading dock at the rear of the store led to the service areas. Store employees had an independent access stair that connected the parking area to the service area on the top level.

The building was equipped with fire hose cabinets, presumably fed by the building's water supply system

through a Siamese connection for fire department use, and located on the façade of the building.

It also had an automatic fire detection and alarm system. Photoelectric smoke detectors had been installed in the sales area, the food court, and much of the service area, and rate-of-rise heat detectors protected the parking area, bakery, confectionary, and kitchen. The system included 90 combined smoke detectors, 49 heat detectors, 10 manual fire alarm boxes, and 10 warning devices with sound alarms and strobe lights, as well as 3 sound-alarm devices. The alarms were grouped in 20 fire detection zones and connected to a combined intrusion/fire detection panel.

The Fire

According to the ATF report, the fire was accidental. It started in the kitchen in the horizontal transition of the charcoal grill chimney, where a large accumulation of grease served as fuel load. The heat of the fire melted the chimney's metal bands, allowing the fire, until then confined to the duct, to break through the upper surface of the transition and rise up the pitch of the roof, where it ignited polyurethane insulation and ceiling tiles.

The fire continued to spread through the concealed space between the ceiling and the roof deck in a south-southwest direction, weakening the ceiling supports near the grill. It eventually broke through the ceiling around the grill's chimney on the mezzanine, causing the glass wall separating the food court from the sales area to break. This was the first time customers and employees saw the fire.

Exterior view of Ycuá Bolaños Botánico

PHOTOGRAPH: CORBIS

FIRE TIMELINE

The following chronology is based on information obtained from interviews with witnesses and firefighters, press clippings, and information from ATF's origin and cause determination report.

Before 9 a.m. A grease fire starts in a horizontal transition portion of the charcoal grill's chimney in the food court.

11:19 a.m. One of the last clients to leave the supermarket before the fire pays for his purchase at the cash register. There were no visible signs of fire.

11:22 a.m. The fire breaks through the suspended ceiling and becomes visible. The plaster panels start to fall from the suspended ceiling. Many inside the food court start to run towards the ramp leading to the vehicle parking area.

11:32 a.m. The dispatch center at the local fire department receives the first telephone call reporting the fire from a neighbor.

11:33 a.m. (approximately) A volunteer firefighter who lives in the neighborhood helps several people out of the building through the pedestrian entrance. A security guard tries to prevent customers from leaving the building and fires two shots in the air. Moments later, he closes the doors, allegedly to keep people from leaving without paying. The gate separating the ramp for the supermarket carts from the parking area is also closed.

11:35 a.m. (approximately) Neighbors and passersby start throwing stones against the exterior glass walls in an unsuccessful attempt to help the trapped victims out of the building.

11:37 a.m. The first fire company, which consist of a fire engine with five to seven firefighters, a cistern truck, and an ambulance, reaches the scene. A second alarm is declared, and the fire is immediately qualified as "a high-magnitude incident." The firefighters' main priority is to rescue victims; so structural firefighting efforts are postponed. The firefighters have difficulty entering the building because the doors are closed [locked??].

11:45 a.m. (approximately) A second fire company arrives.

11:50 a.m. The fire spreads to the supermarket's service area.

12:30 p.m. (approximately) Firefighters vent the fire through openings in the roof.

5:30 p.m. The rescue of injured victims continues. It is unclear when the fire was controlled.

7 p.m. The fire department ends rescue efforts. A number of people died on the ramp to the parking garage when the fire rolling down the ramp overtook them. However, there is no conclusive information as to where most loss of life occurred.

The rush of oxygen-rich air through the broken glass generated a fireball that rolled in a south-southeast direction above the suspended ceiling, causing additional ceiling tiles to fall in the main sales area. This further increased the available oxygen fueling the fire until it eventually reached the southern wall of the supermarket.

By this time, most of the goods in the sales area had been engulfed in flames. The most severe fire damage occurred in the extreme southern part of the building, where the fire load, which included clothing, textiles, and similar merchandise, was greater than that of the north side of the sales area, which contained mostly foodstuffs.

As the fire continued to burn, it generated a pressure wave that pushed the flames down toward the lower parking level through the ramp connecting the garage with the supermarket.

The ATF's description of the fire propagation coincides with witnesses' reports, some of which refer to a fire "that fell from the roof." The numerous explosions the witnesses noted can be explained by the fire's effect on aerosol cans, the cold storage compressor, and other items.

Building Code Analysis

The Ycuá Bolaños Botánico Supermarket complied with local codes. Architect Teresa Miranda, director of the Urban Administration Department for Asunción, told the local press that the supermarket met Municipal Regulation 25097 of the city of Asunción's building code, "not having found any radical objection meriting observations or rejections of the submitted permit documents." The regulation adopted in 1988, establishes fire and life requirements for establishments such as the Ycuá Bolaños Botánico Supermarket, including maximum travel distance to exits; fire enclosures for means of egress; and swinging direction of exit doors. It also lists the types of buildings, such as the supermarket, in which fire detection and alarm systems, fire hose cabinets, and water supplies are required.

In contrast to the 2003 edition of NFPA 101®, *Life Safety Code*®, however, the Asunción regulation does not require automatic sprinklers in such occupancies. As a result, the supermarket was not sprinklered.

However, it was protected by a fire detection system, which the *Life Safety Code* does not require in this type of occupancy. According to the *Life Safety Code*, fire detection systems aren't an acceptable replacement for sprinkler systems unless a performance-based design is used.

By reference, the *Life Safety Code* requires compliance with NFPA 96, *Ventilation Control and Fire Protection of Commercial Cooking Operations*, which states in Appendix A.7.1.2 that "vertical or substantially pitched ducts are preferred over horizontal ducts because of their capacity to drain grease and to transfer heated vapors more rapidly to the exterior of a building." The fire began in a horizontal portion of the duct. However, we have insufficient information to determine whether the duct met NFPA 96's requirements for minimum clearance between the duct and combustible materials, particularly the polystyrene ceiling tiles.

The Asunción regulation requires fewer exits for a building such as the supermarket than the *Life Safety Code*, as well. As a result, the food court, which had an occupant load of 324, had one exit instead of two, and the sales area, with an occupant load of 1,126, had only two exits, not the four the *Life Safety Code* would have required.

In the sales area, the maximum travel distance was 315 feet (96 meters), instead of the maximum 150 feet (46 meters) the *Life Safety Code* requires, and the capacity of the available means of egress was 821 persons, even though the occupant load was 1,450. And this doesn't take into account the occupants of the service areas. Furthermore, a review of drawings and photographs reveals that none of the exit doors swung in the direction of egress travel, as the *Life Safety Code* requires.

In contrast to the 2003 edition of NFPA 101, local regulations do not require sprinklers in such occupancies. As a result, the supermarket was not sprinklered.

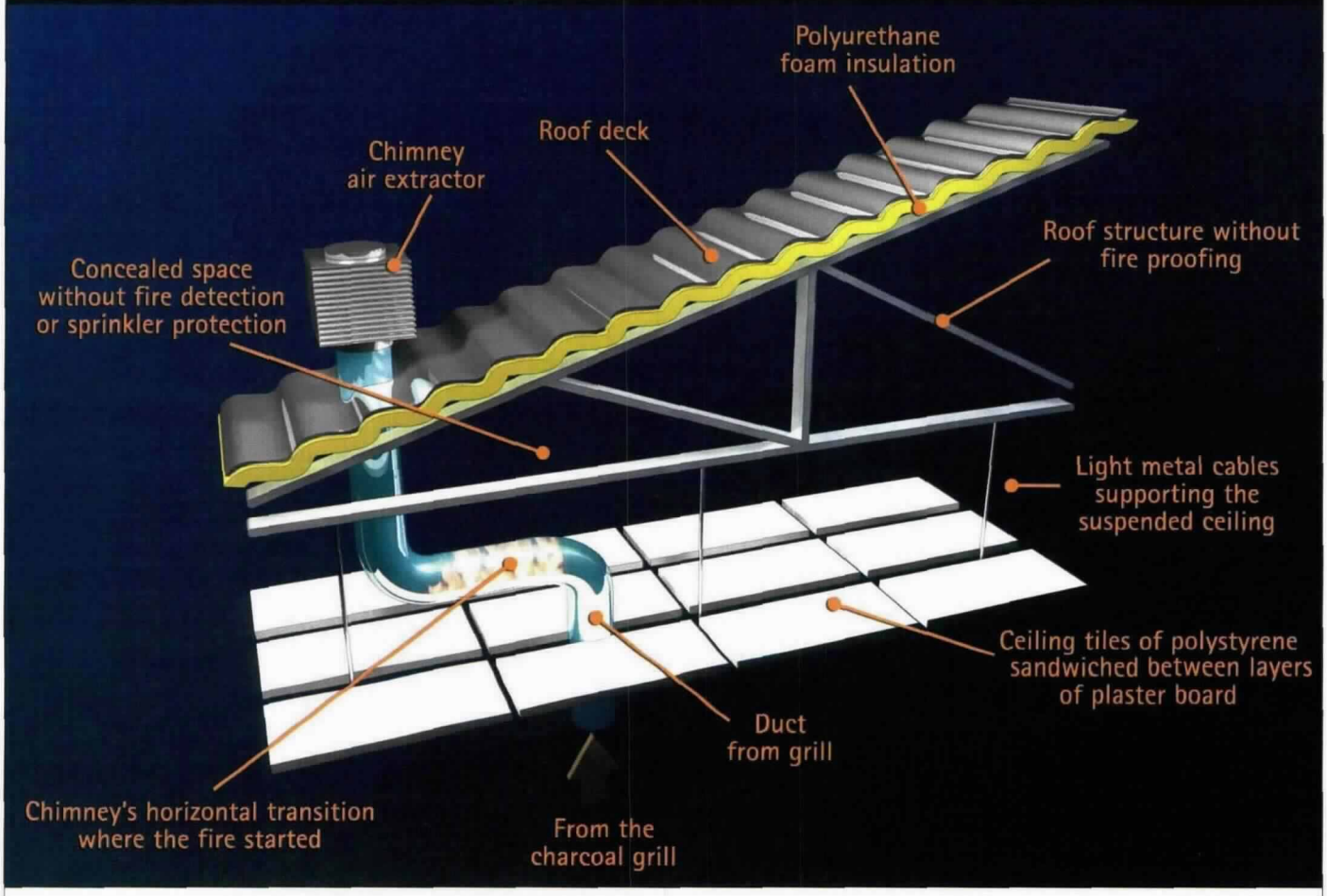
The ATF is currently conducting laboratory flame-spread tests of the polyurethane foam applied to the supermarket's roof deck. Although we have no information as to whether the foam met ASTM C-1029, *Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation*, or the roof assembly met UL 1256, *Standard for Safety for Fire Test of Roof Deck* or FM 4450, *Test Standard for Class 1 Insulated Steel Deck Roofs*, we do know that many construction assemblies used in the developing world have not been tested or studied under fire conditions.

Conclusions

This fire tragically underscores the problem that currently exists in many emerging countries, where architectural designs mirroring those of more developed countries are implemented without regard to their more rigorous life safety and fire protection requirements.

It not only highlights the risks involved when large buildings are not protected with automatic sprinkler systems and the means of egress do not meet minimum travel distances, number of exits, egress capacity, and management criteria of NFPA codes and standards, but

Sketch of concealed space between roof deck and suspended ceiling



it also calls into question the strategy of protecting large buildings only with occupant-use fire hoses and fire detection and alarm systems. In this fire, there was no evidence that that building occupants used the fire hoses to control the fire or that the fire alarm system provided an alarm in a timely fashion. In fact, none of the witnesses reported having heard the fire alarm system during the fire, and there's no indication that the supermarket had contracted with a central station monitoring service at the time of the fire, even though the panel was capable of communicating to a central station.

As far as what we can learn about this fire vis-à-vis NFPA codes and standards, we believe further study of the chimney and its horizontal section is in order. We're also interested in the results of the ATF's flame spread analysis of the polyurethane samples taken from the building. Should that information become available, we will report on it in future issues.

Acknowledgements

This report could have not been done without the assistance of Thomas Hahn, acting branch chief with the ATF in Washington, D.C.; Cap. Ppal. Carlos Torres Alujas, national fire chief of the Paraguay Volunteer Fire Service in Asunción; Omar Pérez Zavala of Kyrios S.A. in Asunción; Yolanda Vargas and Cecilia O'Higgins of Preventec S.A. in Asunción; and ABC Color newspaper in Asunción.

Endnotes

1. As of August 16, 2004: 331 bodies had been identified; 48 people were missing; 43 remains were in the process of being identified; 67 people had died at various hospitals; and 296 survivors had been medically treated.

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BY STEPHEN G. BADGER

Large-Loss Fires for 2003

The direct property loss in large-loss fires was greater than $12 billion.

SUMMARY

- In 2003, the number of large-loss fires remained the same as 2002, but the direct property loss in these fires was four times as high.
- In nine of the past 10 years, 1994 to 2003, there has been at least one fire with direct property loss in excess of $100 million.
- In 2003, there were three fires with a loss of over $100 million. These three fires accounted for a loss of $2,185 million, or 79 percent of the total large loss fire loss. Two were wildland fires.
- In only three of the past 10 years has there been a billion dollar loss fire.
- 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/.

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 2003, fire departments in the United States responded to 1,584,500 fires. These fires caused an estimated loss of $12.3 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 $2,759 million in direct property loss, killed 33 civilians and one firefighter, and injured 295 firefighters and civilians. Despite the fact that these fires accounted for only 0.003 percent of all the fires estimated to have occurred in the United States last year, they accounted for 22.4 percent of the total estimated dollar loss.

The direct property loss in large-loss fires for 2003 was four times the corresponding figure in 2002, when the loss was $698 million. Even before inflation adjustments, the number of large-loss fires in 2003 was tied as the second lowest total in the 10 years since 1994 (see Table 1 and Figure 1 and Figure 2)[3]. The increase in the losses for 2003 are due to two wildland fires in California, where the combined loss was $2,035 million, or 73.8 percent of the total losses.

When adjusted for inflation to 1994 dollars, the fires that occurred in 2003 categorized as large-loss (i.e., loss of $5 million in 1994 dollars) drops to 34, with a total adjusted loss of $2,181 million. This is the second lowest number of large-loss fires since 1994. The adjusted loss is the highest in the 10-year period and is 76 percent higher than the 10-year average adjusted loss total.

The number of large-loss fires and explosions has been trending downward over the last few years. Losses in these fires are volatile and have shown no consistent trend.

Costliest Fires of 2003

In October, California was hit with the Fire Storm 2003. Wildland fires broke out throughout the state, many in wildland/urban interface areas, and many burned their way into developed areas. The losses on many have not yet been reported to NFPA. Two of the most costly fires in 2003 were part of this fire breakout.

On October 25 at 5:37 p.m., the "Cedar Fire" broke out and wasn't fully wasn't fully extinguished until December 5. During the six weeks, this fire burned over 273,000 acres, and damaged or destroyed 2,275 residential properties, 22 commercial properties, 576 outbuildings, and 148 vehicles. One firefighter and 13 civilians were killed, and 104 firefighters were injured. The civilians were either trying to escape the oncoming fire or attempting to save their homes. The firefighter was overrun by fire while attempting to protect homes. The estimated loss in this fire was listed as $1.06 billion. The cause is still under investigation.

On the same day, the second fire, known as the "Old Fire," broke out at 9:16 a.m. This fire burned over 91,000 acres, and damaged or destroyed 993 residential properties, and 10 commercial properties, and damaged 35 structures. There were six deaths in this fire. The fire loss was estimated at $975 million. The cause is still under investigation.

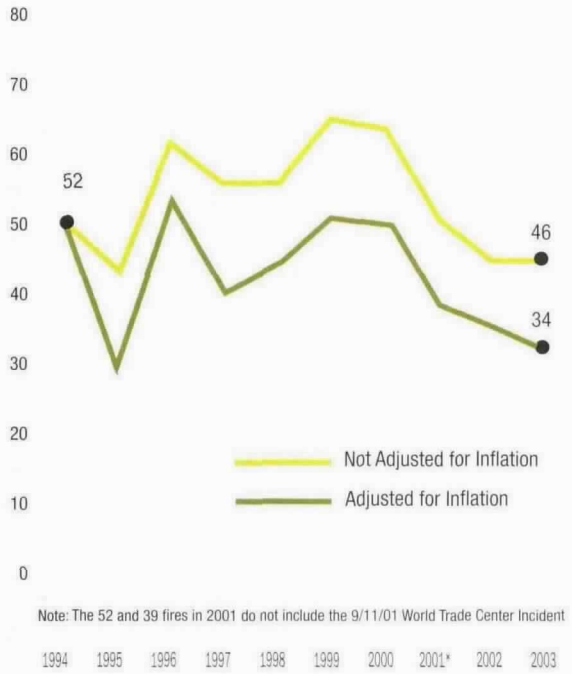
These fires were two of 20 fires that caused a loss of $10 million or more in property damage last year (see Table 2). Together these 20 costliest incidents resulted in a combined loss of $2,584 million. This represented 94 percent of the total dollar loss in the 46 large-loss

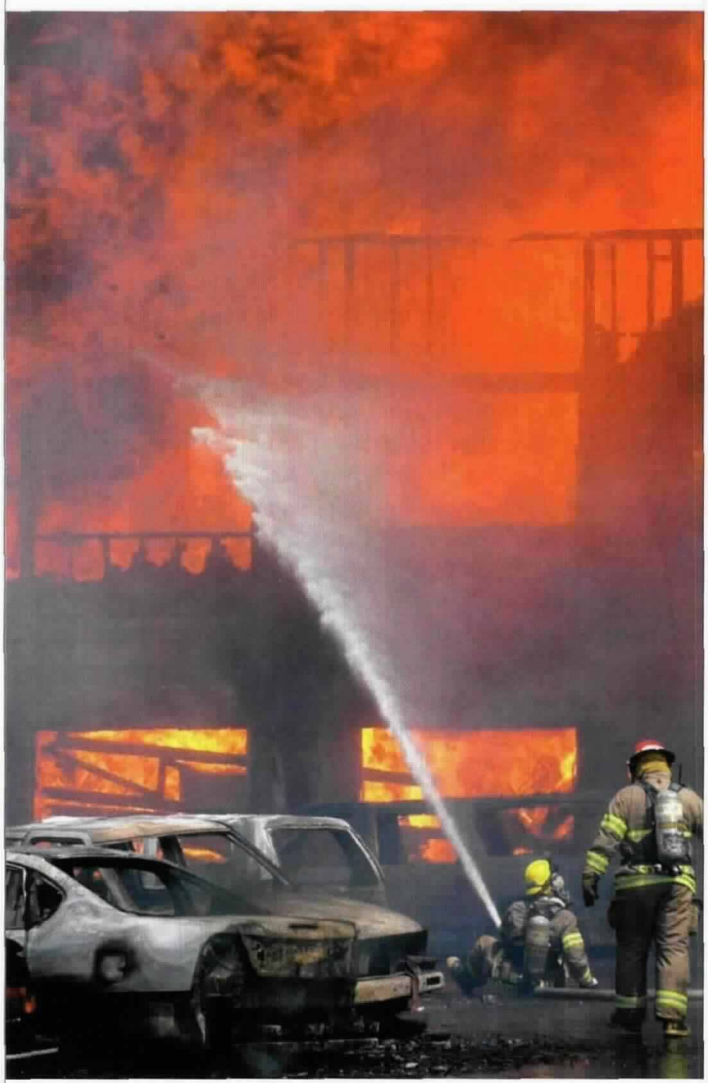
TABLE 1 - Large-Loss Fires that Caused $5 million or More in Property Damage, 1994-2003

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)
1994	52	52	$837	$837
1995	44	30	$1,362	$1,253
1996	63	55	$1,544	$1,414
1997	57	41	$885	$740
1998	57	45	$1,167	$1,006
1999	67	52	$2,285	$1,966
2000	65	51	$2,029	$1,683
2001*	52	39	$978	$766
2002	46	36	$698	$528
2003	46	34	$2,759	$2,181

* Excluding the 9/11/01 World Trade Center Incident from the loss totals and fire incident totals.
Note: Number of fires and unadjusted loss are based on data from studies that appeared in previous annual large-loss studies. Some of the information may differ from previously published material because material was updated after publication.
Note: Adjustment for inflation is based on the Consumer Price Index using 1994 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 (1994-2003)





In 2003, the number of large-loss fires like this one in Arizona remained the same as 2002, but the direct property loss in these fires was four times as high.

PHOTOGRAPH: AP/WIDE WORLD

fires for 2003, and 21 percent of the total U.S. fire loss in 2003. The "Cedar Fire" alone accounted for 13 percent of the total U.S. fire loss in 2003.

NFPA maintains a list of the 10 largest fire losses in U.S. history. With the addition of the Cedar Fire and the Old Fire, this list now includes four wildfires, all since 1991, led by the Oakland Fire Storm and including the 2000 New Mexico fire whose loss was similar to the losses in this year's two California wildfires.

Where the fires occurred

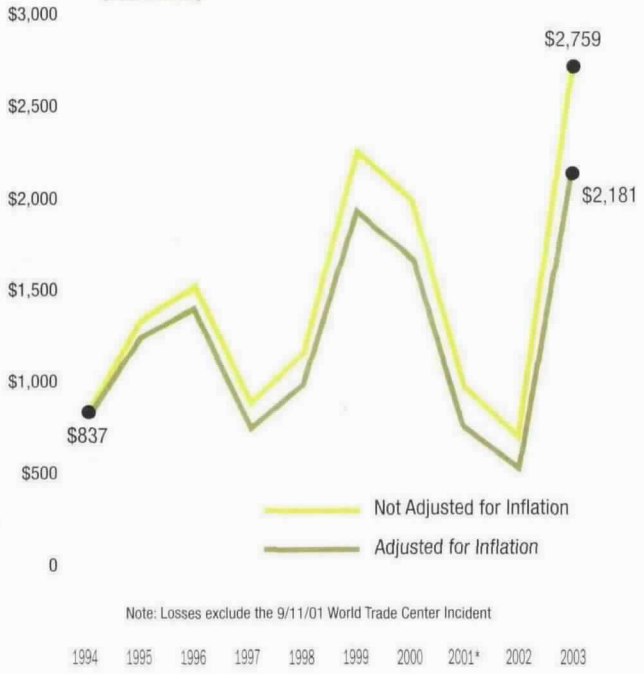
Large-loss fires occurred in every major property category except health care and correctional facilities (see Table 3 and Figure 3). Thirteen large-loss fires occurred in manufacturing properties, resulting in $264 million in property loss. Eleven fires occurred in special properties, resulting in $174 million in property loss. Four fires each occurred in wildlands, stores, and offices (of which one was in an office building), and residential properties, resulting in $2,126 million, $47 million, and $35 million in property loss, respectively. There were three fires each in basic industry and storage properties, resulting in $40 million and $19 million in property loss, respectively. There were two fires in public assembly properties, resulting in $16 million in property loss. There was one fire each in vehicles and educational properties, resulting in losses of $32 and $6 million, respectively.

Forty-one of 46 of the large-loss fires for 2003 occurred in structures, with a combined loss of $601

TABLE 2 - Large-Loss Fires of $10 Million or More in 2003

Incident and Location	*Loss in Millions*
Wildland fire, California	$1,060
Wildland fire, California	975
Pharmaceutical plant, explosion and fire, North Carolina	150
High-rise office building under construction, New York	80
Wildland fire, Arizona	70
Aircraft fire on runway, Tennessee	32
Manufacturing plant, Georgia	30
Medical office building, Pennsylvania	23
Wildland fire, California	21
Electric sub-station, California	20
Building under construction, Iowa	15
Railroad trestle, Georgia	15
Building under construction, Nevada	15
Manufacturing plant, Kentucky	14
Apartment house, Virginia	13
Single-family home, Texas	11
Museum, Maryland	10
Electric sub-station, Michigan	10
Electric sub-station, Virginia	10
Steel manufacturing plant, Ohio	10
Total- 20 Fires	$2,584

FIGURE 2 - Direct Dollar Loss in Large-Loss, Unadjusted and Adjusted (1994-2003)



million. Four wildland fires and a vehicle fire accounted for the rest of the loss. Twenty of the 41 structure properties were operating at the time of the fire, including 17 at full operation, two partially operating, and one that had roofers at the premises. Another 15 were closed or had no one on the site. The operating status of the other six structures was unknown or not reported.

Eleven of the 24 structure fires with known causes were intentionally set, as was one of the wildland fires. These 12 fires accounted for 26 percent of last year's large-loss fires, and resulted in a combined property loss of $ 1,058 million, or 38 percent of the loss in these large-loss fires.

Detection and Suppression Systems

Of the 41 structure fires, 21 were in properties that had no automatic detection equipment present. Some form of automatic detection equipment protected 12 properties, and it was unknown or not reported if the other eight properties had any detection equipment at all. This means that only 36 percent of the properties for which the presence of detection equipment was known had some type of automatic detection system.

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

Eight of the 12 systems operated. Two didn't operate–one system wasn't complete and no reason was given for the other. The operation of the other two systems wasn't reported.

Of the 41 structures involved in large-loss fires in 2003, only 12 were equipped with automatic suppression equipment. Twenty-two definitely had no automatic suppression equipment, and it is unknown or wasn't reported whether the other seven properties had any type of suppression equipment present. This means that only 35 percent of the structures for which the presence of automatic suppression equipment was known were equipped with some sort of system.

Six of the 12 protected properties had complete coverage sprinkler systems. Five of the six had a wet-pipe system, and one had a dry-pipe system. Two properties had partial sprinkler system coverage – one had a wet-pipe system, and the type system for the second property wasn't reported. The extent of coverage for four wasn't reported. One of the four had a wet-pipe sprinkler system, two had dry-pipe systems, and the fourth system wasn't described.

Suppression systems operated in five of the 12 properties protected; five systems did not operate. The operation of two systems is unknown or not reported. Two of the five systems that operated were effective in controlling or extinguishing the fire. Three systems were ineffective – one each, due to being inadequate for the hazard, suffering collapse damage to the system, and not covering the area of origin. Of the five that did not operate, two systems had not yet been completely installed and so were not operational, one system had been shut down before the fire, one system was not in

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*
Manufacturing	13	28%	$264	9.6%
Special Properties	11	24%	$174	6.3%
Wildlands	4	9%	$2,126	77.1%
Stores and Offices	4	9%	$47	1.7%
Residental	4	9%	$35	1.3%
Industry	3	7%	$40	1.4%
Storage	3	7%	$19	0.7%
Public Assembly	2	4%	$16	0.6%
Vehicle	1	2%	$32	1.2%
Educational	1	2%	$6	0.2%
Totals *	**46**	**100%**	**$2,759**	**100.0%**

the area and was not a factor, and the last system failed for an unreported reason.

What We Can Learn

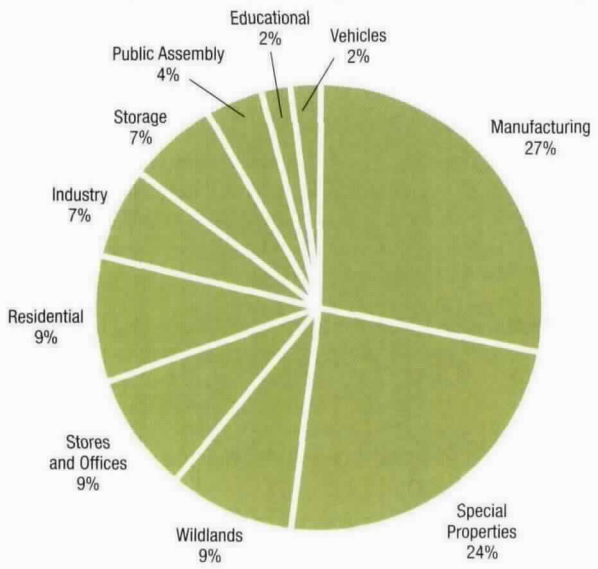
In 2003, the number of large-loss fires remained the same as 2002, but the direct property loss in these fires was four times as high. In nine of the past 10 years, 1994 to 2003, there has been at least one fire with direct property loss in excess of $100 million. In 2003, there were three fires with a loss of over $100 million. These three fires accounted for a loss of $2,185 million, or 79 percent of the total large loss fire loss. In only three of the past ten years has there been a billion dollar loss fire. This was 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 a large fraction of large-loss fires are reported in properties with no such protection, with only partial protection, or with systems rendered ineffective by actions or omissions before fire began. Such was the case again this year. Initial explosions or structural collapse also sometimes damages a system to the point of being inoperable or ineffective, and sometimes systems were installed but not completed.

Table 4 shows that of the 33 structures for which the presence of both detection and suppression systems was fully reported, seven had both detection and suppression systems, five had just an automatic suppression system, and five had just an automatic detection system, and 16 had neither.

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.

FIGURE 3 - Large-Loss Fires by Major Property Use



Where We Get Our Data

NFPA collects its data by reviewing national and local news media, including fire service publications. The NFPA's annual survey of the U.S. fire experience is an additional data source. We also contact federal agencies that have participated in investigations, the state fire marshal's offices, and military sources. Once an incident has been identified, we request information from the fire department or the agency having jurisdiction. The diversity and redundancy of these data sources enable the NFPA to collect the most complete data available on large-loss fires.

Endnotes

1. Michael Karter Jr. "U.S. Fire Loss in 2003," *NFPA Journal*, November/December 2004.
2. The 46 large-loss fires of 2003 are those for which losses were reported and verified.
3. The figures reported for prior years might not be the same as those originally reported, due to late arriving information.

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.

Acknowledgments

NFPA thanks the U.S. fire service for its contributions of data The author wishes to thank Norma Candeloro for providing the support this study requires.

TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2003

MANUFACTURING

NORTH CAROLINA
Dollar Loss: $150,000,000
Month: January
Time: 1:27 p.m.

Property Characteristics and Operating Status: No property characteristics were reported on this pharmaceutical plant. The plant was operating at the time of the explosion and fire.

Fire Protection Systems: No information reported.

Fire Development: An unknown ignition source ignited polyethylene dust particles released during the manufacturing of rubber products. The dust built up above ceiling tiles of a dropped ceiling. This ignition caused a dust explosion, and a fire followed.

Contributing Factors and Other Details: There were 6 deaths and 34 injuries reported.

GEORGIA
Dollar Loss: $30,000,000
Month: May
Time: 7:46 a.m.

Property Characteristics and Operating Status: This two-story food-preparation plant was of unprotected, noncombustible construction and covered 120,000 square feet (11,148 square meters). The plant was in full operation at the time of the fire.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: A fire of undetermined cause broke out in a first-story equipment area, near a cooker that was used to place char marks on cooked chicken.

Contributing Factors and Other Details: Three injuries reported.

KENTUCKY
Dollar Loss: $14,000,000
Month: February
Time: 7:31 a.m.

Property Characteristics and Operating Status: This two-story automobile insulation plant of unprotected noncombustible construction covered 300,000 square feet (27,870 square meters). It was in full operation at the time of the explosion and fire.

Fire Protection Systems: A complete coverage, combination heat and smoke detection equipment was present. The system activated. There was a complete coverage, wet-pipe sprinkler system. The system operated and kept the fire from spreading.

Fire Development: The fire was in a curing oven used for fiberglass panels and involved residual products. The open oven door allowed fire to ignite airborne fiberglass particles, which created an explosion.

Contributing Factors and Other Details: The explosion and flame caught workers at or near their workstations resulting in 7 deaths and 36 injuries. Loss to building was $4,000,000 and loss to its contents was $10,000,000.

OHIO
Dollar Loss: $10,000,000
Month: August
Time: 4:32 p.m.

Property Characteristics and Operating Status: This five-story blast furnace of unprotected noncombustible construction covered 36,000 square feet (3,344 square meters) and was in full operation at the time of the fire.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: An electrical failure that occurred during a multi-state blackout caused the fire; however, the exact sequence of events wasn't reported.

Contributing Factors and Other Details: None reported.

NORTH CAROLINA
Dollar Loss: $9,000,000
Month: December
Time: 12:24 p.m.

Property Characteristics and Operating Status: This one-story plastics item manufacturing plant of heavy timber construction covered 18,000 square feet (1,672 square meters) and was in full operation at the time of the fire.

Fire Protection Systems: No automatic detection equipment was present. A complete coverage wet-pipe sprinkler system was present and operated but it was ineffective due to damage from a collapse that caused a large loss of water to other sections of the system.

Fire Development: Welding on a piece of machinery ignited a pile of polyester waste on the floor. Employees attempted to extinguish the blaze with hand-held extinguishers but were unsuccessful against a large, spreading fire.

Contributing Factors and Other Details: Three firefighters were injured and loss to building was $5,000,000 and loss to contents was $4,000,000.

LOUISIANA
Dollar Loss: $8,000,000
Month: April
Time: 9:22 p.m.

Property Characteristics and Operating Status: This one-story, 20-foot-high (6-meter) bag manufacturing plant of unprotected noncombustible construction that covered 133,000 square feet (12,356 square meters) was closed for the night when the fire broke out.

Fire Protection Systems: No information was reported on automatic detection equipment and no automatic suppression equipment was present.

Fire Development: A fire of undetermined cause broke out in a loading-dock area.

Contributing Factors and Other Details: Access was limited due to parked vehicles and the large demand placed on the water system limited the hose streams needed for protecting exposures

TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2003

and fire extinguishment. There was an area evacuation due to hazardous materials in the plant. Loss to building was $3,000,000 and loss to contents was $5,000,000.

OHIO
Dollar Loss: $8,000,000
Month: August
Time: 11:48 a.m.

Property Characteristics and Operating Status: This grain processing area of protected noncombustible construction was in full operation at the time of the explosion and fire. The area covered wasn't reported. The site also contained several 7-story concrete silos.

Fire Protection Systems: No information was reported on automatic detection equipment. No automatic suppression equipment was present.

Fire Development: The ignition source of this dust explosion is undetermined. Walls were blown out some 50 feet to 60 feet (15 meters to 18 meters). A shock wave and fireball traveled up a 7-story silo.

Contributing Factors and Other Details: One civilian was killed. Three civilians and a firefighter were injured.

IOWA
Dollar Loss: $6,700,000
Month: December
Time: 12:40 p.m.

Property Characteristics and Operating Status: This two-story food preparation plant was operating at the time of the fire. The size and type of construction wasn't reported.

Fire Protection Systems: The plant's system of smoke detection equipment operated, but the coverage wasn't reported. No automatic suppression equipment was present.

Fire Development: A fire of unknown origin broke out in the service area. No other information was reported.

Contributing Factors and Other Details: Loss to building was $1,950,000 and loss to contents was $4,750,000.

CALIFORNIA
Dollar Loss: $6,250,000
Month: October
Time: 5:29 a.m.

Property Characteristics and Operating Status: This two-story metal products plant of protected noncombustible construction covered 56,250 square feet (5,225 square meters) and was closed for the night when the fire broke out.

Fire Protection Systems: No automatic detection equipment was present. A complete coverage wet-pipe sprinkler system was present and operated with 12 heads opening, which helped to control the fire. An alarm sounded and an alarm company notified the fire department.

Fire Development: This incendiary fire was ignited in multiple locations on the plant's second floor.

Contributing Factors and Other Details: Loss to building was $3,000,000 and loss to contents was $3,250,000.

KANSAS
Dollar Loss: $5,800,00
Month: May
Time: 1:52 a.m.

Property Characteristics and Operating Status: This one-story food preparation plant covered 19,000 square feet (1,765 square meters) and was in full operation when the fire broke out. The type of construction wasn't reported.

Fire Protection Systems: Automatic detection equipment was present but the type, coverage, and operation weren't reported. No automatic suppression equipment was present.

Fire Development: This fire broke out in the processing area when a failure in the heating equipment ignited structural insulation.

Contributing Factors and Other Details: None reported.

WASHINGTON
Dollar Loss: $5,500,000
Month: August
Time: 8:27 p.m.

Property Characteristics and Operating Status: This two-story metal products plant was of heavy timber construction and covered 45,000 square feet (4,180 square meters). The plant was operating when the fire broke out.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: A spontaneous ignition of rags in the spray booth area caused the fire, which spread throughout the building and through the roof.

Contributing Factors and Other Details: Loss to building was $3,000,000 and loss to contents was $2,500,000.

SPECIAL PROPERTIES

NEW YORK
Dollar Loss: $80,000,000
Month: April
Time: 12:30 p.m.

Property Characteristics and Operating Status: This 53-story high-rise office building was still under construction at the time of the fire.

Fire Protection Systems and Fire Development: No information reported.

Contributing Factors and Other Details: Twelve firefighters were injured.

IOWA
Dollar Loss: $15,000,000
Month: April
Time: 5:28 a.m.

TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2003

Property Characteristics and Operating Status: This five-story apartment complex of unprotected ordinary construction was still under construction. The ground floor area was not reported. No one was on the site when the fire broke out.

Fire Protection Systems: No automatic detection equipment was present. A complete coverage dry-pipe sprinkler system was present but the installation wasn't complete, so the system wasn't operational.

Fire Development: A passerby discovered this fire of undetermined origin. The complex was fully engulfed in fire when firefighters arrived.

Contributing Factors and Other Details: Two firefighters were injured.

GEORGIA
Dollar Loss: $15,000,000,
Month: May
Time: 3:43 p.m.

Property Characteristics and Operating Status: A railroad trestle of heavy creosote-soaked timber construction.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: High winds fanned a wildland fire back to life after it was thought to be extinguished. The fire jumped its breaks and burned unnoticed underneath the trestle until it ignited structural members. When firefighters arrived, 600 feet (182 meters) of the trestle was burning.

Contributing Factors and Other Details: One firefighter was injured. With poor access to the trestle, apparatus was unable to get near it. Firefighters using boats had problems at low tide until they obtained a swamp boat.

NEVADA
Dollar Loss: $15,000,000
Month: September
Time: 8:27 p.m.

Property Characteristics and Operating Status: This two-story apartment complex of unprotected wood frame construction covered 30,000 square feet (2,787 square meters) and was under construction. No one was on the site at the time of the fire.

Fire Protection Systems: A detection system was present and activated, however the type and coverage weren't reported. No information was reported on any automatic suppression equipment.

Fire Development: Firefighters arriving at this incendiary fire found several multi-family dwellings fully engulfed in fire. The fire spread to, and destroyed or damaged, 23 structures.

Contributing Factors and Other Details: The fire spread rapidly due to the openness of the structures in the building phase.

CALIFORNIA
Dollar Loss: $9,000,000
Month: May
Time: 4:38 a.m.

Property Characteristics and Operating Status: This three-story apartment was of unprotected wood frame construction. The ground floor area was not reported. No one was on the site at the time of the fire.

Fire Protection Systems: No automatic detection or suppression systems were present and the structures were still under construction.

Fire Development: Firefighters responding to this incendiary fire found two, three-story apartment buildings fully involved in fire and spreading rapidly. This fire destroyed or damaged numerous structures still in the construction phase, as well as several vehicles.

Contributing Factors and Other Details: Four firefighters were injured. Large amount of exposed wood spread the fire rapidly. Loss to the building was $8,000,000 and loss to contents was $1,000,000.

OREGON
Dollar Loss: $8,020,000
Month: March
Time: 6:23 a.m.

Property Characteristics and Operating Status: This three-story unprotected wood-frame apartment building that was under construction covered 75,000 square feet (6,967 square meters). The operating status wasn't reported.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: Firefighters arriving at this incendiary fire found the structure heavily involved. The fire entered the attic area of a nearby, occupied senior citizen housing and burned throughout.

Contributing Factors and Other Details: One firefighter, two senior home occupants, and a police officer who was assisting in evacuations were injured. Open construction allowed the fire to spread rapidly. Loss to the building was $6,500,000 and loss to contents $1,520,000.

MINNESOTA
Dollar Loss: $8,000,000
Month: June
Time: 3:48 a.m.

Property Characteristics and Operating Status: This three- to five-story, multi-family dwelling complex of unprotected wood frame construction was still under construction and covered an entire block. No one was on the site at the time of the fire.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: The fire's cause and origin are undetermined. Eight dwellings and several vehicles were destroyed or damaged.

Contributing Factors and Other Details: Two firefighters were

TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2003

Time: 4:17 a.m.

Property Characteristics and Operating Status: This two-story adult group residence of unprotected wood frame construction covered 31,000 square feet (2,879 square meters) and was under construction. No one was on the site at the time of the fire.

Fire Protection Systems: Complete coverage automatic detection equipment of an unreported type was present, but not operational. A sprinkler system was installed but the type and coverage weren't reported. This system also was not yet operational.

Fire Development: This fire originated in the basement. A propane-fueled portable heater used to dry recently installed tile was too close to the combustible walls. Firefighters found the structure fully involved in fire when they arrived.

Contributing Factors and Other Details: One firefighter was injured.

NEVADA
Dollar Loss: $6,900,000
Month: January
Time: 2:32 a.m.

Property Characteristics and Operating Status: This three-story apartment complex was of unprotected wood-frame construction, covered 50,000 square feet 4,645 square meters), and was still in the construction phase. No information was reported on the operation of the site.

Fire Protection Systems: No information was reported.

Fire Development: Firefighters arrived to find this incendiary fire had spread to and engulfed the entire project. At least three dwellings were damaged or destroyed.

Contributing Factors and Other Details: None reported.

WILDLANDS

CALIFORNIA
Dollar Loss: $1,060,000,000
Month: October
Time: 5:37 p.m.

Property Characteristics and Operating Status: Wildland-urban interface

Fire Development: The cause is under investigation. This wildland fire burned 208,000 acres (84,175 hectares), and destroyed or damaged 2,444 homes, 155 commercial properties, and 3,356 vehicles.

Contributing Factors and Other Details: One firefighter was killed protecting a dwelling, and 104 firefighters were injured. Thirteen civilians also died and 9 were injured. The civilians were killed while attempting to escape or protecting their homes.

CALIFORNIA
Dollar Loss: $975,000,000
Month: October
Time: 9:16 a.m.

Property Characteristics and Operating Status: Wildland-urban interface.

Fire Development: This fire was the result of two fires merging; the Old Fire and Grand Prix fire. The cause of the Old Fire was determined to be incendiary but the cause of the Grand Prix is undetermined. This combined wildland fire burned 150,729 acres (60,998 hectares), destroyed, or damaged 1,234 homes, 12 commercial properties, 70 outbuildings, 129 vehicles, and 36 miscellaneous properties.

Contributing Factors and Other Details: Six civilians were killed in this fire. There were 47 people injured but it wasn't reported whether they were firefighters or civilians. Deaths occurred as civilians attempted escape or tried to protect their property.

ARIZONA
Dollar Loss: $70,000,000
Month: June
Time: 3:00 p.m.

Property Characteristics and Operating Status: Wildland-urban interface. National Forest. Area consisted of heavy brush, ponderosa pine, mixed conifer, oak, and chaparral.

Fire Development: The cause is under investigation. This fire burned 84,750 acres (34,297 hectares) and destroyed 322 homes and cottages, 7 commercial properties and 4 outbuildings.

CALIFORNIA
Dollar Loss: $20,900,000
Month: October
Time: 2:15 a.m.

Property Characteristics and Operating Status: Wildland-urban interface.

Fire Development: The cause is undetermined. Fire burned 108,204 acres (43,789 hectares) and destroyed 37 residential properties, 278 outbuildings, and 17 vehicles. Thirty-two structures were damaged.

Contributing Factors and Other Details: Twenty-one injuries were reported, but it's unknown whether they were firefighters or civilians.

STORES AND OFFICES

PENNSYLVANIA
Dollar Loss: $23,000,000
Month: June
Time: 7:30 a.m.

Property Characteristics and Operating Status: This three-story medical office building of heavy timber construction covered 30,000 square feet (2,787 square meters). This building was originally built as a shirt-making factory, but later renovated for offices. The building was opening for the day.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: A short circuit ignited wood structural mem-

nally built as a shirt-making factory, but later renovated for offices. The building was opening for the day.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: A short circuit ignited wood structural members in the attic. Fire spread through a 4- to 6-foot (1.2-meter to 1.8-meter) void.

Contributing Factors and Other Details: There was a delay in the fire's discovery due to it starting in a void space. Loss to the building was $20,000,000 and loss to the contents was $3,000,000.

ARIZONA
Dollar Loss: $9,260,000
Month: March
Time: 11:59 a.m.

Property Characteristics and Operating Status: This two-story furniture store of unprotected ordinary construction covered 30,000 square feet (9,144 square meters). There was a tent in front of the store with sales items. The store was open at the time of the fire.

Fire Protection Systems: There was a system of unreported type detectors. The coverage was not reported, but the system operated once the fire extended into the store. No automatic suppression equipment was present.

Fire Development: The fire in this store was an exposure fire. An improperly discarded cigarette blew into the display tent and ignited cardboard boxes. The fire spread rapidly throughout the tent and spread into the store.

Contributing Factors and Other Details: There was a delay in notifying the fire department as employees attempted to extinguish the fire with a garden hose. High winds of 35 mph and gusts to 45 mph fanned the fire. Three firefighters were injured.

RESIDENTIAL

VIRGINIA
Dollar Loss: $12,823,900
Month: February
Time: 4:45 a.m.

Property Characteristics and Operating Status: This 4-story senior citizen apartment house of protected wood-frame construction contained 100 units and covered 23,536 square feet (2,186 square meters). Of the 100 units, 81 were occupied.

Fire Protection Systems: There was a complete coverage combination heat and smoke detection equipment. The system operated but it wasn't in the area of origin. An arriving police officer activated a manual pull station to sound the alarm. There was a complete coverage wet-pipe sprinkler system but one head operated. This system also was not in the area of origin (outside balcony).

Fire Development: The cause of this fire is undetermined and it originated on a third-story balcony. The fire spread up the exterior and entered the attic through roof soffits. The fire spread horizontally then down to the apartments on the fourth and third floors.

Contributing Factors and Other Details: The balconies were of combustible materials, allowing for ignition. Two firefighters were injured. Loss to the building was $9,823,900 and loss to contents was $3,000,000.

TEXAS
Dollar Loss: $11,000,000
Month: November
Time: 8:52 p.m.

Property Characteristics and Operating Status: This three-story, single-family house of unprotected ordinary construction covered 5,400 square feet (501 square meters). The occupants were away at the time of the fire.

Fire Protection Systems: There was a complete coverage smoke detection system that activated and alerted a central station alarm company. A residential sprinkler system was present, but the coverage wasn't reported. The system was not operational at the time of the fire. The reason for this was not reported, nor was the coverage.

Fire Development: An electrical short circuit in a concealed space between the first and second story ignited structural members and traveled upward through electrical chases to the attic.

Contributing Factors and Other Details: There was a gated entry to the property, a narrow driveway, and double security doors at all the entrances. Firefighters had made two previous responses to the residence for alarm activation but found no evidence of smoke or fire to justify a forced entry. Loss to the house was $10,000,000 and loss to contents was $1,000,000.

INDUSTRY

CALIFORNIA
Dollar Loss: $20,000,000
Month: March
Time: 6:39 p.m.

Property Characteristics and Operating Status: Operating electrical substation - 500-kilovolt (kV).

Fire Protection Systems: No information was reported.

Fire Development: This fire was caused by an electrical failure in a transformer. Arriving firefighters found three transformers involved in fire and a large amount of mineral oil used to insulate the transformers was burning. The fire department was assisted by an Air Force crash truck, which applied foam to the surrounding structures.

Contributing Factors and Other Details: The fire occurred in a remote area, making long hose layouts necessary.

MICHIGAN
Dollar Loss: $10,000,000
Month: October
Time: 11:45 a.m.

Property Characteristics and Operating Status: Operating electrical sub-station.

Fire Protection Systems: No information was reported.

TABLE 4 LARGE-LOSS FIRE INCIDENTS OF 2003

Fire Development: Arcing in electrical equipment in a conduit ignited mineral oil.

Contributing Factors and Other Details: Firefighters couldn't access the fire area because of a gated entry and charged electrical equipment.

VIRGINIA
Dollar Loss: $10,000,000
Month: November
Time: 8:54 a.m.

Property Characteristics and Operating Status: Operating electrical sub-station.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: Several telephone poles were knocked over during high winds and one caused a fault in a nearby transformer. When the system attempted to reset itself, an explosion occurred, breaching the transformer, allowing hundreds of gallons of mineral oil to escape and ignite. The exact point of origin couldn't be determined due to the amount of fire damage.

STORAGE

ILLINOIS
Dollar Loss: $6,800,000
Month: October
Time: 4:03 a.m.

Property Characteristics and Operating Status: This three-story warehouse containing tires was of heavy timber construction and covered 150,000 square feet (13,935 square meters). The warehouse was closed for the weekend.

Fire Protection Systems: No automatic detection equipment was present. A complete coverage wet-pipe sprinkler system was present and operated, but was ineffective due to the large fire load.

Fire Development: The cause is undetermined.

Contributing Factors and Other Details: Fire growth was extremely fast due to the fire load. Firefighters were forced to withdraw to a defensive attack. Two firefighters were injured. Loss to the building was $800,000 and loss to contents was $6,000,000.

NEW YORK
Dollar Loss: $6,324,000
Month: April
Time: 9:14 p.m.

Property Characteristics and Operating Status: This one-story rubber products warehouse was operating when the fire broke out. The construction method and ground floor area weren't reported.

Fire Protection Systems: There was automatic detection equipment present, but the type and coverage weren't reported. The system didn't operate and the reason for this wasn't reported. There was a dry-pipe sprinkler present, but the coverage was not reported. This system also failed to operate but no reason for this was reported.

Fire Development: This incendiary fire was set in rubber goods stored on pallets in the shipping area.

Contributing Factors and Other Details: One firefighter was injured. Loss to the building was $3,000,000 and loss to the contents was $3,324,000.

PUBLIC ASSEMBLY

MARYLAND
Dollar Loss: $10,150,000
Month: September
Time: 2 a.m.

Property Characteristics and Operating Status: This 20-foot-high (6-meter) vehicle museum was of unprotected ordinary construction and covered 4,000 square feet (371 square meters). The museum was closed for the night.

Fire Protection Systems: No automatic detection or suppression systems were present.

Fire Development: Cause is undetermined. The police department discovered the fire when they responded to motion detector activation in the building. The fire destroyed several old vehicles stored in the building.

Contributing Factors and Other Details: Loss to the building was $150,000 and loss to contents was $10,000,000.

EDUCATIONAL

CALIFORNIA
Dollar Loss: $5,750,000
Month: November
Time: 9:37 p.m.

Property Characteristics and Operating Status: This one-story elementary school covered 20,000 square feet (1,858 square meter). The construction method and operating status weren't reported.

Fire Protection Systems: Smoke detection equipment was present, but the coverage and activation weren't reported. No automatic suppression equipment was present.

Fire Development: The cause is undetermined. Neighbors spotted smoke issuing from the building and called 911.

Contributing Factors and Other Details: Two firefighters were injured. Loss to the building was $5,000,000 and loss to the contents was $750,000.

VEHICLE

TENNESSEE
Dollar Loss: $32,000,000
Month: December
Time: 12:26 p.m.

Property Characteristics and Operating Status: This fire involved a cargo aircraft on landing at an operating airport.

Fire Development: A crash during landing caused the wing to

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

Firefighter Injuries for 2003

NFPA estimates that there were more than 78,000 injuries in 2003.

SUMMARY

- 78,750 firefighter injuries occurred in the line of duty in 2003, a decrease of 2.5 percent from the year before.
- 38,045 or 48.3 percent of all firefighter injuries occurred during fireground operations. An estimated 14,550 occurred during other on duty activities, while 13,855 occurred at nonfire emergency incidents.
- Regionally, the Northeast had the highest fireground injury rate.
- NFPA estimates that there were 13,150 exposures to infectious diseases (e.g., hepatitis, meningitis, HIV, others) in 2003.
- The full report is available on the Web at www.nfpa.org/Research/.

BASED ON SURVEY DATA reported by fire departments, NFPA estimates that 78,750 firefighter injuries occurred in the line of duty in 2003[1], a decrease of 2.5 percent.

This is the lowest it's been since 1977 when NFPA started using its current survey methodology. However, the lower number of injuries in recent years is due in part to additional questions on exposures, which allows us to place them in their own categories. Previously some of these exposures may have been included in total injuries.

NFPA estimates that there were 13,150 exposures to infectious diseases (e.g., hepatitis, meningitis, HIV, others) in 2003. This amounts to one exposure per 1,000 emergency medical runs by fire departments in 2003.

NFPA also estimates that there were 22,900 exposures to hazardous conditions (e.g., asbestos, radioactive materials, chemicals, fumes) in 2003. This amounts to 24 exposures per 1,000 hazardous condition runs in 2003.

An estimated 16,900-firefighter injuries resulted in lost time in 2003.

Background

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, the NFPA reported 105 firefighters died on duty (See "2003 Firefighter Fatalities," *NFPA Journal*® July/August).

This report addresses 2003 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 (2003). 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.[2]

Injuries by Type of Duty

Estimates of firefighter injuries by type of duty are in Figure 2. As in past reports, types of duty are 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
- Other on-duty activities (e.g., inspection or maintenance duties).

Results by type of duty indicate that many of the injuries occur during fireground operations: 38,045 or 48.3 percent of all firefighter injuries in 2003.

Table 1 displays firefighter injuries at the fireground and injury rates for the 1988 to 2003 period. Before 1988, firefighter injuries were around 100,000 per year, with no trend up or down, since NFPA's first calculation of estimates in 1977. Injuries at the fireground decreased from their high of 61,790 in 1988 to a low of 37,860 in 2002 for a decrease of 38.7 percent. The rate of injuries per 1,000 fires didn't show a consistent pattern and stayed around the same level except for 1996

TABLE 1 - Firefighter Injuries at the Fireground and at Nonfire Emergencies, 1988-2003

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

Source: NFPA survey

to 1997 and 2001 to 2002. This is because the number of fire incidents also decreased a considerable 35 percent for the 1988 to 2002 period.

In addition to injuries at the fireground, an estimated 14,550 or 18.4 percent occurred during other on-duty activities, while 13,855 or 17.6 percent occurred at non-fire emergencies.

Nature of Fireground Injuries

Estimates of 2003 firefighter injuries by nature of injury and type of duty are in Table 2.

The nature of injury cause categories is 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 (44.2 percent); wound, cut, bleeding, bruise (21.6 percent); burns (7.3 percent); smoke or gas inhalation (6.1 percent); thermal stress (5.6 percent).

Results were consistent during all non-fireground activities, with strains, sprains, and muscular pain accounting for 55.7 percent of all non-fireground injuries, and wound, cut, bleeding, bruise accounting for 20.3 percent.

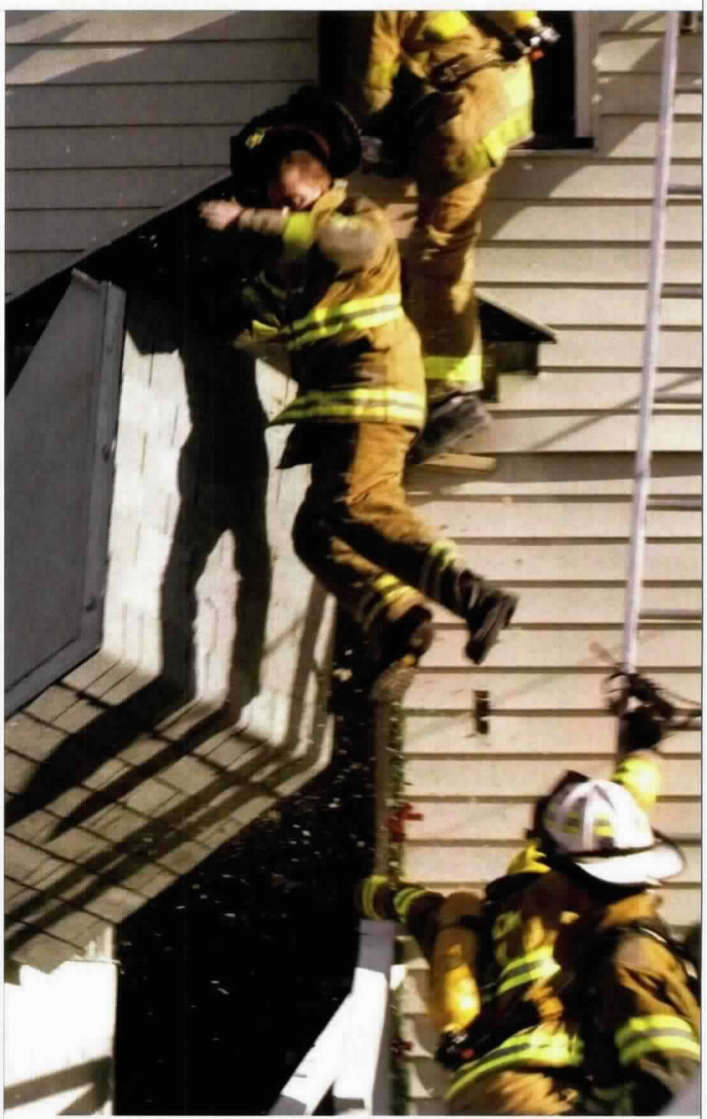
Causes of Fireground Injuries

The causes of fireground injuries were examined (see Figure 3). The definition of cause here refers to the initial circumstance leading to the injury. The cause categories in the survey are based on NFPA 901.

Overexertion, strain (32.4 percent), and fall, slip, jump (27.6 percent) were the two leading causes of fireground injuries. Other major causes were exposure to fire products (10.6 percent); contact with object (10.5 percent).

Fire Department Vehicle Collisions

NFPA reported in July that 33 firefighters died in



Frederick County, Virginia firefighters were injured at the scene of this 2003 house fire east of Winchester, Virginia.

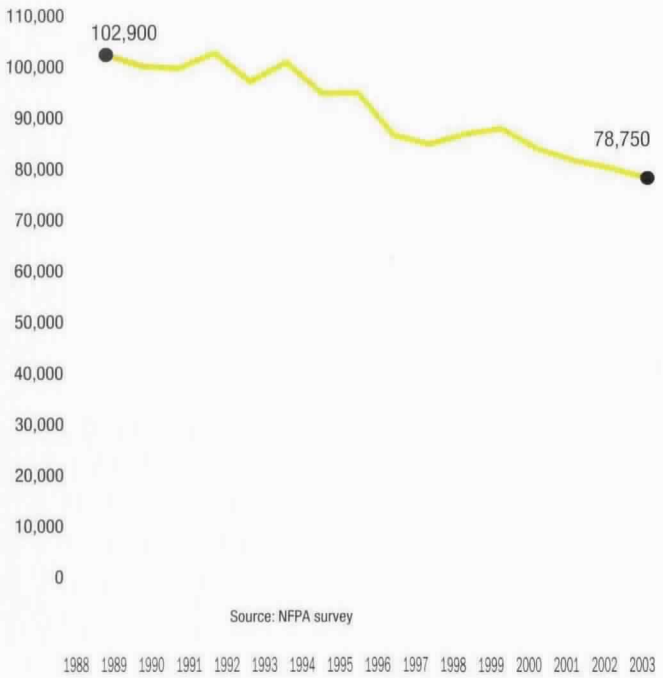
PHOTOGRAPH: AP/ WIDE WORLD

TABLE 2 - Firefighter Injuries by Nature of Injury and Type of Duty, 2003

	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)	70	1.4	2,765	7.3	215	1.6	330	4.7	70	0.5	3,450	4.4
Smoke or Gas Inhalation	75	1.4	2,320	6.1	245	1.8	25	0.4	110	0.8	2,775	3.5
Other Respiratory Distress	75	1.4	570	1.5	255	1.8	85	1.2	250	1.7	1,235	1.5
Burns and Smoke Inhalation	40	0.8	980	2.6	45	0.3	35	0.5	40	0.3	1,140	1.5
Wound, Cut, Bleeding Bruise	1,150	22.1	8,225	21.6	2,695	19.5	1,185	16.7	2,740	18.8	15,995	20.3
Dislocation, Fracture	165	3.2	970	2.6	180	1.3	340	4.8	410	2.8	2,065	2.6
Heart Attack or Stroke	10	0.2	235	0.6	70	0.5	70	1.0	270	1.9	655	0.8
Strain, Sprain Muscular Pain	3,050	58.9	16,830	44.2	8,070	58.3	4,130	58.2	7,870	54.1	39,950	50.7
Thermal Stress (frostbite, heat exhaustion)	95	1.8	2,145	5.6	60	0.4	325	4.6	40	0.3	2,66	3.4
Other	470	9.0	3,005	7.9	2,020	14.6	575	8.1	2,750	18.9	8,820	11.2
	5,200		*38,045*		*13,855*		*7,100*		*14,550*		*78,750*	

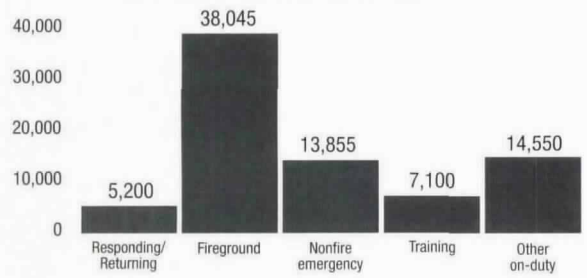
Source: NFPA survey
Note: If a firefighter sustained multiple injuries for the same incident, only the nature of the single most serious injury was tabulated.

FIGURE 1 - Total Firefighter Injuries by Year (1988-2003)



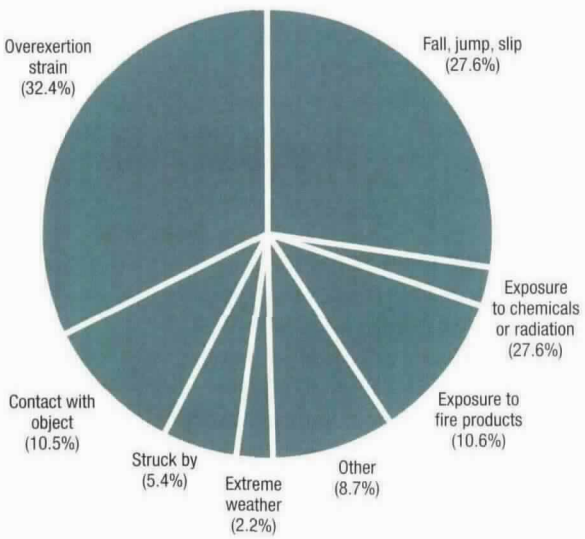
Source: NFPA survey

FIGURE 2 - Total Firefighter Injuries by Type of Duty



Source: NFPA survey

FIGURE 3 - Fireground Injuries by Cause, 2003



Source: NFPA survey

motor vehicle collisions in 2003. (See "2003 Firefighter Fatalities" *NFPA Journal* July/August.)

In 2003, there were an estimated 15,900 collisions involving fire department emergency vehicles, where departments were responding to or returning from incidents (see Table 3). The 15,900 collisions is the highest since 1990 when we started tracking them, though the number of emergency calls also sets a new high every year. To put this number in perspective however, fire departments responded to more than 22.4 million incidents in 2003 so that the number of collisions represents about one tenth of 1 percent of total responses. However, these collisions resulted in 850 firefighter injuries or 1.1 percent of all firefighter injuries.

Also, 980 collisions involving firefighters' personal

TABLE 3 - Fire Department Vehicle Collisions and Resulting Firefighter Injuries While Responding to or Returning from Incidents, 1990-2003

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

Source: NFPA survey

TABLE 4 - Average Number of Fires, Fireground Injuries and Injuries Rates by Population of Community Protected, 2003

Population of Community Protected	Average Number of Fires	Average Number of Fireground Injuries	Number of Fireground Injuries per 100 Fires	Number of Fireground Injuries per 100 Firefighters
500,000 to 999,999	3,150.7	69.3	2.1	6.7
250,000 to 499,999	1,501.5	38.5	2.5	7.9
100,000 to 249,999	610.7	14.2	2.2	6.8
50,000 to 99,999	281.3	6.1	2.3	5.8
25,000 to 49,999	140.7	3.2	2.2	4.7
10,000 to 24,999	70.8	1.2	1.8	3.0
5,000 to 9,999	42.3	0.6	1.4	1.8
2,500 to 4,999	26.6	0.5	1.7	1.6
Under 2,500	14.6	0.2	1.7	1.2

Source: NFPA survey

vehicles occurred in 2003 while departments were responding to or returning from incidents. These collisions resulted in an estimated 85 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 2003 is in Table 4. These tabulations show that the number of fires a fire department responds to is directly related to the population protected, 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 statistic: from a high of 69.3 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 for more direct comparison between departments protecting communities of different sizes. The number of fireground injuries per 100 fires is in the fourth column of Table 4.

The overall range of rates varied little from a high of 2.6 for departments that protect communities 250,000 to 999,999 to a low of 1.4 for departments that protect communities of 5,000 to 9,999. 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 2.3 injuries per 100 fires or 35 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 in the fifth column of Table 4. Larger departments generally had the highest rates with departments protecting communities of 250,000 to 499,999 having the highest rate with 7.9 injuries per 100 firefighters. As community size decreases, the rate drops quite steadily to a low of 1.2 for departments protecting less than 2,500 people. That's a 6-to-1 difference in risk of injury between com-

PHOTOGRAPH: AP/WIDE WORLD

TABLE 5 - Average Number of Fires and Fireground Injuries per Department and Injuries per 100 Fires by Population of Community Protected and Region, 2003

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	*	*	*	*	*	*	3,132.1	61.7	2.0	3,234.3	51.4	1.6
250,000 to 499,999	*	*	*	2,045.8	46.0	2.3	1,408.7	30.9	2.2	1,291.0	40.9	3.2
100,000 to 249,999	872.3	35.8	4.1	616.9	20.5	3.3	696.5	9.3	1.3	426.9	10.9	2.6
50,000 to 99,999	352.9	14.3	4.0	252.1	5.7	2.2	312.7	4.5	1.4	240.2	3.7	1.5
25,999 to 49,999	129.9	6.3	4.8	118.8	3.0	2.6	166.5	2.3	1.4	169.4	2.5	1.5
10,000 to 24,999	66.4	2.0	2.9	62.3	1.3	2.0	83.3	1.0	1.2	77.9	0.6	0.7
5,000 to 9,999	34.0	0.9	2.5	38.2	0.5	1.3	52.3	0.6	1.1	51.3	0.5	1.0
2,500 to 4,999	20.6	0.5	2.4	25.3	0.5	1.8	33.1	0.4	1.3	31.1	0.4	1.3
Under 2,500	11.1	0.5	4.2	13.6	0.2	1.4	20.4	0.3	1.3	13.7	0.1	0.6
Overall Regional Rate			5.2			2.1			1.4			1.9

Source: NFPA survey
*Insufficient data

munities 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 100 times as many fires, and as a result, it incurs considerably more fireground injuries.

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 nation-wide 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

It's unlikely that all firefighter injuries can be eliminated. A risk management system and the application of existing technology, however, can reduce present injury levels and bring about corresponding reductions in lost time, and medical costs. The following are some examples of proactive actions taken at the local level that can reduce injury rates:

- Commitment 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, which includes a thorough investigation of all time loss injuries, and the means of implementing it;
- 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; and
- Increased efforts in the area of fire safety education programs, so that citizens are made aware of measures to prevent fires and of correct reactions to the fire situation.

Every fire service organization needs to commit to reducing firefighter injuries. A majority 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's a good place to begin when developing programs for the reduction of firefighter injuries.

Overview of 2003 Firefighter Injuries

- 78,750 firefighter injuries occurred in the line of duty in 2003, a decrease of 2.5 percent from the year before.
- 38,045 or 48.3 percent of all firefighter injuries occurred during fireground operations. An estimated

14,550 occurred during other on duty activities, while 13,855 occurred at nonfire emergency incidents.

• Regionally, the Northeast had the highest fireground injury rate with 5.2 injuries occurring per 100 fires; this was more than twice the rate for the rest of the country.

• The major types of injuries received during fireground operations were: strain, sprain, muscular pain (44.2 percent); wound, cut, bleeding, bruise (21.6 percent); burns (7.3 percent); smoke or gas inhalation (6.1 percent). Strains, sprains, and muscular pain accounted for 55.7 percent of all nonfireground 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

The 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.

Endnotes

1. 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 (2003), the NFPA is very confident that the actual number of firefighter injuries falls within the range of 69,750 to 87,750.

2. Michael J. Karter, Jr., "2003 Fire Loss in the United States", *NFPA Journal*, Vol. 98, No. 6 (November 2004).

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 (2003) 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.

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Structural Firefighting

Two firefighters suffered burns when they fell through a roof while battling a fire in a single-family, three-story, wood-frame dwelling. The firefighters were part of a five-person roof team performing vertical ventilation when the roof suddenly gave way, engulfing two of the firefighters in flames.

Roof ventilation operations began approximately 21 minutes after the initial telephone call reporting the fire. Two of the firefighters assigned to cut ventilation holes were cautiously operating in the thick smoke when the roof underneath them gave way. One firefighter plunged into the attic waist deep and fire enveloped him for 15 seconds to 30 seconds.

The fire significantly damaged most of his protective ensemble. His partner instinctively grabbed onto his shoulders and attempted to pull him from the hole, but the unstable roof partially collapsed trapping him. The company officer and other team members rapidly extricated the two from the hole and both climbed down a ground ladder on their own. An ambulance transported them to a regional burn center.

The first firefighter had third-degree burns on his feet and legs, and the second firefighter had first- and second-degree burns on his left hand.

According to the department, their injuries could have been much worse if they were not wearing their protective ensemble in the proper manner. The fire department investigation states that the thermal lining remained intact and the self-contained breathing apparatus and protective hood prevented the firefighters from suffering burns that are more serious.

Motor Vehicle Crash

A speeding car struck and seriously injured a firefighter who was placing road flares at crash scene. According to the department's standard operating procedure, two engine companies were dispatched to the incident. The first engine company was responsible for any patients, while the second provided warning lights and protection for those operating in the highway.

The 10 a.m. crash occurred on a slight downhill grade after a rain shower, creating slippery road conditions. The speeding car entered the highway from an on-ramp between the two engines. The driver failed to see both apparatus and by the time the driver saw the crash, he lost control of his vehicle striking the firefighter. The driver then fled the scene.

The firefighter suffered head, neck, and extremities injuries. He was wearing a protective coat and pants with a helmet, gloves, and boots. He was hospitalized for 6 weeks and returned to duty 11 months after the incident. The department states that speed and wet roads were contributing factors.

Fire Suppression

A firefighter fractured his skull and left femur in four places after falling approximately 20 feet (6 meters) from a ground ladder.

The injured firefighter was directing a hose stream into a burning single-family dwelling. He lost his balance and grip and fell from the ladder.

According to the fire department, the temperature at the time of the fire was -16°F (-26°C) creating slippery conditions on the fireground. The firefighter wasn't secured to the ladder when he fell. He was wearing his entire protective ensemble properly and, according to the department, his helmet may have prevented more serious head injuries.

The injured firefighter returned to full duty six months after suffering his injuries.

Fire Suppression

Four firefighters suffered minor injuries after tires exploded while they extinguished a fire in a large piece of construction equipment.

Firefighters responded to a reported brush fire near a road that was under construction. When they arrived, they discovered a fire in the engine compartment and transmission area of a large road scraper.

There were also several small fires on the inside wheel wells and along the ground underneath the vehicle. The engine company quickly established a water supply and began extinguishing the fires. Each member was wearing a full-protective ensemble but without SCBA due to the fires being small and outside.

After extinguishing most of the fire in the engine compartment, the two firefighters handling the hose line advanced to the rear of the vehicle. While moving to the rear of the vehicle, one of the 8-foot (2.4-meter) diameter split rim tires violently exploded knocking the firefighters to the ground.

The blast also knock over a third firefighter standing approximately 30 yards (25 meters) away. After the firefighters regained their composure and checked on each other's condition, a second split rim tire exploded, knocking the three to the ground again. For a second time, they gathered their wits and evacuated the area, and called for assistance. Flying debris from the explosions struck the pump operator.

Their injuries were minor considering the size of the tires and their proximity to the explosions. After being evaluated in the emergency room for abrasions, minor burns, and respiratory injuries, all four were released and returned to work within two weeks.

Fire Suppression
A lieutenant with 15 years experience suffered a shoulder tear and hip contusion after a fire-weakened floor collapsed beneath him. The officer had changed SCBA cylinders and was performing overhaul on the first story of the single-family dwelling, when the floor suddenly gave way. He fell waist deep into the hole. His partner immediately pulled him out and radioed command. All firefighters were evacuated from the building and operations changed to a defensive mode.

The officer was wearing a complete protective ensemble, which protected him from any burns. He underwent shoulder surgery, and is currently in rehabilitation and is unable to perform firefighting duties.

Training
A lieutenant suffered second and third degree burns over 26 percent of his body during a live-fire training exercise. The injured officer, a 10-year veteran of the department, was supervising three firefighters when fire conditions in the room rapidly deteriorated forcing the firefighters handling the attack hand line from the structure.

The incident safety officer immediately conducted an accountability check and discovered that one member was missing. Two rapid intervention teams found and removed the missing firefighter from the structure.

The acquired structure was a one-story, single-family dwelling. The burn room was a living room on the first story, where firefighters would enter and observe fire behavior before extinguishing the fire. The first two evolutions were completed without any problems.

At this point, instructors decided vertical ventilation wasn't needed and the ventilation crew left the roof. The fire intensified during the third evolution. Interior conditions rapidly deteriorated, overcoming the crew. The three firefighters exited the building but a lieutenant became disoriented and got lost.

The department had an extensive safety program that included a back-up team and two rapid intervention teams. All members participated in a safety briefing, and completed a safety walk through of the entire building.

The department prepared the acquired building by removing glass windows, cleaning the structure, and providing ventilation holes in the ceiling, roof, and gable vents in the attic.

Paramedics transported the lieutenant, who was wearing complete protective ensemble, to the hospital where he stayed for 24 days. He returned to work 14 weeks later.

Responding/Returning
A 33-year-old firefighter fell from his apparatus while responding to an automobile fire. He was wearing all of his protective clothing except his gloves, self-contained breathing apparatus (SCBA), and helmet when he mounted the apparatus. Before leaving the station, he was seated and belted in the jump seat behind the officer.

The apparatus approached an intersection and came to a complete stop at a red light so the driver could account for all oncoming traffic. The firefighter removed his seatbelt to pull on his SCBA straps. The apparatus proceeded through the intersection and took a left turn. During the turn, his door swung open and he fell out of the apparatus.

According to the fire department, he was on light duty for 30 days with a sprained hand and wrist. The department concluded that when he turned to don the straps, his knee, or coat accidentally opened the door.

Emergency Medical Run
An engine company staffed with a captain and three firefighters was dispatched along with a rescue to an EMS run for a "nature unknown" without police response. When firefighters arrived, they encountered a man who was possibly intoxicated and under the influence of an unknown stimulant. He was sitting on a couch, swaying, acting lethargic, and sweating profusely.

After conducting a patient assessment, the captain turned to communicate the assessment to the responding rescue when the patient became aggravated, stood up, and started berating one of the firefighters. After numerous attempts to calm the patient, he approached a second firefighter and began yelling at him. The captain requested the police respond. Again, they attempted to calm the agitated man.

Suddenly, the man pushed the first firefighter, punched the second firefighter in the face, and reached for a machete under a bed. The captain transmitted the code words "Firefighter needs assistance" over the radio. This message is used when a firefighter feels his life is in danger and increases the police response. The firefighter and patient were struggling over the machete on the floor when the others attempted to subdue him.

Fortunately, the man's wife entered the room and removed the machete from view. During the struggle, all four firefighters tried to keep the man pinned to the bed while waiting for the police. The captain transmitted a second "Firefighter needs assistance" and stated, "they were being attacked."

The firefighter, who was punched, received a contusion to his face and minor scratches. He returned to duty the following shift. During the melee, the captain suffered from torn ligaments in his left thumb and had a chunk of flesh bitten from the back of his right arm. He was out of work for four months.

BY MICHAEL J. KARTER, JR.

United States Fire Loss for 2003

Of the structural fires in 2003, 402,000 were residential fires.

SUMMARY

- 1,584,500 fires were attended by public fire departments, a moderate decrease of 6.1 percent from the year before.
- Every 20 seconds, a fire department responds to a fire somewhere in the nation.
- 3,925 civilian fire deaths occurred in 2003, an increase of 16.1 percent from a year ago.
- About 80 percent of all fire deaths occurred in the home.
- 18,125 civilian fire injuries occurred in 2003, a decrease of 1.6 percent. This estimate for civilian injuries is on the low side, due to under reporting of civilian injuries to the fire service.
- Nationwide, there was a civilian fire injury every 29 minutes.
- An estimated $12,307,000,000 in property damage occurred because of fire in 2003, an increase of 19.1 percent from last year.
- An estimated 37,500 intentionally set structure fires occurred in 2003, a decrease of 15.7 percent.

IN 2003, PUBLIC FIRE DEPARTMENTS responded to 1,584,500 fires in the United States, according to estimates based on data NFPA received from fire departments responding to its 2003 National Fire Experience Survey (see Tables 1 and 2). This represents a moderate decrease of 6.1 percent from 2002.

There was an estimated 519,500 structure fires in 2003, a slight decrease of 0.1 percent. From 1977 to 2003, the number of structure fires was at its peak in 1977 when 1,098,000 structure fires occurred (see Figure 1). The number of structure fires then decreased steadily in the 1980s to 688,000 by the end of 1989 for an overall decrease of 37.3 percent from 1977. Since 1989, structure fires have decreased 24.7 percent to 517,500 by the end of 1998 and have stayed in the 517,500 to 519,500 range during 1999-2003 except for 2001.

Of the structure fires in 2003, 402,000 were residential fires, accounting for 77.3 percent of all structure fires, and virtually no change from 2002. Of the residential structure fires, 297,000 occurred in one- and two-family dwellings, accounting for 57.2 percent of all structure fires. Another 91,500 occurred in apartments accounting for 17.6 percent of all structure fires.

For non-residential structures, most property type showed little or no change in 2003. The only non-residential property types with notable changes were an increase of 7.7 percent in institutional properties to 7,000; and a decrease of 8 percent in industrial properties to 11,500.

From 1977 to 2003, the number of outside fires was at its high in 1977 when 1,658,500 outside fires occurred. Outside fires decreased steadily the next six years to 1,011,000 in 1983 for a considerable decrease of 39 percent from 1977. Outside fires changed little for the rest of the 1980s except for 1988 when 1,214,000 occurred. Outside fires reached 910,500 in 1993, and stayed near the 1,000,000 level for the next three years. In 1997 and 1998, outside fires were at the 850,000 level and went up 8.7 percent to 931,500 in 1999, before dropping a cumulative 9.9 percent in 2001 and 2002 to 839,000.

In 2003, outside fires decreased a substantial 10.3 percent to 753,000. In particular, brush fires decreased 9.8 percent to 360,000, and rubbish fires decreased 6.6 percent to 190,500.

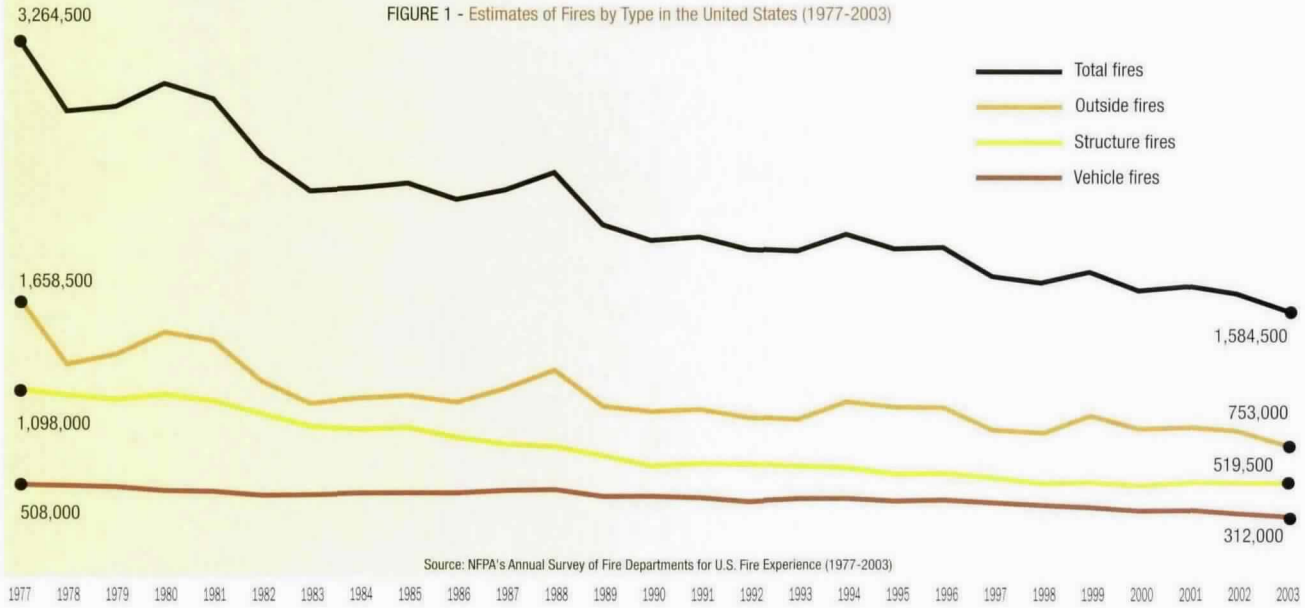
Civilian deaths

Based on data reported to NFPA, the 1,584,500 fires reported by U.S fire departments in 2003 resulted in an estimated 3,925 civilian deaths. This is an increase of 16.1 percent from 2002.

An estimated 3,165 died in residential fires in 2003, an increase of 17.4 percent. Of these deaths, 410 occurred in apartment fires, an increase of 5.1 percent. Another 2,735 civilians died in one- and two-family dwellings, an increase of 20 percent. This is 455 more deaths than the year before, and returns it closer to 2000 and 2001 levels.

When dwelling death rates declined sharply in 2002, we advised caution because death rates can vary considerably from year to year, particularly for smaller communities. The same applies to the 2003 increase, but the long-term trend is still downward.

FIGURE 1 - Estimates of Fires by Type in the United States (1977-2003)



Source: NFPA's Annual Survey of Fire Departments for U.S. Fire Experience (1977-2003)

1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

Fires caused an estimated $12,307,000,000 in property damage in 2003, an increase of 19.1 percent from last year.

PHOTOGRAPHS: AP/ WIDE WORLD

In all, fires in the home (one- and two-family dwellings including manufactured homes and apartments) resulted in 3,145 civilian deaths, an increase of 17.8 percent from 2002.

Looking at trends in civilian deaths since 1977 and 1978[1], several observations are worth noting (see Figure 2). Home fire deaths peaked in 1978 when 6,015 fire deaths occurred. Home fire deaths then decrease steadily in 1979, 1980, and 1982 and decreased a substantial 20 percent during the period to 4,820 by the end of 1982. From 1982 to 1988, home fire deaths stayed in the 4,655 to 4,955 range except for 1984 when 4,075 fire deaths occurred. In the past 14 years, home fire deaths moved well below the 1982-1988 plateau and have stayed in the 3,145 to 3,720 range during 1991-2003 except for 1996, 1999, and 2002.

With home fire deaths still accounting for 3,145 fire deaths or 80 percent of all civilian deaths, fire safety initiatives targeted at the home remain the key to any reductions in the overall fire death toll. According to NFPA's Public Education Division, there are five major strategies. First, a national adoption of the fire-safe cigarette to address the leading cause of fire deaths: smoking materials. Second, more widespread public fire safety education is needed on how to prevent fires and how to avoid serious injury or death if fire occurs. Third, increase awareness of installing and maintaining smoke alarms and developing and practicing home fire escape plans. Fourth, the installation of sprinklers should be pursued. Fifth, additional ways must be pursued to make home products more fire safe. The regulations requiring lighters that are more child-resistant are a good example. Sixth, address the special fire safety needs of high-risk groups, e.g., the young, older adults, and the poor.

In 2003, an estimated 220 civilians died in non-residential structure fires, a highly significant increase of 175 percent. This increase reflects the 100 fire deaths that occurred in the Station Nightclub Fire in West Warwick, Rhode Island, and 31 deaths that occurred in two nursing home fires in Connecticut and Tennessee.

Of the 3,385 civilians who died in structure fires, 305 or 9 percent died in fires that were intentionally set.

Also in 2003, 455 civilians died in highway vehicle fires, a decrease of 15.7 percent, and 20 died in other vehicle fires.

TABLE 1 - Estimates of 2003 Fires, Civilian Deaths, Civilian Injuries and Property Loss in the United States

Estimate	*Range*[1]	*Percent Change From 2002*
Number of fires		
1,584,500	1,547,500 to 1,621,500	-6.1**
Number of civilian deaths		
3,925	3,575 to 4,275	+16.1*
Number of civilian injuries		
18,125	16,125 to 20,125	-1.6
Property loss[2]		
$12,307,000,000[3]	$12,027,000,000 to 12,587,000,000	+19.1**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.
[1] These are 95 percent confidence intervals.
[2] This includes overall direct property loss to contents, structures, vehicles, machinery, vegetation, and anything else involved in a fire. It does not include indirect losses. No adjustment was made for inflation in the year-to-year comparison.
[3] This figure includes the Southern California Wildfires (Cedar and Old Wildfires) with an estimated total property loss of $2,040,000,000. Loss by specific property type for this fire was not available.
* Change was statistically significant at the .05 level.
**Change was statistically significant at the .01 level.

TABLE 2 - Estimates of 2003 Fires and Property Loss by Property Use

	NUMBER OF FIRES		**PROPERTY LOSS**[1]	
	Estimate	*Percent Change From 2002*	*Estimate*	*Percent Change from 2002*
Southern California Wildfires (includes Cedar and Old Wildfires)			$2,040,000,000	—
Fires in structures	519,500	+0.1	$8,678,000,000	-0.7
Fires in highway vehicles	286,000	-6.8**	1,101,000,000	-7.0*
Fires in other vehicles[2]	26,000	+15.6	255,000,000	+22.6*
Fires outside of structures with value involved but no vehicle (outside storage, crops, timber, etc.)	66,000	-7.0	162,000,000	+33.9**
Fires in brush, grass wildland (excluding crops and timber) with no value or loss involved	360,000	-9.8**	—	—
Fires in rubbish including dumpsters with no value or loss involved *(outside of structures)*	190,500	-6.6	—	—
All other fires	136,500	-17.3**	71,000,000	-13.4
Total	1,584,500	-6.1**	$12,307,000,000	+19.1**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.
The figure for the Southern California Wildfires is total property loss. Loss by specific property type was not available for this fire.
[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.
[2] This includes trains, boats, ships, aircraft, farm vehicles and construction vehicles.
*Change was statistically significant at the .05 level.
**Change was statistically significant at the .01 level.

Civilian fire injuries

Results based on data reported to NFPA indicate that in addition to 3,925 civilian fire deaths, there were 18,125 injuries in 2003. This is a slight decrease of 1.6 percent from 2002.

Estimates of civilian fire injuries are on the low side, because many civilian injuries aren't reported to the fire service. For example, many injuries occur at small fires that fire departments don't respond to, and sometimes when departments do respond, they may be unaware of injured persons who they didn't transport to medical facilities.

NFPA estimates that there were 14,075 civilians injured in residential properties, a slight increase of 0.2 percent. Of these injuries, 10,000 occurred in one- and two- family dwellings, while 3,650 occurred in apartments.

TABLE 3 - Estimates of 2003 Structure Fires and Property Loss by Property Use

	STRUCTURE FIRES		PROPERTY LOSS[1]	
	Estimate	*Percent Change from 2002*	*Estimate*	*Percent Change from 2002*
Southern California Wildfires (includes Cedar and Old Wildfires)			$2,040,000,000	—
Public assembly	14,000	0	$302,000,000	+11.7
Educational	7,000	0	69,000,000	-25.0
Institutional	7,000	+7.7	28,000,000	+7.7
Residential (total)	402,000	+0.3	6,074,000,000	+0.3
One- and two-family dwellings[2]	297,000	-1.2	5,052,000,000	+0.9
Apartments	91,500	+3.4	897,000,000	-3.1
Other residential[3]	13,500	+12.5*	125,000,000	+0.8
Stores and offices	25,000	+4.2	721,000,000	+19.4**
Industry, utility, defense[4]	11,500	-8.0	625,000,000	-5.0
Storage in structures	31,500	-1.6	675,000,000	+7.7
Special structures	21,500	-2.3	184,000,000	-45.6**
Total	519,500	+0.1	$8,678,000,000[5]	-0.7

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.
The figure for the Southern California Wildfires is total property loss. Loss by specific property type was not available for this fire.
[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.
[2] This includes manufactured homes.
[3] Includes hotels and motels, college dormitories, boarding houses, etc.
[4] Incidents handled only by private fire brigades or fixed suppression systems are not included in the figures shown here.
[5] This total does not include the Southern California Wildfires.
*Change was statistically significant at the .05 level.
**Change was statistically significant at the .01 level.

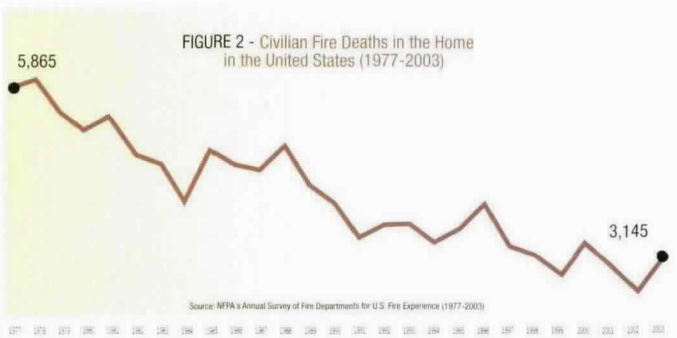


FIGURE 2 - Civilian Fire Deaths in the Home in the United States (1977-2003)

From 1977 to 2003 , the number of civilian injuries has ranged from a high of 31,275 in 1983 to a low of 18,125 in 2003 for an overall decrease of 42 percent. There was no consistent pattern going up or down until 1995, when injuries fell roughly 5,000 in 1994-1995 to 25,775, changed little in 1996, dropped 8 percent to 23,750 in 1997, changed little in 1998, dropped 5 percent in 1999, and then increased slightly in 2000, and then dropped 20 percent in 2001-2003 to 18,125 by the end of 2003.

Property loss

NFPA estimates that the 1,584,500 fires responded to by the fire service caused $12,307,000,000 in property damage in 2003. This is an increase of 19.1 percent from a year ago. (This total figure includes the Southern California Wildfires (Cedar and Old Wildfires) with an estimated total property loss of $2,040,000,000. Loss by specific property type for this fire weren't available, and aren't included for results by property type in this report.).

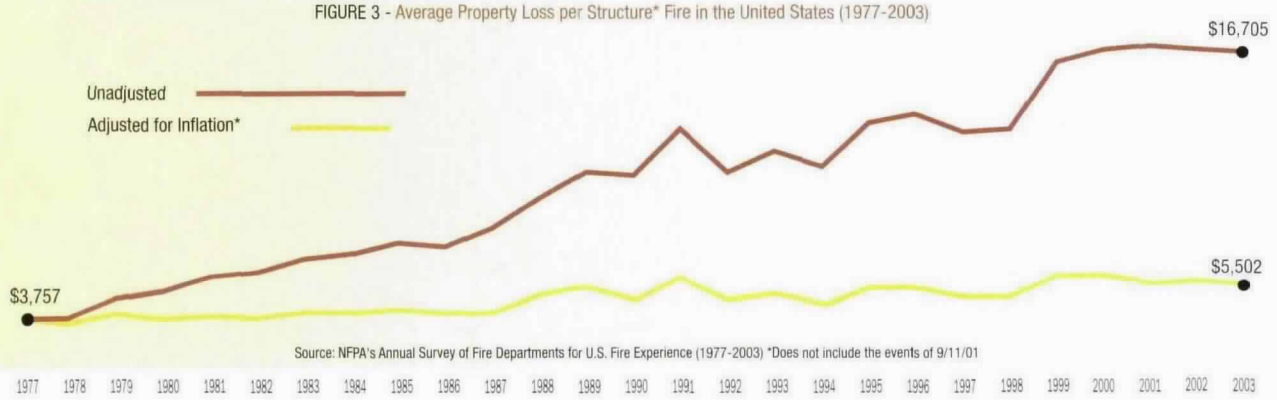
Fires in structures resulted in $8,678,000,000 in property damage, a slight 0.7 percent decrease from 2002. Average loss per structure fire was $16,705, a slight decrease of 0.8 percent.

From 1977 to 2003, and excluding the events of 9/11/01, the average loss per structure fire ranged from a low of $3,757 to a high of $17,016 in 2001 for an overall increase of 353 percent. When property loss is adjusted for inflation, the increase in the average structure fire loss between 1977 and 2001 is 56 percent.

Of the property loss in 2003, an estimated $6,074,000,000 occurred in residential properties, up a very slight 0.3 percent from 2002. An estimated $5,052,000,000 occurred in one- and two-family dwellings, virtually no change from 2002. An estimated $897,000,000 also occurred in apartments. Other property damage figures worth noting for 2003 include $69,000,000 in educational properties, a decrease of 25 percent; $721,000,000 in store and office properties an increase of 19.4 percent; $302,000,000 in public assembly properties, a decrease of 11.7 percent; $675,000,000 in storage properties, an increase of 7.7 percent.

Property loss totals could change dramatically from

FIGURE 3 - Average Property Loss per Structure* Fire in the United States (1977-2003)



Source: NFPA's Annual Survey of Fire Departments for U.S. Fire Experience (1977-2003) *Does not include the events of 9/11/01

TABLE 4 - Estimates of 2003 Civilian Fire Deaths and Injuries by Property Use

	CIVILIAN DEATHS			CIVILIAN INJURIES		
	Estimate	*Percent Change from 2002*	*Percent of all Civilian Deaths*	*Estimate*	*Percent Change from 2002*	*Percent of all Civilian Injuries*
Residential (total)	3,165	+17.4*	80.6	14,075	+0.2	77.6
One-and two-family dwellings[1]	2,735	+20.0*	69.7	10,000	+0.5	55.2
Apartments	410	+5.1	10.5	3,650	-1.4	20.1
Other Residential[2]	20	-20.0	0.5	425	+6.3	2.3
Non-residential structures[3]	220[4]	+175.0	5.6	1,525	-1.6	8.4
Highway vehicles	455	-15.7	11.7	1,400	-17.7	7.7
Other vehicles[5]	20	-20.0	0.5	200	+60.0	1.1
All other[6]	65	+62.5	1.7	925	-7.5	5.1
Total	3,925	+16.1*		18,125	-1.6	

Estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey. Note that most changes were not statistically significant; considerable year-to-year fluctuation is to be expected for many of these totals because of their small size.

[1] This includes manufactured homes.
[2] Includes hotels and motels, college dormitories, boarding houses, etc.
[3] This includes public assembly, educational, institutional, store and office, industry, utility, storage, and special structure properties.
[4] This includes 100 fire deaths in the Station Nightclub Fire in Rhode Island, and 31 deaths in two nursing home fires in Connecticut and Tennessee.
[5] This includes trains, boats, ships, farm vehicles and construction vehicles.
[6] This includes outside properties with value, as well as brush, rubbish, and other outside locations.
*Statistically significant at the .05 level.

year to year because of the impact of occasional large loss fires.

Intentionally set fires

Based on data reported by fire departments in the survey, NFPA estimates there were 37,500 intentionally set structure fires in 2003, which is a significant decrease of 15.7 percent from 2002. (The NFPA survey is based on the newly revised NFIRS 5.0 system, this new system has an intentionally set category that's equivalent to the old incendiary category. There's no new equivalent to the old suspicious category, which has been eliminated.)

These intentionally set structure fires resulted in an estimated 305 civilian deaths, a decrease of 12.9 percent. These set structure fires also resulted in $692,000,000 in property loss, a significant decrease of 24.7 percent from 2002.

In 2003, there also were an estimated 30,500 intentionally set vehicle fires, a significant decrease of 25.6 percent. These set vehicle fires resulted in $132,000,000, a significant decrease of 40.5 percent.

Description of NFPA survey

NFPA annually surveys a sample of fire departments in the U. S. 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, a sample was selected stratified by size of community protected. Some 3,082 fire departments responded to the 2003 fire experience survey. 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.

For each estimate, a sampling or standard error was also calculated. The sampling error is a measure of the error caused by the fact that the estimates are based on a sampling of fire losses rather than a complete census of the fire problem. Due to the fact that the survey is

TABLE 5 - Estimate of 2003 Losses in Intentionally* Set Structure Fires

Intentionally Set Structure Fires*	*Estimate*	*Percent Change From 2002*
Number of Structure Fires	37,500	-15.7**
Civilian Deaths	305	-12.9
Property Loss[1]	$692,000,000	-24.7**

The estimates are based on data reported to the NFPA by fire departments that responded to the 2003 National Fire Experience Survey.
[1] This includes overall direct property loss to contents, structure, a vehicle, machinery, vegetation, or anything else involved in a fire. It does not include indirect losses, e.g., business interruption or temporary shelter costs. No adjustment was made for inflation in the year-to-year comparison.
*The NFPA Survey is based on the newly revised NFIRS 5.0 system. This new system has an intentionally set category which is equivalent to the old incendiary category. There is no new equivalent to the old suspicious category, which has been eliminated.
**Statistically significant at the .01 level.

based on a random sample, we can be very confident that the actual value falls within the percentage noted in parentheses for each overall fire loss estimate: number of fires (2.3 percent), number of civilian deaths (9.0 percent), number of civilian injuries (5.6 percent), and property loss (2.3 percent).

The results presented in this report are based on fire incidents attended by public fire departments. No adjustments were made for unreported fires and losses (e.g., fires extinguished by the occupant). Also, no adjustments were made for fires attended solely by private fire brigades (e.g., industry and military installations), or for fires extinguished by fixed suppression systems with no fire department response.

Definitions

Civilian: The term "civilian" includes anyone other than a fire fighter, and covers public service personnel such as police officers, civil defense staff, non-fire service medical personnel, and utility company employees.

Death: An injury that occurred as a direct result of a fire that is fatal or becomes fatal within one year.

Fire: Any instance of uncontrolled burning, which includes combustion explosions and fires out on arrival. Excludes controlled burning (whether authorized or not), over pressure rupture without combustion, mutual aid responses, smoke scares, and hazardous responses (e.g., oil spill without fire).

Injury: Physical damage that is suffered by a person as a direct result of fire and 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 results in at least one day of restricted activity immediately following the incident. Examples of injuries resulting from fire are smoke inhalation, burns, wounds and punctures, fractures, heart attacks (resulting from stress under fire condition), strains, and sprains.

Property damage: Includes all forms of direct loss to contents, structure, machinery, a vehicle, vegetation or anything else involved in the fire but not indirect losses, such as business interruption or temporary shelter provisions.

Structure: An assembly of materials forming a construction for occupancy or use in such a manner as to serve a specific purpose. A building is a form of structure. Open platforms, bridges, roof assemblies over open storage or process areas, tents, air-supported, and grandstands are other forms of structures.

Vehicles, Highway, and Other: Fires in these instances may have been associated with an accident; however, reported casualties and property loss should be the direct result of the fire only.

Highway vehicles include any vehicle designed to operate normally on highways, e.g., automobiles, motorcycles, buses, trucks, trailers (not mobile homes on foundations), etc. Other vehicles include trains, boats and ships, aircraft, and farm and construction vehicles.

Full report on "U.S. Fire Loss during 2003"

The data and information included in this report are only part of the fire loss picture. A more detailed and complete report on the overall patterns and trends of 2003 is available from the Fire Analysis and Research Division. The complete report includes patterns by size of community; patterns by region and size of community; and a more complete description of survey methodology.

The full report is scheduled to be available this month at www.nfpa.org under One-Stop Data Shop. Hard copies can be ordered through Nancy Schwartz at (617) 984-7450 or osds@nfpa.org.

Acknowledgments

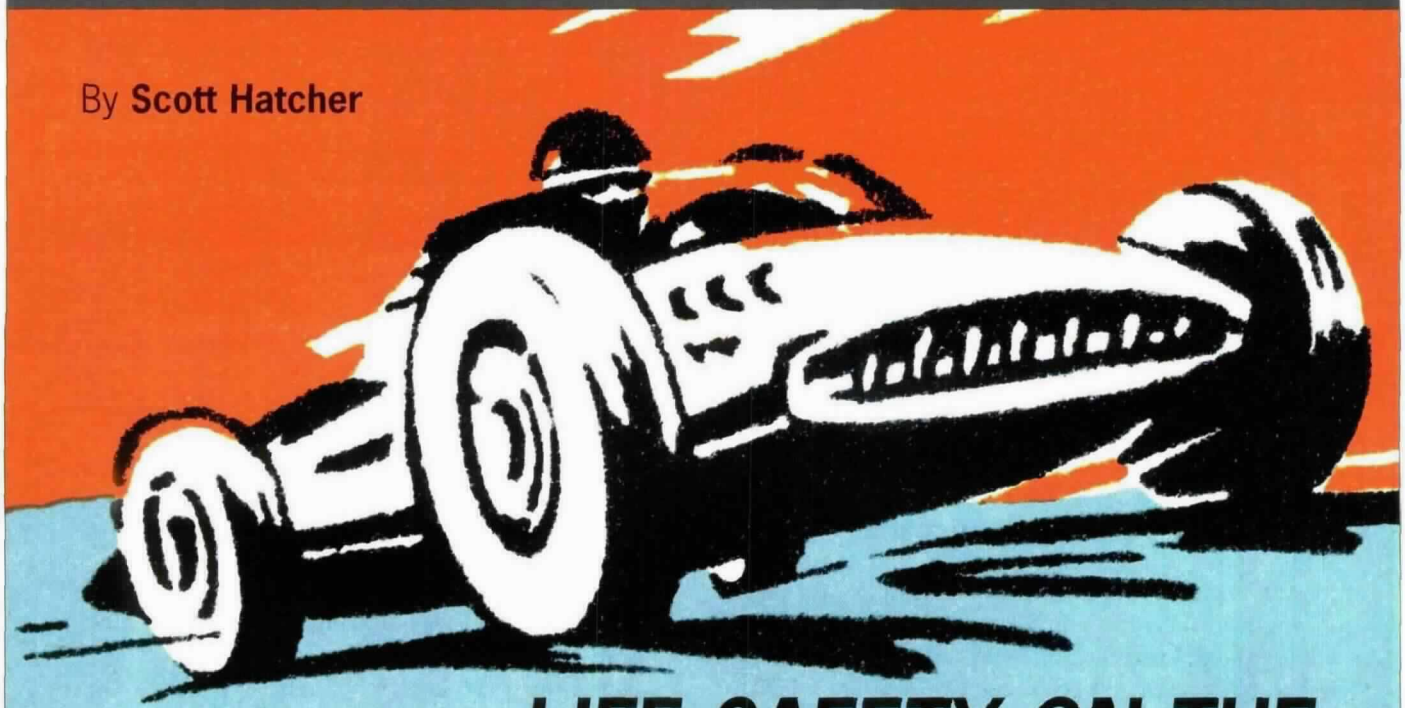
NFPA thanks fire departments that responded to the 2003 National Fire Experience Survey and provided us the data so necessary to make national projections.

The survey project manager and author of the report thanks the members of NFPA staff who worked on this year's survey including Frank Deely, John Baldi, and John Conlon for editing 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.

Endnotes

1. Note that the NFPA changed its survey methodology in 1977-1978, and meaningful comparisons cannot be made with fire statistics estimated before 1977.

By **Scott Hatcher**



LIFE SAFETY ON THE FAST TRACK

With a seating capacity of 166,000-plus, the largest sports venue in Tennessee and one of the largest in the country relies on NFPA codes.

BRISTOL IS A SMALL CITY in the foothills of eastern Tennessee's Appalachian Mountains, near the Virginia state line. This town of 24,000 pulls motor racing enthusiasts from all over the Eastern Seaboard and beyond, generating crowds of 166,000-plus at the Bristol Motor Speedway (BMS).

At 0.533 miles (0.857 kilometers), BMS is one of the shortest tracks on the Nextel Cup circuit, with the highest banking–36 degrees–at turns. The combination makes for good sightlines and thrilling viewing from anywhere in the stadium, and appeals to drivers as well as spectators.

BMS began to reach for this super track status in 1996, when J. Burton Smith, chair of Speedway Motorsports, Inc, bought what was then called Bristol International Raceway. At the time, the track seated 71,000, mostly in the original concrete outdoor bleachers and a few small boxes, and its fire safety arrangements were rudimentary.

In a series of yearly expansion projects, Smith added three-tier grandstand seating for 160,000 and 150 luxury skyboxes, a spectacular 100 feet (30 meters) above the circuit, and three-quarters of the way around the track. In total, the skyboxes accommodate about 6,000 fans. When another 50, are added in the near future, skyboxes will completely encircle the speedway.

Upgrades demand life safety

With the addition of three tiers of grandstand seating, a terrace, and tower, 10 elevator towers with 40 elevators around the circuit, a low-rise infield building topped by a victory-lane winner's circle, and, of course, the skyboxes, upgrading the track's life safety arrangements was imperative.

The first phase of the fire protection system installation began early in 1997, when the curved ends of the track were torn out, and new bleachers and the first 22 skyboxes went in.

From the beginning, the new construction focused on code-approved life safety arrangements, using the 2000 edition of NFPA 101®, *Life Safety Code®*, for life safety and the 2000 edition of NFPA 1, *Fire Prevention Code*. Smoke detectors and horn/strobes were installed in each skybox suite and manual pull stations were placed at all suite exits. Corridors were fitted with smoke detectors,

horns, and strobes, and pull stations were installed at entry/exit points.

In the latest generation of suites, duct detectors were provided, and smoke and heat detectors were installed in each elevator lobby. Elevator recall arrangements were also made.

All this was specified in the original plan. Essentially the same parameters are followed as new boxes are installed.

When Speedway Motorsports bought BMS in 1996, construction and renovation became a fast-track project. Kingsport Armature & Electric of Kingsport was the design/build electrical subcontractor. Kingsport recommended life safety systems and fire alarm signaling from Faraday LLC of Florham Park, New Jersey. MECA Engineering of Kingsport, designed and installed the base system and each yearly expansion.

."We do the life safety upgrades and related work between the last race in August and the first race in March. Last year, we worked 10 hours a day, 7 days a week to complete the new scheduled construction," says Rufus Herd, project manager with Kingsport Armature.

"The first requirement was to meet code," says Allen Ratliff, president of MECA Engineering. "It was critical to get the local authorities on board with what we wanted to do to provide optimum fire safety. We met with the local fire marshal to determine his interpretation of the code. Going into that meeting we said, 'This is our plan, what do you think?'"

All subsequent work was done in conjunction with the fire marshal and with Jack Spurgeon, the Bristol area fire inspector, who inspects every new suite.

"From there, the next stop was cost," Ratliff says. "We had to provide a system that would meet requirements at least cost and be maintainable to give the owner value for years down the road."

The approved life safety plan

Scott Larson, Faraday product manager, explains that the original system employed an addressable fire alarm control panels with 32-character alphanumeric programmable system status display. Subsequent expansions use the networking-compatible system, which offers 80-character LCD display with custom labeling.

The current facility employs five panels, with 62 software zones under one control and 82 software zones under the other. Both panels are UL-listed for NFPA 72®, *National Fire Alarm Code®*, sensitivity testing.

The LCD display shows all current event data, including alarms and troubles, identifies the zone or device, and presents its history. The display is controlled by a set of four pushbutton switches commanding the control processor.

The five panels interface with, and control, photoelectric, heat, and duct detectors; horns; horn strobes; and manual pull stations. The fire alarm panels also control the elevator banks.

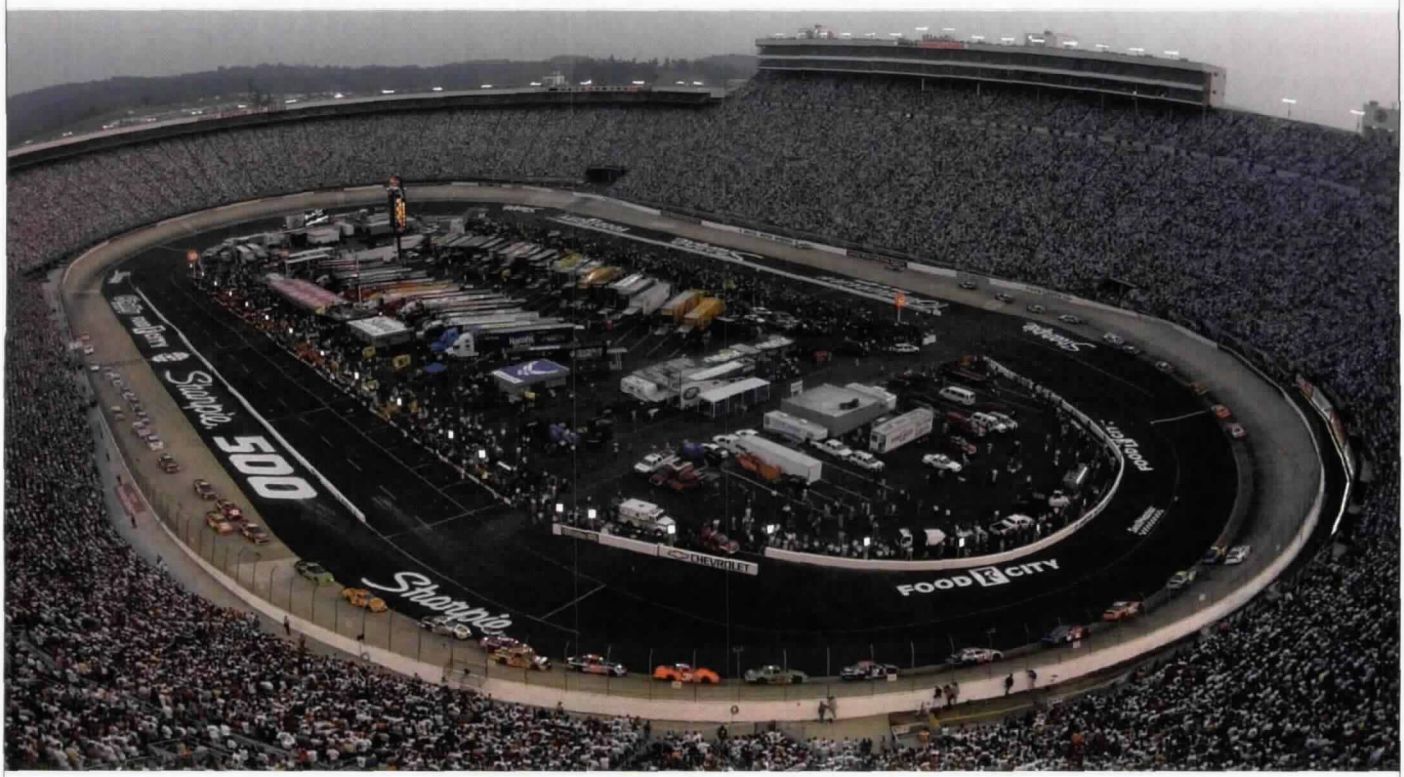
MOTORSPORT SAFETY: A PLANNED APPROACH

BY DAVID MURPHY

THE POPULARITY OF MOTORSPORT venues is at an all-time high. Its continued growth is anticipated as indicated by sponsor/spectator spending and the racing industry's scramble to capitalize on it. Racing venues differ in size and scope from the hometown "mudsling" that's attended by only a handful, to the weekly venues that routinely draw thousands of fans. All of these racing events have common denominators: high-powered vehicles, competitive drivers and crews, large crowds of enthusiastic spectators, vulnerable employees, and the ever-present opportunity for something to go wrong.

Ever since the death of stock car racing's favorite son, Dale Earnhardt, there have been significant improvements regarding driver safety. Other major safety changes have occurred in the pit areas. However, motorsports safety does not pertain just to drivers and teams. According to a recent article published in the Charlotte Observer, there have been 337 racing-related deaths at auto racing venues since 1990. Effective emergency planning includes contingency plans for spectators, vendors, employees, and anyone else that may be in the immediate area. Injuries, medical emergencies, fire control, security, and traffic control are major concerns at every motorsports event. At such events, it is common for fire, police, and emergency medical service personnel to work together. Teamwork, communication, and smooth interaction of these combined forces require an effective management system and training to ensure that everyone is indeed on the same page.

In this effort, the first edition of NFPA 610, *Guide for Emergency and Safety Operations at Motorsports Venues*, has recently been adopted as a recommended practice.



An aerial view of Bristol Motor Speedway, Bristol Tennessee, in August 2003.

Presignal system limits disturbance

The presignal system at Bristol Motor Speedway is defined in Section 6.8.1.2 of the *National Fire Alarm Code*, 2002 edition: "If permitted by the authority having jurisdiction, systems shall be permitted to have a feature that allows initial fire alarm signals to sound only in department offices, control rooms, fire brigade stations, or other constantly attended central locations and for which human action is subsequently required to activate a general alarm, or a feature that allows the control equipment to delay the general alarm by more than 1 minute after the start of the alarm processing. If there is a connection to a remote location, the transmission of the alarm signal to the supervising station shall activate upon the initial alarm signal."

In the 2000 edition of NFPA 101, Section 12.3.4.3.1 has the effect of recognizing the presignal system addressed in NFPA 72: "The required fire alarm system shall sound an audible alarm in a constantly attended receiving station within the building when occupied for purposes of initiating emergency action. Positive alarm sequence in accordance with 9.6.3.4 shall be permitted."

At Bristol Motor Speedway, an alarm initiated in a skybox is reported to the panel and to a remote annunciator in the operations office, and a response team dedicated to the skyboxes is immediately dispatched by radio to check the situation. If a second alarm sounds, it automatically triggers a general alarm. The general alarm sounds at once if the first alarm activates in a hallway, an alarm triggered in a skybox will sound in the involved suite, and the alarms in the suite on either side will annunciate locally with horn and strobe, an early warning to people closest to the problem area.

Standby technicians are stationed on-site at every race to immediately respond to any maintenance or operational problem with the life safety system.

Also running

Associated with BMS is the Bristol Motor Dragway, one of the premier drag strips in the United States. Its five-story suite tower, built in 1999, has life safety arrangements similar to those at BMS.

Now under construction at BMS is a 36,000-square-foot (3,345-square-meter) office structure, complete with a ground-floor interactive "fan zone" to amuse racegoers, which opened during the 2004 racing season.

SCOTT HATCHER is operations manager at Bristol Motor Speedway, Bristol, Tennessee.

DAVID MURPHY currently serves as a principal member on the NFPA 610 technical committee. He retired as Assistant Chief with the Richmond (KY) Fire Department and currently teaches in the Fire and Safety Engineering Technology program at the University of North Carolina at Charlotte.

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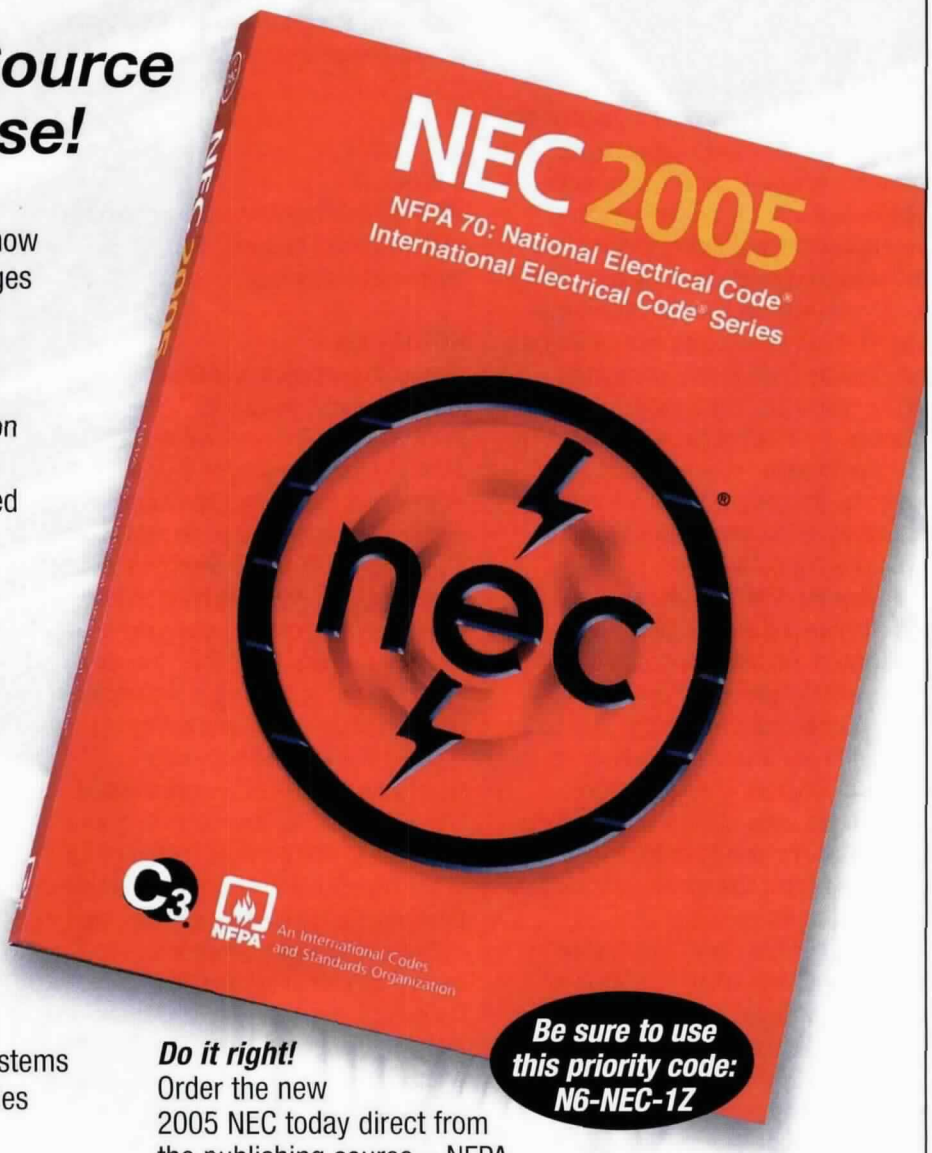

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HOT ISSUES

NFPA Publications of Interest

Fire Safe Building Rehabilitation, by John M. Watts, Jr., and Marilyn E. Kaplan, gives architects, engineers, contractors, code enforcement officials, property owners, preservationists, and others involved in restorating and renovating existing buildings an informed approach to fire-safe rehabilitation that can lower costs, reduce fire loss, and eliminate unnecessary intrusion on historic properties. The book discusses incentives for adaptive reuse, as well as the recent proliferation of rehabilitation codes and standards designed to promote the reclamation of existing buildings without compromising public safety. It also addresses the difficulties encountered in cost-effective and architecturally sensitive rehabilitation and provides design professionals with compliance alternatives.

Fire Safe Building Rehabilitation is both informative and instructive, describing the basic concepts of rehabilitation requirements while offering readers clear, practical advice about complying with regulations applicable to the rehabilitation of existing buildings.

Building and Fire Code Classification of Hazardous Materials by Amy Beasley Spencer, Guy R. Colonna, P.E., and Meghan Fraser simplifies hazardous materials classifications of 1,000 common chemicals from building and fire codes for those involved in hazardous material storage, incident response, and prevention and inspection. Classifying materials in a structure can help establish whether sprinklers are required, determine the fire-resistance required for certain building components, and calculate the required rating of separations between tenants in the same building. By providing a listing of important common chemicals and the classification applicable to these chemicals, this handy book is indispensable for planning, inspection, and operational teams.

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Aviation

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

HOT ISSUES

Airport Emergency and Risk Management Forum

NFPA and the Singapore Aviation Academy have announced their third International Forum on Airport Emergency and Risk Management, to be held January 10 to 12, 2005, at the Singapore Aviation Academy. The forum will bring together international experts to review the latest airport emergency practices, including preparations for handling emergencies arising from terrorism and epidemics.

Giving the keynote address on "Managing the Risk of Terrorism—the U.K. Approach," is Robin Currie, retired Inspector of Fire Services for the Office of the Deputy Prime Minister in the United Kingdom. Currie will review British fire and rescue services' preparations for dealing with terrorism and discuss the realities of melding policy-level theory and real-life experience. He will also examine whether the concepts of risk management are being appropriately applied.

During the track on technological advances in aircraft rescue and firefighting (ARFF), Dennis Kennedy will present "Advances in Foam Technology, System Design and Application Techniques." Kennedy, vice-president and general manager of Tyco Safety Products in the United States, will review hangar design criteria and foam formulations appropriate for ARFF, as well as economic choices that satisfy minimum application rates and quantities.

Joseph Wright, former research and development specialist for the U.S. Federal Aviation Administration, will address "Technological Advances for ARFF Vehicles." In recent years, ARFF vehicles have been enhanced to perform better under adverse conditions, and Wright will discuss these enhancements and others used on ARFF vehicles.

In the aircraft hangar design and fire protection track, Joseph Seo, director of ABL Lim Pte Ltd. in Singapore, will address the "Unique Fire Suppression Design for Singapore Airlines Hangar." Two hangars recently completed for the Singapore Airline Engineering Company employ a standard sprinkler system at roof level and a low-level foam suppression system on the hangar floor to protect the hangars in the event of a flammable liquid spill. Seo will describe the design, installation, testing, and commissioning of this system.

"New Foam Delivery Systems for Hangars" will be the subject of Joseph A. Simone and Joshua Jones' presentation. Simone is chief fire protection engineer and Jones is lead fire protection engineer at the U.S. Naval Facilities Engineering Command. Concerned about the unwanted discharge of aircraft hangar overhead foam systems, the U.S. Navy teamed with researchers and manufacturers to devise a system that delivers foam through piping installed in the hangar trench drain system and terminates at a nozzle in the drain grate. Simone and Jones will review the design and testing of this technology.

James Doctorman, a senior engineer with The Boeing Company, will present "Boeing Aircraft Hangar Fire Protection." Boeing hangars house aircraft in every stage of manufacture, and the fire protection needed in each type of hangar varies. Doctorman will discuss how Boeing protects these buildings.

In the track on new large aircraft and their safety considerations, Thomas

In This Issue

Phillips, a captain with U.S. Airways, will address "The A-380 Safety and Regulatory Considerations for Airports." The double-decker A-380 will begin landing at airports in 2006, and Phillips will review the development of specialized vehicles to give firefighters access to the upper level of the aircraft.

As part of the "Incident Stress Management" track, Dr. Adrian Wang, chief of the Singapore Institute of Mental Health, will discuss "The Importance of Critical Incident Stress Debriefing and an Effective Program for Airport Emergency Responders." All airports need a plan to deal with critical stress management, and Wang will describe how to develop one.

The track on fire protection in airport design will include a discussion of "Aircraft Fuel Hydrant System Design Issues." The speaker will review airport operators' expectations and the challenges designers face in achieving safety economically while meeting internationally accepted standards.

Also to be discussed are "The Challenges in the Provision of the Fire Safety of a Modern Airport Terminal Building—The Changi Experience" by Patrick Lam, senior consultant with CPG Consultants Pte Ltd. in Singapore. Lam will discuss how the Civil Aviation Authority of Singapore and CPG analyzed the proposed layout and considering various fire scenarios to provided a terminal with safe large, open, user-friendly spaces.

In the track on the lessons major aviation disasters have taught, Mark Conroy, NFPA senior engineer, will address "Aircraft Accidents that Caused Major Changes to Emergency Response Equipment and Procedures." Three major accidents over the past 15 years have changed the way we look at aircraft rescue and firefighting. Conroy will review the emergency response to these accidents and share the technological advances in equipment that resulted.

Brian Boucher, a captain for Air Canada, will discuss "A Pilot's Perspective of ARFF at Aircraft Accidents," using the lessons learned from the crash of a FedEx MD-10 in December 2003 at Memphis International Airport and the crash of an Air Canada jet in December 2002 at Fredericton in New Brunswick. He will also evaluate the pros and cons of using new technology during fire suppression.

Finally, Cletus Packiam, head of Airport Operations for the Civil Aviation Authority in Singapore, will discuss "The Application of Risk Management in the Mitigation of Airport Emergencies." Packiam will address the benefits of applying risk management to civil airport operations and discuss how to use the results to enhance emergency planning.

The conference fee is S$1,500 or US$950. Attendees will visit Singapore Airlines' hangars. For updates, visit www.saa.com.sg/forum.

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Building Fire Safety Systems

WEB SITE: http://www.nfpa.org/bfss
CHAIR: Neal Krantz, LVC Technologies Inc.

HOT ISSUES

Seismic Bracing of Risers

The only criteria for the seismic bracing of risers in the 1999 edition of NFPA 13, *Installation of Sprinkler Systems,* are found in Paragraph 13.6-4.5.5, which requires a four-way brace at the top of risers to protect against drifting, and in the appendix. Fortunately, more guidance was added to the 2002 edition.

Paragraph 13.1-4.4 of NFPA 13 defines a riser as any vertical supply pipe in a sprinkler system, and conceptually, there is little difference in the dynamics of earthquake bracing between horizontal and vertical piping. The 1999 edition of NFPA 13 requires a four-way brace for a riser as short as 6 inches (15 centimeters) long from the cross main to the branch line. In the 2002 edition, this requirement was revised to apply only to risers longer than 3 feet (0.9 meters).

Four-way braces may be installed on the horizontal or vertical portion of the pipe, and the attachment to the structure is not limited to the roof or floor. Figure A-6-4.2(a) of NFPA 13 also shows that the attachment should be above the upper flexible coupling required at the top of risers. The only time this is an issue is when the four-way brace is used as a lateral or longitudinal brace for adjacent mains, when the attachment must be above the flexible coupling. The main criterion for placing a brace is the suitability of the structural member to which it is attached.

Figure A-6-4.5.6(c) and (e) shows a four-way brace being used as an adjacent cross main but provides no guidance on how far the cross main can be from the riser. It's appropriate to impose a 24-inch (61-centimeter) maximum separation between the riser and cross main, consistent with Paragraph 13.6-4.5.3, which allows a lateral brace to act as a longitudinal brace if it is within 24 inches (61 meters) of the centerline of the piping braced longitudinally, and with Paragraph 13.6-4.5.4, which allows longitudinal braces to act as lateral braces. The wording of the text does not distinguish between vertical or horizontal piping. For instance, a four-way brace installed on the vertical piping at the top of a riser may be used as the lateral and longitudinal brace to the adjacent horizontal main. In reality, however, the cross main is seldom close enough to the riser for this dual-type bracing, although it is often applied to the supply main from the riser.

The 1999 edition of NFPA 13 requires a brace only at the top of the riser, and Figure A-6-4.5.6 says to take half the weight of the riser. But what do we do in a high-rise with a 1,000-foot (305-meter) riser? The 2002 edition of NFPA 13 clarifies this issue by requiring four-way braces every 25 feet (7.6 meters). Now, we can clearly define the vertical zone of influence. There may also be a horizontal zone of influence if the brace serves a dual function.

For a four-way brace at the top of a riser, Figure A-6-4.5.6 says you must assign half the weight of the applicable section of riser to both the lateral and longitudinal loads, since they are to be considered separately. In Figure B, for example, the four-way brace acts as the longitudinal brace for Cross Main A and the entire supply main, and as the lateral brace for Section A of the supply main. The appendix text in the 1999 edition of NFPA 13 is slightly confusing when it says to consider the longitudinal and lateral loads separately. Since the four-way brace consists of two legs that are seldom parallel or perpendicular to the adjacent mains, the size of each leg should be based on the entire load of the combined vertical and horizontal zones of influence. This provides a conservatively sized four-way brace, which is appropriate since it has to resist movement in both directions simultaneously and there is no guidance for assigning partial loads.

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Education

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"Panic" Is Not an Accurate Description of Behavior in Fire

by PEG CARSON

It is generally accepted that people who don't understand fire development and safe evacuation practices and who have not practiced a fire drill will panic when confronted with a real fire. However, the data tell us that they do not.

At the NFPA World Safety Conference in Salt Lake City last May, Rita Fahy of NFPA and Guylène Proulx of the National Research Council of Canada presented findings from research conducted as early as 1954 and as recently as 2002 in the education session, "Panic and Human Behavior vs. Code Requirements." The research should direct public fire and life safety educators to correct the assumption of panic when targeting messages and programs.

Rita and Guylène presented several definitions of panic, including Sime's 1980 assertion that panic is "an excessive fear reaction which is persistent and unrealistic in terms of the situation." In 1957, Quarantelli described the "panic participant as nonrational in his flight behavior," while Goldenson noted in 1984 that panic is a "reaction involving terror, confusion, and irrational behavior precipitated by a threatening situation."

In fact, experts agree that panic is extremely rare, usually involves only a handful of people, and is short-lived, even though it is often portrayed as the norm in the news, films, and even in information from the fire protection community.

So what do people do if they don't panic? They create casual bonds, engage in a milling process to define the situation and make decisions, behave altruistically, and systematically try to reassure others. According to the research, most people will follow instructions and do their best to save themselves and others.

How do we explain the fact that many who could have escaped a fire didn't if we can't attribute their behavior to panic? We can conclude that most people acted within their ability based upon previous

knowledge and experience, following the instruction given within the time available.

Knowing this reinforces the importance of fire and life safety education.

Rita and Guylène concluded that a proper response is more likely if people are given information before a fire through education, training, drills, signs, public information, and emergency action plans; during a fire by alarms, public address system messages, staff, wardens, the fire department, and the media; and after a fire through the media, postings, e-mail messages, and meetings.

It's important that we agree not to use "panic" terminology to describe behavior in fire and to stop perpetuating a myth that could lead someone to assume he or she will panic and be unable to make the right decision during a fire.

Five-Year Strategic Plan

by PEG CARSON

The mission of the section's five-year strategic plan, which covers the period from 2003 to 2008, is to improve the quality of life by reducing the incidence of fire and preventable injury, death, and property loss through education.

Its goal is to provide a forum in which fire and injury prevention educators can exchange information and disseminate critical to the professional development of section members.

Its objectives are to expand membership by attracting and maintaining members representative of all fire and injury prevention disciplines; enhance section members' professional development; provide a vehicle for information and resource exchange and dissemination among individuals and organizations dedicated to fire and injury prevention; increase participation in, and input into, the consensus standards-making process to ensure that fire and injury prevention concerns and recommendations are reflected in published documents; and promote coalition building, partnerships, and cooperation among private-sector, non-profit, and government agencies to expand fire and injury prevention resources.

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

Electrical

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

HOT ISSUES

More than Codes and Standards

For those of us who think of NFPA strictly as a standards-developing organization, it's time to take another look. While our core mission remains the development of codes and standards to protect life and property, we've now assumed the additional role of information provider, partnering with new organizations to develop products and offer electrical information that can help electrical professionals on the job.

You've already seen new publications in a number of areas. Documents that explain the *National Electrical Code® (NEC)* include:

- *User's Guide to the National Electrical Code®*
- *Analysis of Changes to the NEC*, published jointly with I.A.E.I.
- *Stallcup's Illustrated Code Changes*
- *Stallcup's Journeyman Electrician's Study Guide*
- *Stallcup's Master Electrician's Study Guide*
- *Stallcup's Electrical Calculations Simplified*
- *Pocket Guide to Residential Electrical Installations*
- *Pocket Guide to Commercial and Industrial Electrical Installations*
- *NEC Expert Video Series*
- *NEC Q&A* (coming in 2005)

References for designers, installers, maintainers, and inspectors include:

- *Electrical Inspection Manual with Checklists*
- *NFPA's Electrical References*
- *NFPA's Illustrated Dictionary of Electrical Terms*
- *Successful Electrical Contracting*
- *Stallcup's Generator, Transformer, Motor and Compressor Book*
- *Stallcup's Electric Sign and Outline Lighting Book*

And titles that help instructors train electrical workers and students include:

- *NFPA's Residential Wiring*
- *Stallcup's Electrical Design Book*
- *Stallcup's Grounding and Bonding Simplified*

A new area of emphasis is titles built around the 2004 edition of NFPA 70E, *Electrical Safety in the Workplace*, and OSHA construction site and workplace safety regulations:

- *Handbook for Electrical Safety in the Workplace*
- *Electrical Safety in the Workplace*
- *Working Safely with Electricity* video
- *The Electrical Safety Program Book*
- *OSHA–Stallcup's Electrical Regulations Simplified*
- *OSHA–Stallcup's Construction Regulations Simplified*
- *OSHA–Stallcup's Electrical Construction Regulations Simplified*
- *OSHA–Stallcup's High-Voltage and Telecommunications Regulations Simplified*

To learn more, visit www.necdigest.org or www.nfpacatalog.org.

We also welcome advice and proposals from the electrical community. If you'd like to suggest an item or a title, contact Charles Durang at NFPA, One Batterymarch Park, Quincy, MA 02169. You may also call him at (617) 984-7557, or email him at cdurang@nfpa.org.

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

Fire Science and Technology Educators

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

HOT ISSUES

Fire Dynamic Simulator and Smokeview Training

by GREGORY E. GORBETT

Computer fire modeling has changed dramatically since Harold "Bud" Nelson first used it to demonstrate the behavior of the 1986 fire at the Dupont Plaza Hotel in Puerto Rico. The latest computer fire model, the Fire Dynamics Simulator (FDS), is an asset to all fire-related fields, but one must have considerable training to use it and interpret the results accurately.

FDS, developed by the National Institute of Standards and Technology, is classified as a field model. It allows the user to observe the development of a fire using a computer-generated animation of the model calculations. The model's two programs, FDS and Smokeview, are used to model and visualize fire phenomena.

FDS is a computational fluid dynamics model of fire-driven fluid flow that numerically solves a form of the Navier-Stokes equations appropriate for low-speed, thermally driven flow with an emphasis on smoke and heat transport from fires. In other words, FDS software takes data, including room dimensions, heat release rates, fuel loads, and surface materials, and solves mathematical equations to give valuable output data.

Smokeview is the visualization program used to display the dynamic and static results of the FDS simulation.

FDS models are used to demonstrate the activation of fire protection devices such as smoke alarms, heat detectors, and sprinklers and to reconstruct industrial and residential fires. FDS is also used to explain fire dynamics to students and jurors alike.

FDS typically requires users to know more about computers and fire dynamics than previous fire models. Those using FDS must understand programming, fluid dynamics, fire dynamics, and thermodynamics, and must be aware of version updates and possible patches that may be released. Engineering-based math and science courses will enable users to understand the derivation of the equations and their resulting calculations.

As for hardware, FDS and Smokeview require a fast CPU, a good graphics card, and plenty of RAM to run the model. The minimum specifications for a computer include 1 GHz Pentium III processor and 512 MB of RAM, but the user may want to exceed these minimum specifications to speed up the models' run time.

FDS will soon be an integral component of all fire-related fields, and those who work in these fields should be aware of the models' fundamentals. Fire safety professionals will have to stay up to date with such models to understand opposing experts, competitors, and the standards that will be based on findings from FDS.

Gregory E. Gorbett is a fire and explosion investigator and analyst with John A. Kennedy & Associates.

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

Fire Service

WEB SITE: http://www.nfpa.org/fireservice

CHAIR: Terry Allen, Chief, Cambridge, Ontario, Canada

HOT ISSUES

Update from Great Britain

by DAVID KENNEDY

Section Chair Terry Allen asked me to update you on activities in Great Britain.

At the moment, the fire service is recovering from a 2003 industrial dispute about pay, conditions of service, and modernization, during which firefighters went on strike for 16 days, leaving the military to provide a skeleton fire service throughout the nation. This caused much

bitterness among firefighters' employers and the public, but the strikes are over and discussions of the issues continue, although it will take time to restore trust between the parties. I am convinced that the ties between colleagues will heal this rift, as we all wish to protect our people.

Another aspect of the dispute is the government's intention to regionalize fire brigades nationally, decreasing the number from about 50 in England and Wales to 9 and from 8 in Scotland to 3 or 1. This proposal will review the way the fire service responds to fire calls and the number of engines that respond on first call. It's a big bite to digest all at once, considering that these standards have not changed in almost 50 years.

Having read the NFPA firefighter fatality and injury reports for 2003, I was horrified to see how many experienced firefighters are injured in accidents or by falling out of trucks. Considering the number of codes in place in the United States to prevent such occurrences, it seems a great waste of people dedicated to saving lives and preventing harm. Your standards and codes are so respected the world over it seems a pity they can't prevent tragic losses at home.

In closing, I look forward to bringing what I can to the section Executive Board to encourage members to develop the skills we need to protect our citizens.

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

Health Care

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

CHAIR'S CORNER
by DICK STRUB

I would like to take this opportunity to review some of the highlights of the NFPA Fall Education Conference, being held November 14 through 17 in Miami. Although the time is almost upon us, some of you may be able to make last-minute plans to attend, and those who are already planning to be there may decide which segments will be most interesting.

Nine preconference seminars on Friday and Saturday will cover fire alarm inspection, testing, and maintenance; emergency and standby power; NFPA 5000®, *Building Construction and Safety Code®*; the CFPS primer; NFPA 1, *Uniform Fire Code*; the new national preparedness standard for private-sector emergency management and business continuity programs; NIST's fire dynamics simulator; NFPA 25, *Sprinkler Systems Maintenance;* and electrical inspection for the fire-safety practitioner. Several of these presentations would be of interest to those in the health-care industry.

The section will sponsor several education sessions, including a discussion from 1:30 to 4:30 on Sunday afternoon of the codes and standards review process, led by Mike Daniel and Tom Bulow; a session on Monday afternoon on evacuating a health-care facility by Mike Crowley of Rolf Jensen & Associates; a section "town meeting" moderated by Tom Gardner of Schirmer Engineering from 10:15 to noon on Tuesday; and a case study from 3:45 to 5:30 p.m. on Tuesday of the incident command system, led by Lloyd Djuplechan of Kaiser Hospitals. In addition, Lee Newsome of Emergency Response Educators and Consultants, Inc. will present a session devoted to the hospital emergency incident command system.

At the section's combined executive board and business meeting, there will be a vote on the Nominating Committee's nominations for the Board of Directors:

Chair: Susan McLaughlin
First Vice-Chair: Thomas Gardner
Second Vice-Chair: Dean Menken
Secretary: Phillip Thomas
Director: Donald Bender
Director: Dale Woodin
Director: Max Hauth

This is NFPA's last Fall Education Conference. I look forward to seeing you in Miami.

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

Industrial Fire Protection

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

CHAIR'S CORNER
by Mike Snyder

As the holidays approach, we often take time to make resolutions and set goals for the new year. Here are a few ideas I hope you can use to set personal and professional fire-safety goals for 2005.

During Fire Prevention Week (FPW) 2004, we stressed the importance of working smoke alarms and home fire escape planning. Make a commitment to ensure these practices are alive and well in your own homes in 2005. Consider taking 20 minutes to share the message with a neighbor. And don't forget that a new smoke alarm is a great holiday gift, particularly when you install it properly!

In today's competitive environment, the public and employers demand that professionals show evidence of competency in their specialties. Third-party certification is an important credential to help you meet this need. NFPA offers several certification programs, including the Certified Fire Protection Specialist (CFPS) designation. For more information, visit www.nfpa.org/ProfessionalDev/CertificationPrograms/CertificationPrograms.asp.

Registration as a Professional Engineer is another avenue for certification.

If you have already completed these certifications, consider helping someone in your workplace begin or continue his or her professional development.

Host a safety meeting at work

Volunteer to lead one or more meetings that focus on a relevant fire safety topic at your workplace. Effective loss control in the industrial and commercial world begins with knowledgeable and trained employees, and your involvement will ensure that the right topics are selected and the proper information shared.

Welding, cutting, and other hot work fires are usually caused by poor preparation or failure to oversee the work area effectively after these activities are completed. Many practices to prevent hot work fires are published in NFPA 51B, *Fire Prevention During Welding, Cutting, and Other Hot*

Work. Take the time to get this standard and use it to ensure that systems to control the hot work hazards are implemented in your workplace.

Emergency planning for a facility usually relies heavily on the services of one or more local fire departments. In 2005, make sure your facility hosts appropriate facility tours and conducts emergency drills for the local fire department to ensure they understand the facility, its hazards, and its fire protection features.

Reduced municipal budgets often affect fire department training budgets, so you might consider hosting a training session for local firefighters at your facility. You may be surprised how far a bit of your time and a minor budgetary allocation will go towards providing a meaningful training session for your local fire departments.

Remember, the success of our fire-safety mission starts with the actions we take as individuals. Let's take the next step for industrial fire safety improvement in 2005. On behalf of the members of the IFPS, I wish you and your family a safe and joyous holiday season!

FPW Contest Reminder

The IFPS Board members know how many of you devote countless hours to developing and implementing fire safety programs for your facilities. We would welcome hearing from you about any Fire Prevention Week programs you may have undertaken this past month, for two reasons. First, you might win the 2004 Fire Prevention Week Contest award, and, more importantly, you will share your experiences with all the other NFPA members. Let us hear from you this year.

The contest application can be found on the IFPS page on the NFPA web site. The deadline for receipt of all entries is December 1, 2004.

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

International Fire Marshals Association

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

HOT ISSUES

Spring 2005 Regional Fire Code Development Committee Meetings

To encourage greater fire service participation in the NFPA codes- and standards-making system, NFPA and IFMA have established four regional fire code development committees. These committees, the members of which are from the fire service in each region, are responsible for developing proposals for changes to NFPA codes and standards, reviewing NFPA's *Report on Proposals* (ROP), developing comments on proposed changes, and acting as liaisons to their regional fire service on issues pertaining to NFPA codes and standards. These meetings cost nothing to attend, but attendees are responsible for all fees associated with their participation. For information, contact section Executive Secretary Steven Sawyer.

The fall regional fire code development committee meetings schedule is available at http://www.nfpa.org/Codes/RegionalFireCode/RegionalFireCode.asp.

IFMA Participates in Second Annual PARADE Conference

IFMA representatives attended the second annual PARADE Conference held from November 3 to 7 at the United States Fire Academy in Gaithersburg, Maryland. This conference provides educational offerings, as well as a forum in which to discuss issues with peers and an avenue to exchange information.

All U.S. state fire marshals, metro fire marshals, and 10 IFMA representatives, one from each FEMA region, attended. IFMA also has a co-chair in each region and a national co-chair. If you have any issues you would like them to look into, please let them know.

IFMA Annual Meeting to Be Held in Las Vegas in June

IFMA's annual meeting will move from November to June next year, as a result of NFPA's decision to suspend the Fall Education Conference. Please join us in Las Vegas, Nevada, from June 5 to 10, when we will hold the chapter presidents' meeting.

Stay tuned for more information.

Professional Development

The International Fire Marshals Association Fire Protection Institute *Principles of Fire Protection Engineering* course and the performance-based design course are being offered in conjunction with the SFPE's professional development weeks in 2005.

Anyone interested in attending a course or sponsoring a program may contact Section Executive Secretary Steven F. Sawyer at (617) 984-7423 or ssawyer@nfpa.org. Please visit www.nfpa.org/ifma for complete details.

And don't forget...

IFMA turns 100 in 2006. If you any have ideas how to celebrate the occasion, please contact the executive secretary.

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 Venezuela Chapter

In July, NFPA's proposed Venezuela Chapter presented its official petition for formation to NFPA. The petition is the culmination of two years' work, during which the group gathered the 30 members needed to form the chapter and constituted a nine-member board that has met regularly in different cities to encourage professionals to join NFPA.

The Venezuelan Chapter's goal is to become one of the biggest chapters in the region. Chapter members also intend to implement the *Mis Primeros Pasos* program, create a firefighter membership affiliation program with the help of fire safety equipment manufacturers and distributors, and develop training on codes and standards.

Section Board Meets in Colombia

The International Fire Protection Congress and Exposition, sponsored by NFPA and

organized by the Ibero-American Fire Protection Association (OPCI), took place in Bogotá, Colombia, from September 7 to 10. During the Congress, the section's Board of Directors met to discuss the creation of a fire-safety technical terms glossary and disseminating information on the region's fire-safety problems.

In his opening remarks, NFPA Board Chair George Ockuly told attendees of NFPA's interest in supporting fire protection in the region.

The congress attracted more than 200 industry professionals, who participated in 3 seminars and 27 speaker session presented by leading local and international experts. Attendees also had an opportunity to take NFPA's Certified Fire Protection Specialist primer.

Fifteenth FISP/FIRE Show

Sponsored by NFPA and organized by Grupo CIPA, the 15th International Fire and Security Show and the 6th International Fire Safety Conference took place in São Paolo, Brazil, from August 25 to 27. Gabriela Portillo Mazal, NFPA's global communications specialist, represented NFPA, and Marcelo Lima and Federico Cvetreznik represented the section. Lima, director of the Latin American Section, also spoke about UL and product certification, and Cvetreznik, a section member and instructor for NFPA's professional development seminars in Latin America, spoke about NFPA 101, *Life Safety Code®*, and performance-based design.

Our thanks to José Roberto Sevieri and Luis Carlos do Carmo of Grupo CIPA for inviting NFPA to participate.

NFPA in Brazil

NFPA Principal Gases Engineer Ted Lemoff presented a seminar on NFPA 58, *Liquefied Petroleum Gas Code*, to members of the Brazilian propane industry in São Paulo on September 16. About 150 people attended, including representatives of the government and fire departments from five Brazilian states. Lemoff also attended the tenth anniversary dinner of Projeto GLP, the organization of the Brazilian propane industry.

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

Session on Multiple-Fatality Motel Fire

On November 16, the section sponsored a speaker session at the NFPA Fall Educational Conference in Miami to address lessons learned from the January 2004 fire at a Greenville, South Carolina, Comfort Inn in which six people died. Speakers included NFPA's Senior Fire Investigator Bob Duval, section Executive Committee Chair Richard Anderson, Vice-Chair Jeff Shearman, Secretary Byron Briese, and Director Emeritus Ray Ellis.

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: Rebecca Denlinger, Cobb County Fire and Emergency Services

HOT ISSUES

Executive Board Business Meeting

At the section Executive Board meeting on August 14, Chair Becky Denlinger noted that she will represent the section at the IAFC's 2004 Strategic Planning and Leadership Forum on October 15 and 16, and that Bill McCammon and Russ Sanders will represent Cal Chiefs and NFPA, respectively.

Denlinger will also represent the section at the September Chief Fire Officers Association conference in Birmingham, England, and she has been nominated to serve on the National Infrastructure Advisory Council, the majority of whose members are private-sector CEOs.

Denlinger approved the minutes of the last meeting and introduced Ed Linsenmeyer, chair of the Federal Laboratory Consortium; Robert Saba of the Fire Fighting Task Force; and Walter Egger, CTIF secretary general and interim president. Egger is working with the CTIF Executive Board on a partnership between the Metro Chiefs Section and CTIF.

Denlinger also reviewed a National

Association of State Fire Marshals project for improving the NFIRS system in which Denlinger will participate.

At Vector Command's invitation, Denlinger asked Chief David Daniels to represent the section at the Toronto/Vector Command Symposium. She also reported that section member Chief Bob Hendricks will represent the section on the National Safe Place Advisory Board.

The DHS/USFA/Critical Infrastructure Protection (CIP) project is now underway, and all section members in the United States should receive email notices about it. Anyone who does not should contact Russ Sanders.

Following Denlinger, Vice-Chair Kelvin Cochran reported that results of the 2005 Conference Program survey will be used to develop the final program. Leadership was a common theme, as were wellness and fitness, and homeland security.

Treasurer Bobby Ojeda followed Cochran with the Treasurer's Report, noting that, as of July 1, the section's budget balance was $128,813. Anyone who wishes to see the complete report can contact Ojeda, who also gave an update on programs and activities planned for the 2005 Metro conference.

Following the Treasurer's Report was the Board Member's Report, given by Otis Latin. Latin advised that the section's History Book Project has been tabled until a sponsor can be found.

Reporting on NFPA and IAFC Board activities, Luther Fincher, the IAFC/NFPA Board representative, told section members that he attended the NFPA Board meeting on June 14 and 15, where he was appointed to the Board Executive Committee. He also noted that the IAFC Board met on August 10 and 11 in New Orleans, where Jim Harmes won the IAFC second vice-president seat.

Fincher also attended the Wellness/Fitness Meeting in Austin, Texas, on June 8 to 11. He explained that incumbent testing remains a sensitive issue.

Finally, Fincher reported that several resolutions will be presented at the IAFC business session, which at least 53 IAFC members must attend to establish a quorum. Denlinger asked if absentee ballots had been discussed, and Fincher replied they had not.

Immediate Past Chair Wes Shoemaker will chair a meeting of the Metro Executive Board and key Metro conference sponsors to refine the section's sponsor guidelines and will report on the meeting at the 2005 conference.

The next Metro business meeting will be held at the NFPA Fall Education Conference in Miami on November 14 from 9 a.m. to noon. This will be the last NFPA Fall Education Conference.

Following these reports, Denlinger introduced Robert Saba, who updated attendees on the Fire Fighting Task Force, and Ed Linsenmeyer, who discussed the Federal Laboratory Consortium/Metro Memorandum of Understanding.

She then introduced David Daniels, who discussed the IAFC Health and Safety Committee, which wants to become an IAFC section. The IAFC Board supports this initiative, and Daniels asked IAFC members to sign a petition for presentation to the IAFC. Daniels also called on the section to endorse the formation of an IAFC Safety Section. A copy of this resolution is on the section Web site.

Following Daniels, Bill Bamattre reported that a Congressional proposal to reduce annual USAR grants would jeopardize the program and asked Metro chiefs to send letters to the chairs of appropriate Congressional committees and the Department of Homeland Security in support of the current level of funding. Chief Bamattre then reminded the members about the current Metro/NIMS project, stressing that such projects would not function without federal funding.

Following Bamattre, Chief Leo Stapleton introduced incoming IAFC President Bob Dipoli, and Chief David Washington updated attendees on plans for the section's 2006 conference, tentatively scheduled for April or June.

Moving on to new business, Luther Fincher said he supported Steve Westermann for IAFC second vice-president in 2005. Smokey Dyer moved to endorse Westermann for the position, and approval was unanimous.

Gary Warren reported that there were 13 or 16 fire deaths in Austin, Texas, in 2002—the circumstances of three deaths are in question—and that a marketing firm helped the fire department develop materials

emphasizing the importance of working smoke detectors. Since then, Austin has gone an entire year without a fire death.

Following Warren, David Washington discussed a Las Vegas public education initiative called "Heat Kills." If anyone wants information about this program, please contact Chief Washington.

Jack McElfish ended the new business portion of the meeting by reporting that EMS agencies are trying to obtain Fire Act Grant money. The IAFC's position is that only fire service agencies should receive these grants.

In closing, Denlinger introduced David Paulison, administrator of the United States Fire Administration, who called on Metro chiefs to support the USFA's efforts to address the rate of firefighter deaths.

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

Rail Transportation Systems

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

Work on Next Edition of NFPA 130

The NFPA 130 Technical Committee has held two meetings and numerous task groups have met to address potential changes to the 2006 edition of NFPA 130, *Fixed Guideway Transit and Passenger Rail Systems*. Items include completion of metric conversions to more accurately account for proper measurement, clarification and coordination of requirements for egress in trainways and stations, and the possible addition of explanatory language to the requirement for coordinating ventilation systems and traction power blocks in tunnels.

The committee is also reviewing the vehicle requirements that underwent a substantial change in the 2003 edition and considering harmonizing NFPA 130 with the goals of the Federal Railroad Administration. The requirement for station egress is also being reviewed.

The closing date for public comments is November 29.

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

Research

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

HOT ISSUES

Research Application Symposium

The Fire Protection Research Foundation will hold the Ninth Fire Suppression and Detection Research Application Symposium in Orlando, Florida, from January 26 to 28, 2005. Hear cutting-edge technical papers on research projects and testing, case studies, new strategies, technologies, and systems. For more

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

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

Wildland Fire Management

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

HOT ISSUES

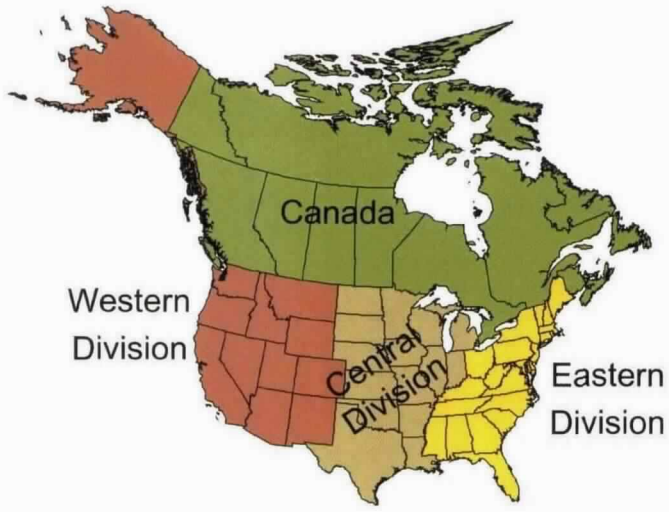
Regional Representation Boundaries

Recently, the Wildland Fire Management Section Executive Board re-drafted and affirmed its regional divisions. Every two years, section members elect four regional representatives to the Board. Currently, the eastern director is Gary Wood of the North Carolina Division of Forest Resources; the central director is Jerome Harvey of the Lead, Colorado, Fire Department; the western director is Bill Mills of the City of Colorado Springs Fire Prevention Division; and the director for Canada is Tom Johnston of the Canadian Interagency Forest Fire Centre in Manitoba.

In the past, there has been some confusion as to which states these officers represent. To help clear up any doubts, the Board adopted the map below.

In addition to the regional representatives, the Board consists of Director-at-Large Mike Long of the Florida Division of Forestry, Secretary Nancy Porter of the USDA Forest Service, First Vice-Chair Lewis Blair of Cullman Electric Motor, Second Vice-Chair James Langhorne of the Montecito Fire District, and Chair Billy Terry of the USDA Forest Service.

If you'd like more information about section activities or want to suggest ways the section can better meet your needs, contact your regional representative.



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

Fire Alarm Test Equipment

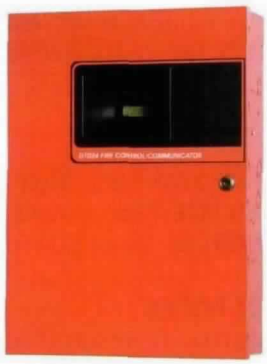
HSI Fire & Security Group, a new division of Home Safeguard Industries, introduces VersaTools™ includes the VersaTest™ aerosol dispenser for functional testing smoke and CO detectors and the VersaPole™ telescoping fiberglass test pole with 20' extendable reach. Optional 4' extensions are available. HSI has expanded its Smoke Detector Tester™. Visit www.homesafeguard.com.

HSI Fire & Security Group
Circle Reader Service Card No. 101

Control Panel

The D7024 addressable fire alarm control panel is a high-performance, low-cost solution for conventional and addressable applications. The panel features a built-in text display, a robust power supply, built-in Digital Alarm Communicator Transmitter (DACT), a synchronization signal for notification appliance circuits, and up to 255 points. The D7024 also offers easy remote programming and contaminated detector reporting.

Bosch
Circle Reader Service Card No. 105



Voice Evacuation Panel

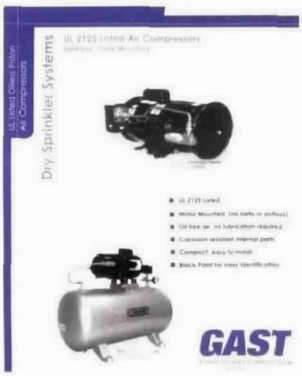
The Audio Command Center (ACC-25/50ZS) Emergency Voice Evacuation Panel zone splitter can split up to 50 watts of audio power into up to eight zones. The ACC-25/50ZS allows the user to record five field-programmable messages (up to 60 seconds total) with an integral commercial grade microphone or from an external audio source.

Fire-Lite Alarms
Circle Reader Service Card No. 102

Air Compressors

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

Gast Manufacturing
Circle Reader Service Card No. 106



Fire-Resistant Downlight

Now there is a better solution to costly and ineffective field-fabricated enclosures for fire-rated recessed downlighting applications. Prescolite's FireTight is a simpler, less expensive alternative that is patented, tested, and UL approved for most one-hour and two-hour fire rated ceiling assemblies. Call (888)-PRS-4TEC or visit www.prescolite.com for details.

Prescolite
Circle Reader Service Card No. 103

A & E Partnership

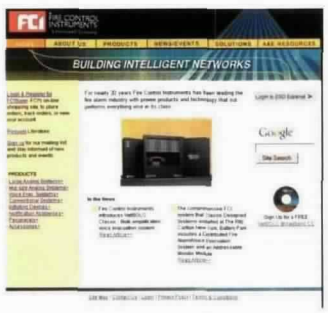
SimplexGrinnell announces the formation of a national team of fire and life-safety systems professionals focused on supporting the architectural and engineering community with design and specification services. The SimplexGrinnell A&E Partnership is an initiative that reflects a strong corporate-level commitment to meeting the needs of architects and engineers. For more information, visit www.simplexgrinnell/AEpartnership

SimplexGrinnell
Circle Reader Service Card No. 107

Life Safety Systems

Fire Control Instruments (FCI), a part of Honeywell's Fire Group, is a performance and technology leader in the life safety systems industry for commercial, industrial, and educational applications worldwide. FCI announces the launch of its newly designed Web site, www.firecontrolinstruments.com. FCI's comprehensive Web site provides users with an in-depth view of the company and its products, as well as a link to a thorough resource guide for the engineering community.

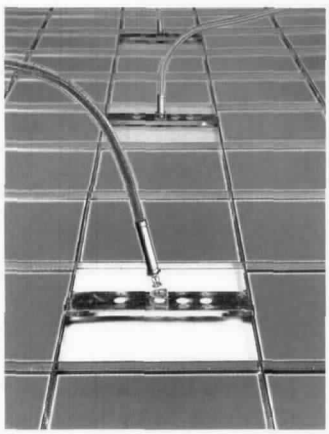
FCI
Circle Reader Service Card No. 104



Flexible Sprinkler Connections

FlexHead-pioneers of flexible fire sprinkler connections, now offer the same state-of-the-art technology that they invented for the semiconductor industry, to the commercial marketplace. 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



Locking Cap

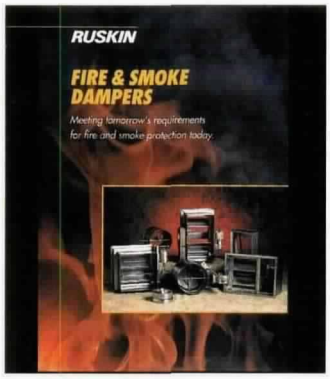
As communities improve Homeland Security, the vulnerability of automatic sprinkler systems and the potential compromise of fire department connections (FDC's) merit attention. Unprotected FDC openings invite miscellaneous foreign objects. Caps are available in male plugs and large diameter Storz. They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

Knox Company
Circle Reader Service Card No. 109

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



Fire Safe Valve Actuator

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

Essex Fluid Controls
Circle Reader Service Card No. 110

Waterless Fire Suppression

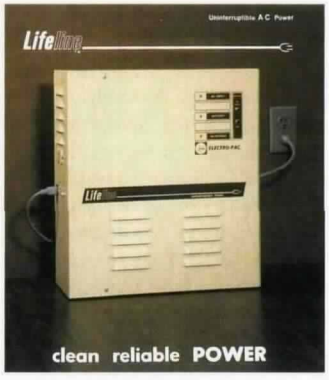
The new Kidde ENVIRO™ 1230 Fire Protection System fast, effective fire protection for sensitive facilities. Plus an agent – 3M™ Novec™ 1230 Fire Protection Fluid – that's safe for people and the environment. Zero ODP, the lowest GWP of all halon alternatives and the greatest margin of safety for protecting occupied facilities. (800) 872-6527, ext. 2606.

Kidde Fire Systems
Circle Reader Service Card No. 114

Uninterruptible Power

Fire Alarm Power Supply Unit suitable for providing uninterruptible power and fire protective signaling service to NFPA 72 systems. UL Standard UL1481 and UTRZ. UPS power rating 600VA. External batteries on a rack provide 4 hours back-up time-300W load. Two hours back-up time-600W load.

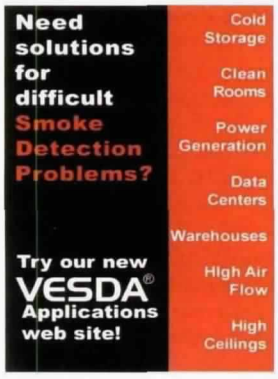
Instrumentation & Control Systems, Inc.
Circle Reader Service Card No. 111



Product Information

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

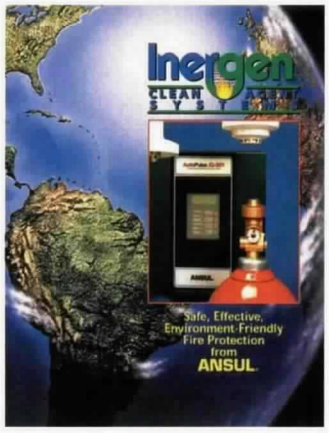
Vision Fire and Security
Circle Reader Service Card No. 115



Clean Agent Systems

INERGEN® systems protect normally occupied areas containing sensitive electronic equipment, irreplaceable documents, and other valuable artifacts and assets. An inert gas mixture, INERGEN agent requires no cleanup, contains no chemicals, is non-toxic and non-conductive, and will not produce corrosive decomposition products. It's approved by UL, FM, ULC, and many other laboratories. (800) 346-3626, www.ansul.com.

Ansul
Circle Reader Service Card No. 112



Fire Pump Test and Flow Test Equipment

The new, FM-approved Hose Monster® neutralizes the tremendous thrust created by flowing water. UL-certified and FM-approved nozzle inserts are easily installed and removed to accommodate flow rates from 118 GPM to 1460 GPM per hose. The built-in pitot system eliminates the need for the hand-held pitot. For information, visit www.hosemonster.com, send an email to service@flowtest.com, or call (888) 202-9987.

Hydro-Flow
Circle Reader Service Card No. 116

Fire Alarm Panels

Faraday of Florham Park, N.J. has introduced two intelligent fire alarm panels for small to medium-sized installations. Developed to meet customer requirements for schools, healthcare facilities, strip malls, motels, office buildings, and manufacturing facilities, Faraday's new MPC-6000 and MPC-7000 intelligent fire alarm panels offer large-system capabilities at small-system cost. For more information, visit www.faradayalarmsystems.com.

Faraday

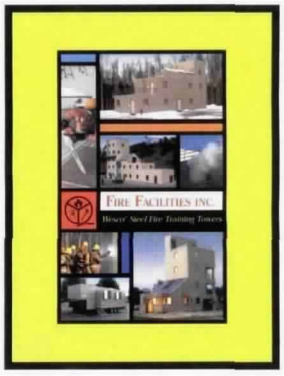
Circle Reader Service Card No. 117

Fire Training Towers

Fire Facilities Inc. markets a full line of pre-engineered and custom designed steel fire training towers. The towers are manufactured in several standard sizes and styles, from mobile to multi-story. Training tower burn rooms are lined with the Westec™ Insulation System to give safe, hands-on firefighting experience under controlled conditions. Call (800) 929-3726 or visit www.firefacilities.com.

Fire Facilities Inc.

Circle Reader Service Card No. 121



Fire System Manager

The IFP-Net Fire System Manager is used to monitor up to 16 IFP-1000 control panels with accessories. Running on a standard PC and Microsoft® Windows® 2000, the IFP-Net has an easy-to-use and attractive graphic user interface. It adapts to a wide variety of monitoring situations and supports multiple operators.

Silent Knight

Circle Reader Service Card No. 118

Smoke and Heat Detectors

The F220 Series Smoke and Heat Detectors from Bosch offer greater reliability in all types of environments. The series features automatic chamber compensation, a dual-color LED, CleanMe® and Chamber Check®, and ChamberMaid™ easy cleaning. Leading the series is the F220-PTHC, a photoelectric smoke detector that uses both heat and carbon monoxide elements, which virtually eliminate unwanted alarms.

Bosch

Circle Reader Service Card No. 122

Control Panel

For over 130 years, Edwards Systems Technology (EST) has been leading the industry in engineering the most comprehensive life-safety solutions for fire, security, emergency evacuation, access control, and CCTV applications. Industry professionals know that whether they need a fully integrated networked system or a simple standalone panel, EST is the right choice for any project. For more information, visit www.est.net.

Edwards Systems Technology

Circle Reader Service Card No. 119

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

Horns/Strobes

System Sensor's SpectrAlert® series now offer selectable output wall-mount horns, strobes and horns/strobes. They provide average current draws that are lower than conventional fixed-candela products. All models incorporate a new patent-pending voltage booster design that has a more consistent flash bulb voltage over the range of candela selections. It features installation-friendly options such as 2- and 4-wire operation; ability to standardize size back boxes with no encroachment into the box; and universal mounting QuickClick™ feature that eliminates mounting screws.

System Sensor

Circle Reader Service Card No. 120

UL864 Recognized Computers

Comark manufactures UL864-recognized computers and displays. We provide con-figuration control, UL864 file submission, and maintenance. Using Intel PIII or P4 CPUs, all systems are tested and burned-in to ensure reliable operation. We have your fire alarm, access control, and building automation solutions. Call (800) 280-8522, x 105 or visit www.comarkcorp.com.

Comark

Circle Reader Service Card No. 124

Clean Extinguishing Agent

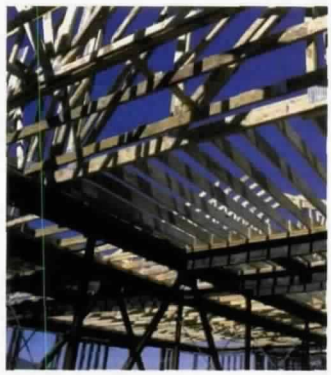
HALOTRON® I, a clean fire extinguishing agent that leaves no powder residue and replaces Halon 1211, is available worldwide for fire extinguishers; aircraft rescue and firefighting vehicles; limited flooding applications; portables and wheeled units. Also EPA SNAP list for commercial/industrial, maritime, and military use. FAA-approved for use on-board commercial aircraft. Visit www.halotron-inc.com.

American Pacific Corporation
Circle Reader Service Card No. 125

Fire Retardants

Hoover Treated Wood Products, Inc. offers lumber and plywood treated with either Pyro-Guard® interior or Exterior Fire-X® outdoor fire retardant. Both products are pressure impregnated and kiln dried under third party monitoring, and bear the Underwriters Laboratories classification mark. For more information, please visit us at www.frtw.com.

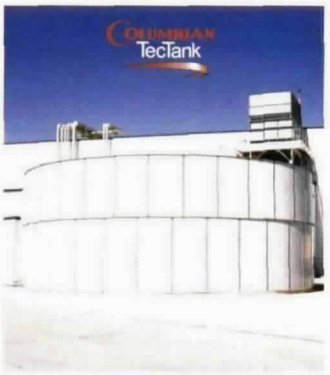
Hoover Treated Wood Products
Circle Reader Service Card No. 129



Water Tanks

Tanks from Columbian TecTank are designed to conform to NFPA 22 and Factory Mutual requirements. Our Trico Bond EP® is a next generation modified epoxy powder coating that combines exceptional physical properties with outstanding chemical resistance. For more information, visit www.cstindustries.com.

Columbian TecTank
Circle Reader Service Card No. 126



Fire Protection System

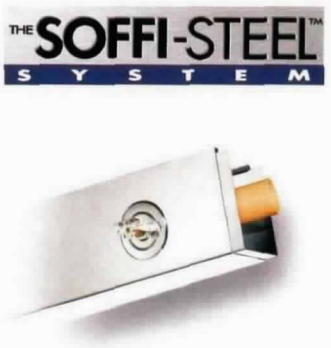
New video CD from Great Lakes Chemical Corporation shows how an FM-200® waterless fire protection system protects critical assets from fire and water damage. See how long it takes a sprinkler system to activate. See an FM-200 system detect and eliminate fire within seconds. Call (877) 686-7888 or visit www.fm-200.com to request a free copy.

Great Lakes Chemical Corporation
Circle Reader Service Card No. 130

Pipe Concealment System

The Soffi-Steel™ System is today's premier modular steel pipe concealment system, custom designed to provide a durable, maintenance-free facing that's attractive and quickly installed. It can be used to conceal fire sprinkler, plumbing, HVAC, and hydronic piping. The Soffi-Steel™ System is available in various finishes and sizes. Call Grice Engineering at (800) 800-3213 or visit www.soffisteel.com.

Grice Engineering
Circle Reader Service Card No. 127



Alarm Cover

The Stopper® II helps stop false fire alarms without restricting legitimate alarms. Cover mounts directly to the wall over an existing pull station. When the cover is lifted, a self-contained alarm sounds drawing attention to the area. The device is UL and UL listed and FM approved.

Safety Technology
Circle Reader Service Card No. 131

Fire Detector

New multi-criteria fire detector, Acclimate™, calculates inputs from two sensor technologies (Photoelectric or Thermal), and equates these signals into pre-determined responses to identify fire scenarios in the quickest manner. Acclimate automatically adjusts to the local environment and sets the detector's operating parameters based on historical data for each installation. Additional software minimizes the effects of unwanted transient alarm sources by monitoring both the current environment and trends in signal, e.g., increasing heat or decreasing photo-signal.

System Sensor
Circle Reader Service Card No. 128

Fire Detector

Siemens Building Technologies Inc., Fire Safety Division has added a range of audio capabilities integrated with its recently introduced FireFinder™ intelligent fire detector system. Now available is a high quality integrated audio system with a wide frequency range. Its 8-channel digital voice amplifiers operate in the 200 Hz to 12 KHz ranges. This means you have the needed frequency response to listen to and enjoy background music. For more information, visit www.sbt.siemens.com.

Siemens
Circle Reader Service Card No. 132

company connections

Fire Equipment Inspections

FireProof XT records equipment inventory and inspections performed on all types of fire and life safety equipment including fire extinguishers, sprinkler systems, eye wash stations, SCBAs and more. Inspectors use software and hand-held computers to electronically document inspections, maintenance, equipment inventory, and equipment movement. Eliminates log sheets and helps prove compliance.

TISCOR

Circle Reader Service Card No. 133

Fire Code Inspections

Inspection Manager FLX combines powerful software with hand-held computers to completely automate annual fire code inspections. Inspectors use software and hand-held computers to electronically document violations, eliminating handwritten forms and time-consuming data entry. The system quickly and easily documents all inspection activities, increasing productivity and accuracy in the field.

TISCOR

Circle Reader Service Card No. 137

Control Panel

The SRP-4x4 is a UL-listed, FM-approved control panel for small detection and extinguishing applications. Field selectable inputs/outputs, standard Class A or B detection circuits, and available Protectowire Alarm Point Location Meter, are just a few of the panel's many features. Easily configured for releasing or detection only applications, the panel is compatible with a wide range of initiating devices including smoke detectors. Visit www.protectowire.com.

The Protectowire Company

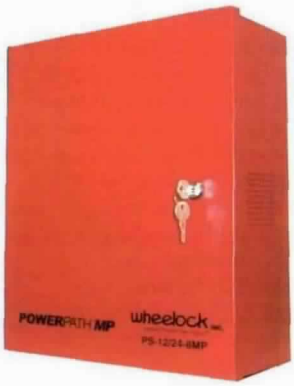
Circle Reader Service Card No. 134

Power Supply/Charger

POWERPATH MP Series PS-12/24-8MP is a power limited 8-ampere power supply/charger used to expand the supervised power capability of a Fire Alarm Control Panel for Notification Appliance Circuits as well as providing 3.5A of auxiliary power to support door holder system accessories. During an alarm, the door holder power is released and directed to the NAC Circuits. For more information, visit www.wheelockinc.com.

Wheelock, Inc.

Circle Reader Services Card No. 138



Clean Agent Retention

The system shown tests tall buildings for smoke movement and smaller systems test for Clean Agent Enclosure Integrity in compliance with NFPA and ISO. Door-fans will show how agents such as FM200 and INERGEN will be lost and how smoke can damage delicate equipment and create life safety hazards. Demo software at www.retrotec.com.

Retrotec

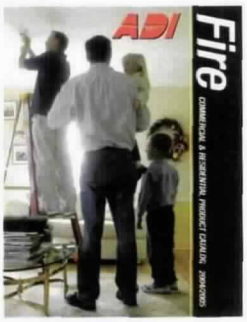
Circle Reader Service Card No. 135

Products Catalog

The ADI Fire Products Catalog is an informative reference tool containing 88 pages of product information, comparison charts, application guides and more. See the latest in control panels, power supplies, smokes, Voice Evac, speakers, strobes, pull stations and cabling. Call 1-800-233-6261 for your nearest ADI location.

ADI Fire Products

Circle Reader Service Card No. 139



Level & Content Tester

An Ultrasonic Liquid Level tester for Fixed Fire Extinguisher Systems is available from Link Instruments Ltd. The ULLC2001 Ultrasonic Liquid Level Comparitor is UL-listed, supplied with precision-made transducers, and uses micro-pic technology components. Each unit is programmed with the customers name in its display. Levels on CO2, Halon, FM200 and other equivalents are easily compared and located. For information, visit www.linkinst.com .

Link Instruments

Circle Reader Services Card No. 136

Alarm Fixtures

Protect your fire alarm strobes and horns with Concealite's Conceal-Alarm, because what vandals see they can't hurt. Conceal-Alarm fixtures allow fire notification devices to be stored behind a metal door in the wall or ceiling, only becoming visible when the device is activated. Conceal-Alarm fixtures are available with a custom finish to match your wall or ceiling and can be easily installed in any type of wall or ceiling. For more information and a specification sheet on Conceal-Alarm, visit www.concealite.com.

Concealite

Circle Reader Service Card No. 140

CONTINUED FROM PAGE 10
or any other safety codes. There are several excellent safety messages that can be delivered to the public to protect them from incidents like the one that blinded Ms. Miller. Your staff, however, chose to link Ms. Miller's accident wrongly with the message that NFPA has had the most difficulty championing through the media. Shame on NFPA's editorial review process for not stopping this gross misrepresentation of facts.

The American Pyrotechnics Association urges the NFPA to promptly correct this gross error by printing this letter in full in the next edition of the NFPA Journal, or by writing an article that correctly reports the facts about Ms. Miller's accident. Either action will go a long way toward correcting NFPA's misstatements and set the record straight that the device was not a consumer firework.

In the future, I would be happy to serve as a resource to you and your staff regarding the proper classification/characterization of fireworks devices so that the NFPA does not make another gross error that would further damage the legitimate fireworks industry.

JULIE L. HECKMAN
Executive Director
American Pyrotechnics Association
Bethesda, Maryland

NFPA Responds

The intent of the article was to focus on the expanding fireworks coalition, spearheaded by NFPA, and on the second coalition press conference that took place in July to call attention to the problems associated with these devices. Representatives of the fire service and the medical community are deeply disturbed by the destruction caused by these devices, both legal and illegal.

While most of the story deals directly with the injuries and fires consumer fireworks cause, we also told the story of the young woman who was severely injured by the 9-inch (23-centimeter) mortar. In it, we failed to point out that the firework that injured her does not meet the Consumer Product Safety Commission (CPSC) definition of consumer fireworks. However, the real issue here is not the type of firework used, but its use by an amateur. If the individual who caused her injury had followed NFPA's advice to leave fireworks use to professionals, this tragedy wouldn't have happened.

We appreciate how difficult it has become to prevent consumers from acquiring display fireworks for their personal use, and we know the general public does not always delineate between the two until something goes terribly wrong. Nevertheless, CPSC numbers show that eight out of nine, or 88.4 percent, of emergency room injuries involve fireworks that federal regulations permit consumers to use. Only a tiny percentage of injuries involve the Class C type fireworks. That's a very serious concern for NFPA and for our fireworks coalition partners.

NFPA remains bothered that these legal devices maim and hurt individuals, sometimes killing them, and cause a significant number of fires every year. The risk of fire death relative to exposure shows fireworks as the most risky consumer product for sale in the United States. It would be difficult to name another legal consumer product that results in so many injuries, given the small period of time that fireworks are usually used.

Often, stories in NFPA Journal reflect our stand on a given topic. While we do not feel we distorted the facts, as you suggest, we could have been clearer in this case, and we thank you for pointing this out.

Our organizational positions on this issue are different. Yet NFPA's codes- and standards-development process, of which you are part, allows such differences to be aired and debated so that the standards produced have the value provided only by consensus. You have helped us shape some of our standards, and we look forward to continue working with you on these efforts.

'NOT THE CASE'

Your statistical summary of firefighter fatalities in 2003 (July/August 2004 issue) discussing the van crash in which eight of our firefighters were killed, states, "Alcohol was a factor in the crash."

This was not the case. We have a letter from the Malheur County District Attorney (Daniel O. Norris), which call into questioning of the alcohol testing on the victims, stating that it "would be inappropriate " to say that alcohol contributed to the incident.

The memory of these brave young firefighters will be better served if this is made clear.

MICHAEL C. TIGHE
Project Manager
First Strike Environmental
Roseburg, Oregon

NFPA Responds

The details published in the article were based on the information we had received to that point.

Subsequent testing determined that the alcohol level of the driver was below the legal limit; questions were raised as to the reliability of the postmortem blood testing; and charges against the company were dropped.

Since the crash, the company has taken steps to reduce the risk of fatigue as a factor in these crashes by sending drivers to pick up crews who have operated on wildland fires for extended periods of time. The company also announced it is working to change alcohol and drug policies within the industry.

RITA F. FAHY,
Manager, NFPA Fire Data Bases

Errata

Our "Code Adoptions" item in the September/October issue mentioned the NFPA 1 adoption. Tennessee also adopted NFPA 101, 2003 edition.

CONTINUED FROM PAGE 22

Ultimately, the hope is to provide the AHJ with a seamless transition among the various NFPA codes and standards.

How will it treat animal housing facilities?

NFPA 150 will have three sections. The first contains administrative requirements. The second provides requirements for buildings housing animals, and the third includes requirements depending upon type of facility and if the public can access the building.

What's the timeline the next edition?

NFPA 150 is in the 2006 cycle. The public proposal closing date is November 29, with the ROP meeting scheduled for February 2 to 4, 2005.

TIM HAWTHORNE is the chair of the Animal Housing Facilities TC.
BONNIE MANLEY is the NFPA Staff Liaison to Animal Housing Facilities TC.

CONTINUED FROM PAGE 23

NFPA 111, *Stored Electrical Energy Emergency and Standby Power Systems*

NFPA 1991, *Vapor-Protective Ensembles for Hazardous Materials Emergencies;* NFPA 1992, *Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies;*

NFPA 1977, *Protective Clothing and Equipment for Wildland Fire Fighting;*

NFPA 1936, *Powered Rescue Tool Systems;*

NFPA 1561, *Emergency Services Incident Management System;* NFPA 1581, *Fire Department Infection Control Program;*

NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems;* NFPA 1410, *Training for Initial Emergency Scene Operations;*

NFPA 1452, *Guide for Training Fire Service Personnel to Conduct Dwelling Fire Safety Surveys;*

NFPA 11, *Low-, Medium-, and High-Expansion Foam Systems;* NFPA 11A, *Medium- and High-Expansion Foam Systems;*

NFPA 99, *Health Care Facilities;*

NFPA 99B, *Hypobaric Facilities;*

NFPA 50, *Bulk Oxygen Systems at Consumer Sites;* NFPA 50A, *Gaseous Hydrogen Systems at Consumer Sites;* NFPA 50B, *Liquefied Hydrogen Systems at Consumer Sites;* NFPA 55, *Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks;*

NFPA 600, *Industrial Fire Brigades;* NFPA 601, *Security Services in Fire Loss Prevention;*

NFPA 35, *Manufacture of Organic Coatings;*

NFPA 225, *Model Manufactured Home Installation Standard;* NFPA 501, *Manufactured Housing;* NFPA 501A, *Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities;*

NFPA 1003, *Airport Fire Fighter Professional Qualifications;*

NFPA 1035, *Professional Qualifications for Public Fire and Life Safety Educator;*

NFPA 1192, *Recreational Vehicles;* NFPA 1194, *Recreational Vehicle Parks and Campgrounds;*

NFPA 92B, *Guide for Smoke Management Systems in Malls, Atria, and Large Areas;*

NFPA 520, *Subterranean Spaces;*

NFPA 326, *Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair;*

NFPA 329, *Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases;*

NFPA 76, *Recommended Practice for the Fire Protection of Telecommunications Facilities,* and

NFPA 214, *Water-Cooling Towers.*

ERIK HOLDEN is a meetings specialist in NFPA's Professional Development Division.

ADINDEX

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☒ Has Not Changed During Preceding 12 Months
☐ Has Changed During Preceding 12 Months *(Publisher must submit explanation of change with this statement)*

PS Form **3526,** October 1999 *(See Instructions on Reverse)*

13. Publication Title: NFPA Journal	14. Issue Date for Circulation Data Below: November 2004	
15. *Extent and Nature of Circulation*	**Average No. Copies Each Issue During Preceding 12 Months**	**No. Copies of Single Issue Published Nearest to Filing Date**
a. Total Number of Copies *(Net press run)*	94,821	93,191
b. Paid and/or Requested Circulation (1) Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541. *(Include advertiser's proof and exchange copies)*	81,032	78,057
(2) Paid In-County Subscriptions Stated on Form 3541 *(Include advertiser's proof and exchange copies)*	0	0
(3) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	N/A	N/A
(4) Other Classes Mailed Through the USPS	0	0
c. Total Paid and/or Requested Circulation *(Sum of 15b. (1), (2),(3), and (4))* ▶	81,032	78,057
d. Free Distribution by Mail (Samples, complimentary, and other free) (1) Outside-County as Stated on Form 3541	7,013	7,051
(2) In-County as Stated on Form 3541	0	0
(3) Other Classes Mailed Through the USPS	0	0
e. Free Distribution Outside the Mail *(Carriers or other means)*	6,677	6,560
f. Total Free Distribution *(Sum of 15d. and 15e.)* ▶	12,688	13,611
g. Total Distribution *(Sum of 15c. and 15f)* ▶	93,720	91,668
h. Copies not Distributed	1,101	1,523
i. Total *(Sum of 15g. and h.)* ▶	94,821	93,191
j. Percent Paid and/or Requested Circulation *(15c. divided by 15g. times 100)*	86.2	85.2

16. Publication of Statement of Ownership
☒ Publication required. Will be printed in the Nov/Dec 2004 issue of this publication. ☐ Publication not required.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner — Date: 10/26/2004

I certify that all information furnished on this form is true and complete. I understand that anyone who furnishes false or misleading information on this form or who omits material or information requested on the form may be subject to criminal sanctions (including fines and imprisonment) and/or civil sanctions (including civil penalties).

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5. If the publication had Periodicals authorization as a general or requester publication, this Statement of Ownership, Management, and Circulation must be published; it must be printed in any issue in October or, if the publication is not published during October, the first issue printed after October.
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PS Form **3526,** October 1999 *(Reverse)*

LOOKINGBACK

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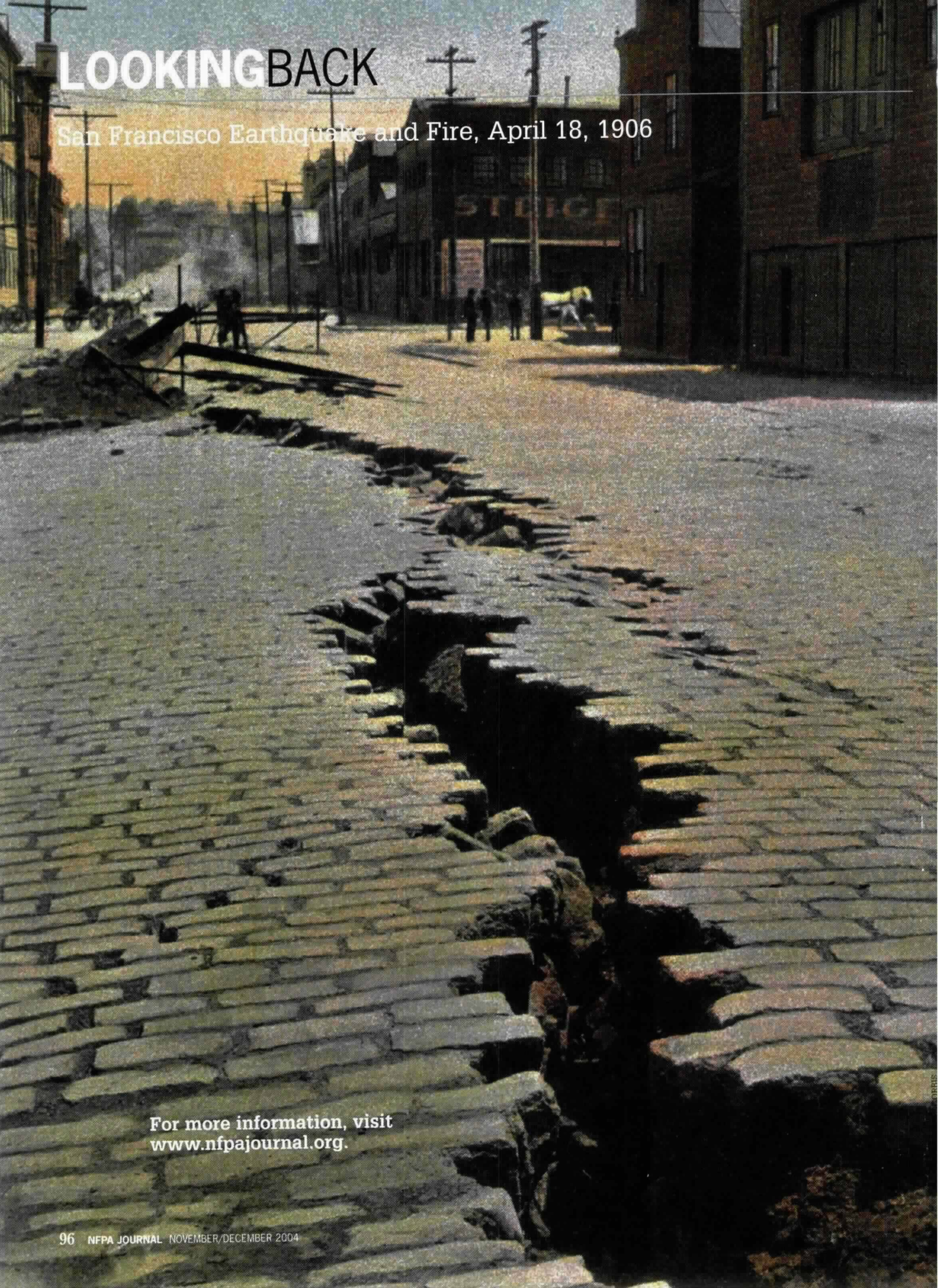

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