**Catastrophic Fire Prevention Task Force**
School Fires

## Executive Summary

Of the many catastrophic fire scenarios one might imagine, few are potentially as devastating as a severe fire in a school.

Today's school environment is in some ways safer and in other ways less safe than the setting posed by Our Lady of Angels school in December 1958, in which 90 children and 3 nuns died after being trapped by fire in their classrooms with no means of safe escape. Today's structures are unquestionably safer, yet the contents of today's classrooms are appreciably more combustible. The range of potential ignition sources in today's schools also is of far greater concern than when the Our Lady of Angels fire occurred. Sprinklers -- where they exist -- make today's schools safer from fire, but at the same time, exits may be restricted for security reasons, impeding escape if a fire were to occur. Even more alarming is that recent findings indicate that injuries per school fire are *higher* than those of *all* non-residential structure fires. Undoubtedly, the fact that more than 70% of school fires arise between 8am and 4pm, while students are attending class, explains in part the disturbing level of injuries associated with school fires.[1]

The purpose of this document is to describe the fire protection challenge facing today's schools, and make short- and long-term recommendations to improve the survivability of students, teachers, administrators and visitors; and to reduce the loss of school property.

## Introduction

According to estimates from the National Fire Incident Reporting System (NFIRS) (1996-1998) and the National Fire Protection Association's (NFPA's) annual survey, *Fire Loss in the United States*, an average of 5,500 structure fires occur in educational facilities[2] each year, resulting in approximately 125 injuries and $50.1 million in property

[1] National Fire Incident Reporting System (NFIRS) (1996-1998) data cited in the United States Fire Administration (USFA) Topical Research Series "School Fires," Vol. 2, Issue 9, October 2001.
[2] Educational facilities as defined by USFA include public, private, and parochial day schools.

damage.[3] Nearly half of these fires were identified as incendiary or suspicious.[4] This percentage has remained relatively constant over the past five years and is significantly greater than the percentage of incendiary or suspicious fires seen in non-residential structure fires overall, during the same time frame. The continued prevalence of incendiary or suspicious fires in school structures is a disturbing phenomenon. However, whether started on purpose or by accident, both statistical and anecdotal evidence suggests that fires in schools can spread far more rapidly than commonly imagined and that special attention should be given to reducing the fuel load in school structures.[5]

**Cases**

?? On January 22, 2002, a late night fire destroyed the administrative offices of Loudon High School in Loudon County, Virginia. The fire erupted in a wing not equipped with a sprinkler system. Fortunately, the brick construction of the building helped keep the fire contained to one area. However, there was extensive smoke and fire damage estimated at $350,000. The cause of the fire is still under investigation.[6]

?? In Montville, Connecticut, on December 23, 2001, fire broke out on the stage of the local high school's auditorium. Fueled by the stage curtain, the fire spread rapidly and resulted in close to $3 million in damage. The fire is still under investigation. However, preliminary findings indicate that an electrical short in the stage lighting fixtures may have been the cause. While there were no injuries, the fire did expose asbestos in the building.[7]

?? On December 18, 2001, Washington, DC, fire fighters, attempting to extinguish two intentionally set fires at Dunbar Senior High School, were restricted from entry by padlocked rear doors. Entry was delayed by a few minutes. Fortunately, there were no injuries. However, the locked doors did hinder the removal of smoke from the building, causing increased fire damage to the structure. The school was cited for code violations.[8]

?? In New Orleans, Louisiana, it is estimated that it will cost close to $2 million and take approximately four months to repair the damage caused by a three-alarm fire at Murray Henderson Elementary School on November 30, 2001. The fire erupted

[3] Of the 5,500 structural school fires that occur each year, 30% take place in elementary schools. NFIRS (1996-1998) data cited in the USFA Topical Research Series "School Fires," Vol. 2, Issue 9, October 2001.
[4] While intentional fire-setting is, indeed, a significant problem, data suggests that it may be more common among high school students. According to NFIRS data for school fires between 1996-1998, 42% of fires in elementary schools are arson fires as compared with fires in high schools, where nearly 70% are arson fires.
[5] The leading forms of materials first ignited in structural school fires are wood/paper (53%), rubbish/trash (19%), and plastic (16%). NFIRS (1996-1998) data cited in USFA Topical Research Series "School Fires," Vol. 2, Issue 9 October 2001.
[6] "Fire Damages Loudon High School," Rosalind S. Helderman, January 24, 2002, The Washington Post.
[7] "Montville High School fire damage estimated at 3 million," December 28, 2001; Associated Press. http://www.wfsb.com.
[8] "Locked Doors at Dunbar High Hinder Firefighters' Response;" Allan Lengel and Justin Blum; The Washington Post, December 19, 2001.

in the early morning, near a janitor's closet at the rear end of the school. Students were having breakfast in the cafeteria, located in the front of the building, when the fire broke out. All of the occupants of the school were able to escape without incident. The fire was fueled by cleaning materials and engulfed an eight-classroom wing of the building.[9]

?? On November 19, 2001, in Franklin, Tennessee, a faulty power cord ignited the back of a computer monitor in a classroom at Hunters Bend Elementary School. An alert school administrator immediately doused the fire with a portable extinguisher, yet the fire moved so fast from the monitor up an adjoining wall that $2,500 in property damage was sustained. An automatic sprinkler system directly above the fire was not designed to activate that fast.[10]

?? On October 30, 2001, in Clay Center, Kansas, a pre-dawn fire at Clay County Middle School resulted in over $35,000 in property damage. The fire originated in the art room on top of a computer desk. When firefighters arrived at the scene the computer printer was "consumed" by fire. The school was unoccupied and there were no injuries.[11]

?? Mitigating the disruption caused by fire was a concern for school administrators in New Orleans after a three-alarm blaze broke out in the cafeteria of Robert M. Lusher Elementary School, in October of 2001. School system officials arranged for students to attend camp-like study programs at nearby Tulane University while the building underwent repairs so students could continue to prepare for standardized tests including the Louisiana Educational Assessment Program (LEAP) exam.[12]

?? On August 19, 2001, an arson fire at Green Oaks Elementary School in Palo Alto, California, prompted State Senator Jack O'Connell to propose new legislation that would make fire sprinkler systems mandatory for all new educational facilities.[13]

?? In Hillsboro, Oregon, the fire and vandalism that occurred at Errol Hassel Elementary School on May 15, 2001, was taken extremely seriously by the local Sheriff's office. Although the fire caused only minor damage totaling approximately $20,000, two suspects were taken into custody and charged with Arson I and Criminal Mischief I. Bail was set at $250,000.00.[14]

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[9] "School Fire Repairs Prove Costly," http://www.theneworleanschannel.com.
[10] Bob Trotter, Fire Marshal, Franklin Fire Department; *Franklin Fire Department Fire Investigation Summary Report.*
[11] "Electrical Fire Causes $35,000 Damage at Middle School," http://www.ksffa.com; *Kansas State Fire Marshal Department Fire Investigation Summary Report.*
[12] "Firefighters Respond: School will be closed until November," The Times-Picayune (New Orleans), October 18 2001.
[13] "Reward offered in school arson," http://www.almanacnews.com/PAW/paonline/almanac/morgue/2001/2001_08_29.arson.html.
[14] http://www.co.washington.or.us/sheriff/media/elemarsn.htm.

?? On April 18, 2001, fire swept down a corridor full of art projects displayed on foam-core panels and then into ceiling spaces and a closet full of cleaning supplies at New Lane Elementary School in Brookhaven, Long Island, NY. The 1200 students and teachers inside the building escaped unharmed. Their extraordinarily well-organized exit undoubtedly saved many lives. However, several firefighters were injured during the incident and the school suffered extensive property damage. It was concluded that the degree and amount of fire damage to the structure of the building was the direct result of the large quantities of readily combustible artwork displays -- a direct violation of the state's fire safety codes.[15]

?? In Urbana, Illinois, an overloaded electrical outlet resulted in a fire that destroyed the southeast wing of the Thomas Paine Elementary School in April 2001.[16] A similar incident occurred in Indiana, when a power strip used to provide electricity to several pieces of electrical equipment (including a toaster, a computer monitor and a printer) malfunctioned, causing a fire to erupt in the middle of the night. While there were no injuries in either case, each of the buildings sustained extensive structural damage.[17]

?? In Reston, Virginia, it appears that damage from a fire at Dogwood Elementary School in November 2000 has extended beyond the $12 million estimate to the students' standardized test results. According to school officials, the disruption caused by the fire was the sole reason that Dogwood students performed poorly relative to previous years on the annual Virginia Standards of Learning Tests. The fire destroyed the building, forcing students to attend various schools across the county. The longer bus rides in some cases added as much as two hours onto the school day. Because of this, the administration canceled the after-school program designed to prepare students for the state test and as a result, the students' scores suffered.[18]

?? The rise in school fires does not appear to be a localized trend. Rather, fires are erupting in classrooms all over the world and many international school administrators are proposing offbeat solutions to the problem. After a fire was deliberately lit in South Australia at the Aberfoyle Park primary school on October 8, 2001, a tiny surveillance camera was installed. The camera was one of several being tested in public schools across South Australia to stop vandalism and arson attacks. According to the South Australian Primary Principals Association, technology that deters vandalism is welcomed by public schools, which are often constrained by tight budgets.[19]

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[15] "Combustible Displays and the New Lane Elementary School Fire," Investigation and Report, Town of Brookhaven Division of Fire Prevention, Joseph F. Sauerwein, Chief Fire Marshal.
[16] "Elementary School Students Return to School After Fire," Adam Jadhav, The Daily Illini, 4-10-01. Http:www.dailyillini.com.
[17] "From our Files: Firewatch," Kenneth J. Tremblay, NFPA Journal, November/December 2001.
[18] "Fire Damage at Dogwood Extends to Test Scores," Liz Seymor; The Washington Post October 25, 2001; *County of Fairfax Fire and Rescue Department Fire Suppression Report.*
[19] "Cameras watch over schools," Rebecca DiGirolamo, http://australianit.news.com.au/.

?? In September 2001, the Mountainview School in Otterburn Park, Montreal, Canada, was closed for a week after fire gutted the kitchen. Investigators believe the fire was caused by a short circuit in the stove.[20]

**Pieces of the Puzzle**

*Ignition Sources*

?? Intentional fire-setting. This category ranges from serious, criminal intent to pranks to sheer curiosity by young children. These fires often are set to elude detection and maximize damage.

?? Electrical. Much the same as any structure, electrical system faults can ignite fires at any time in concealed places such as between walls or at outlets and switches.

?? Heating. Heating-related fires appear to be a concern especially in poorly maintained furnace rooms. Electrical heating units in temporary classrooms also require some study.

?? Careless smoking. Because schools routinely ban smoking in facilities, these fires may exist in unsupervised places, i.e., rest rooms, or outdoors, i.e., sports fields.

?? Faulty equipment. Today, more and more classrooms are equipped with appliances and electrical equipment. Whereas it used to be the case that such items were confined to administrative offices and staff lounges, now it is more common for individual classrooms to contain such equipment. Therefore, it is not surprising that as the amount of the electrical equipment found in classrooms rises, the number of school fires involving faulty equipment will rise as well.

?? Specialized areas:

- Cooking. The trend away from deep-fat and other frying in school cafeteria kitchens has lessened the threat, but cooking fires remain a concern. Kitchens in classroom settings may pose a wider range of hazards.

- Science laboratories equipped with gas jets.

*Most significant fuels*

The nature and sheer volume of fuels in schools enhances the potential for the rapid spread of fire.

[20] "School fire extends vacation," The Gazette (Montreal), September 6, 2001.

?? In classrooms

- ✍ Fiberglass tiles that melt rather than burn have, for the most part, replaced cellulosic ceiling tiles. In either case, a range of combustible materials, e.g., cables, insulation, etc., may be exposed if a fire moves to the space above the tiles. If firestops between classrooms and hallways have been breached, flame spread may continue beyond the room of origin.

- ✍ Bulletin boards, maps and other items on walls.

- ✍ Upholstered furniture and small area rugs often found in lower elementary grades.

- ✍ Some computer equipment is easily ignited and highly combustible.

?? In specialized areas

- ✍ Cleaning supplies storage.

- ✍ Art classrooms contain paints, large quantities of paper and other easily combustible materials.

- ✍ Wood-shops and auto-shops contain building materials, paints and solvents.

- ✍ Chemistry classrooms contain chemicals that could be combustible or explosive, or give off hazardous fumes, if ignited.

*Fire protection*

Because no individual safety measure is reliable all of the time, fire protection must be redundant. Given the importance of fire protection in schools, all of the following approaches are important.

?? Education

- ✍ Generalized

- ✍ Arson prevention

?? Passive fire protection in the design of facilities, use of safety windows and fire doors, width of corridors, etc.

?? Management and Procurement of contents

- ✍ Identifying and removing furniture, appliances and IT equipment that may contribute to fuel load.

- ✍ Provide specifications for safer products found in school settings.

?? Exiting

- ✍ In newer schools, exit doors are sufficient to facilitate the rapid evacuation of students and adults. In older schools, the location and number of exits may be insufficient -- especially if the school population is greater than should be in the facility.

- ✍ Exiting from temporary classrooms. Many educational facilities have turned to temporary classrooms in order to satisfy demands resulting from high population growth. However, it can be extremely costly for schools to provide adequate fire protection roadway access and extend fire protection water supplies required by the state fire code. Many of the temporary classrooms are therefore not in compliance with minimum building and safety codes, including required exiting standards.

- ✍ All exits should be functioning and unobstructed. Fire code enforcement officials have encountered exits that are chained shut to protect students from inappropriate intruders. Also, metal detectors may obstruct some exits. Such conditions not only impede safe exit, but also can hinder firefighter/rescue efforts.

?? Alarms and Drills

?? Automatic Fire Sprinklers

- ✍ Automatic Fire Sprinklers can save lives and significantly reduce property loss. According to the International Fire Marshals Association's *Structure Fires in Educational Properties,* between 1994 and 1998 there was a 78.3% reduction in loss per fire when automatic suppression systems were present in educational property structures.[21]

[21] National Estimates based on NFIRS and NFPA Survey. Source: *Structure Fires in Educational Properties,* International Fire Marshals Association, Winter 2001.

**Task Force Recommendations**

***Recommendation 1:*** Work to ensure that every school in America is reliably protected by automatic fire sprinklers. Referral to Residential Fire Safety Institute.

Sprinklers unquestionably save lives and protect property. Many in the sprinkler industry have suggested that a "one size fits all" sprinkler standard ignores important variables such as the configuration of structures, ambient local air quality and water contamination. Standard hazard classifications were not devised with the unique contents of schools in mind.

NASFM should use its full influence to ensure that all schools and school housing units are fully sprinklered, no later than 2007. But this commitment must be contingent upon a scientific assessment of the fuel load present in typical school scenarios, and the establishment of standards that reflect those realities. This Task Force envisions a special working group convened by NASFM, the National Association of State Boards of Education, the Society of Fire Protection Engineers and members of the education facility subcommittee of NFPA's Life Safety Code.

***Recommendation 2:*** Provide all school districts with guidance on low-cost approaches to achieving the greatest possible immediate compliance with the Life Safety Code. Work with affected industries to achieve greatest savings.

?? Arc fault circuit interrupters: amend fire Life Safety Code to require that all branch circuits that supply 125 volts, single phase, 15 and 20 ampere outlets installed in elementary school classrooms shall be protected by an arc-fault circuit interrupter(s) listed for protection of the entire branch circuit.

?? Procurement policies: upholstered furniture that meets TB 117.

?? ITE and computerized games that meet UL 1950 and have outer housings that meet UL 94 V-0 ratings.

?? Proper storage of combustible liquids.

***Recommendation 3:*** Provide school administrators with information on appropriate referrals of juvenile fire-setters. Referral to Arson and Fire Investigation Committee.

***Recommendation 4:*** Better reporting of school fires. Referral to Fire Data Committee.