School Fires

Findings:

- Fatalities from school fires are rare.
- The three leading causes for school structure fires are incendiary or suspicious (32%), cooking (29%), and heating (9%).
- The leading area of fire origin for school structure fires is the lavatory.
- Kindergarten through high school fires increase at the beginning and end of the academic year. School fires peak in July due to a spike in elementary school fires.

Using the past 3 years of data, for 2003 to 2005, from the National Fire Incident Reporting System (NFIRS) database, the yearly national fire loss for fires on nonadult school properties[1] is estimated at $85 million. Such losses are the result of an estimated annual average of 14,700 fires that required a fire department response. Fires on school properties caused an average of approximately 100 injuries. No fatalities were reported to NFIRS during this period.[2,3] Forty percent of these school-related fires occurred outdoors on school property.[4] Trash fires accounted for 36% of these outside fires, and fires in open fields or woods accounted for an additional 19%. Forty-three percent of fires on school properties, an estimated 6,300 fires, were structure fires.[5] Slightly over half of these structure fires were confined to the object where the fire started, such as a small cooking fire (20%) or a fire confined to a trash can (28%). Six percent of fires on school properties were vehicle fires.

Making Schools Safe

Given the improved safety of school structures today, the likelihood of a fire, such as the one that burned the school of Our Lady of Angels in 1958, where 92 children and 3 nuns died[6] after being trapped with no means of escape, is reduced greatly. Most schools now have sprinkler systems and use safer construction materials. However, due to high-profile events, such as the 1999 Columbine High School shootings, the needs of school security sometimes conflict with the requirements of fire safety. For example, exits may be restricted for security reasons preventing escape should a fire occur.[7] As a result, fire safety experts have increasingly been asked to work in conjunction with security advisors to recommend security procedures that are consistent with the needs of fire safety. Such cooperation is necessary, especially since injuries per school fire are slightly higher than non-residential structure fires, as shown in Table 1.

Table 1. Loss Measures for School Structure Fires (3-year average, 2003–2005)

Loss Measure	All Non-residential Structure Fires	School Structure Fires
Loss per fire	$25,349	$14,948
Injuries per 1,000 fires	12.8	13.1
Deaths per 1,000 fires	0.9	0.0

Source: NFIRS 5.0 data only

Note: Loss per fire is computed for only those fires where loss information was provided.

When Fires Start on School Properties

Overall, the average peak month for fires on school properties was July; fire incidence was at its lowest between December and February, in the middle of the academic year (Figure 1). The July peak is driven by a sharp increase in fires at elementary schools as shown in Figure 2. It may be that elementary schools were more attractive targets for incendiary or suspicious fires during the summer when

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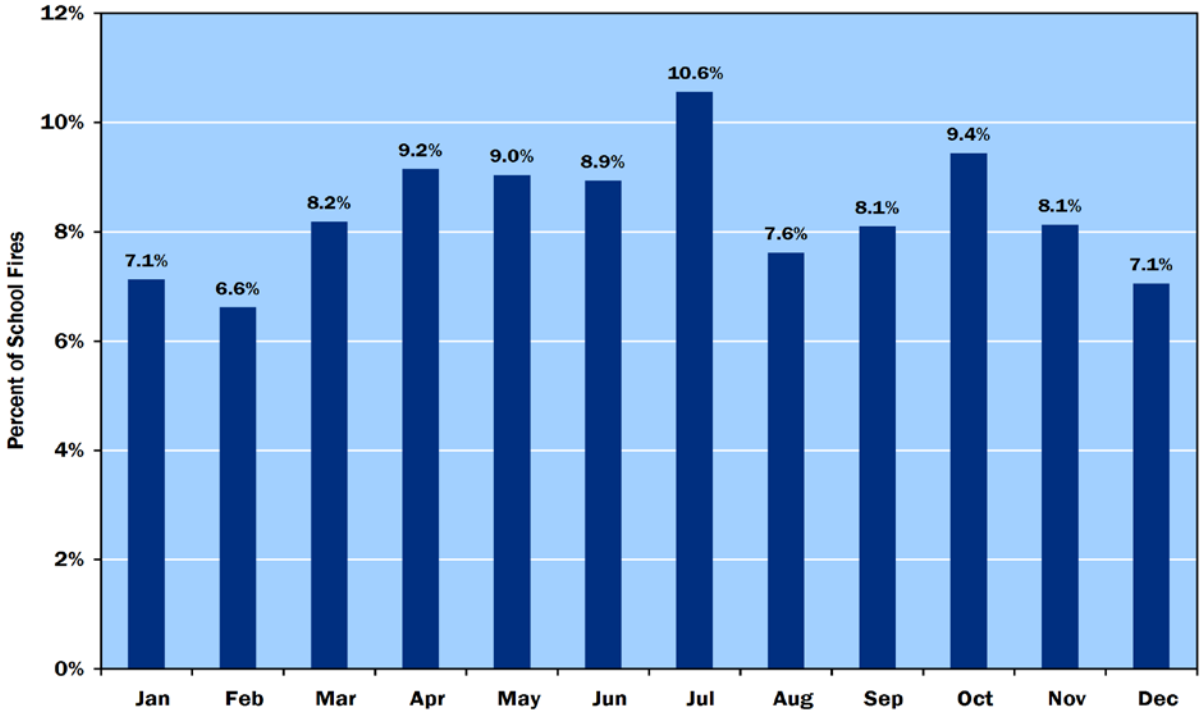
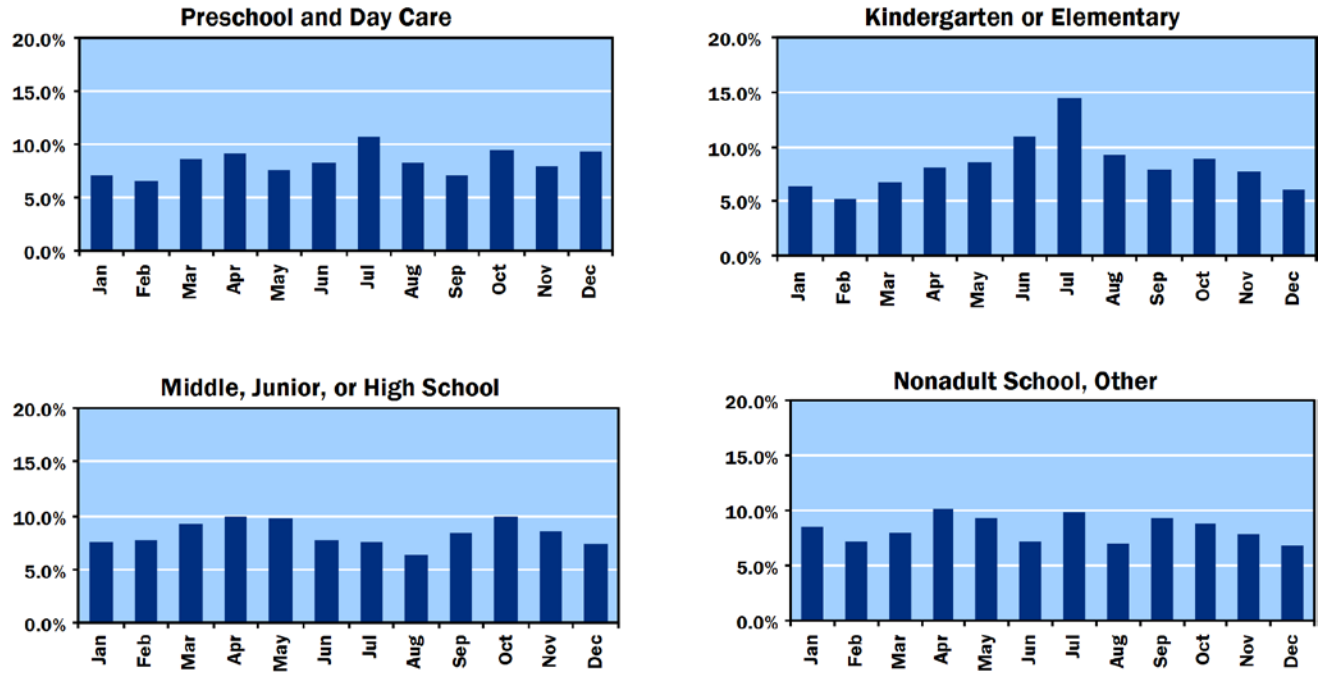
Figure 1. Fires on School Properties by Month (percent, 3-year average, 2003-2005)



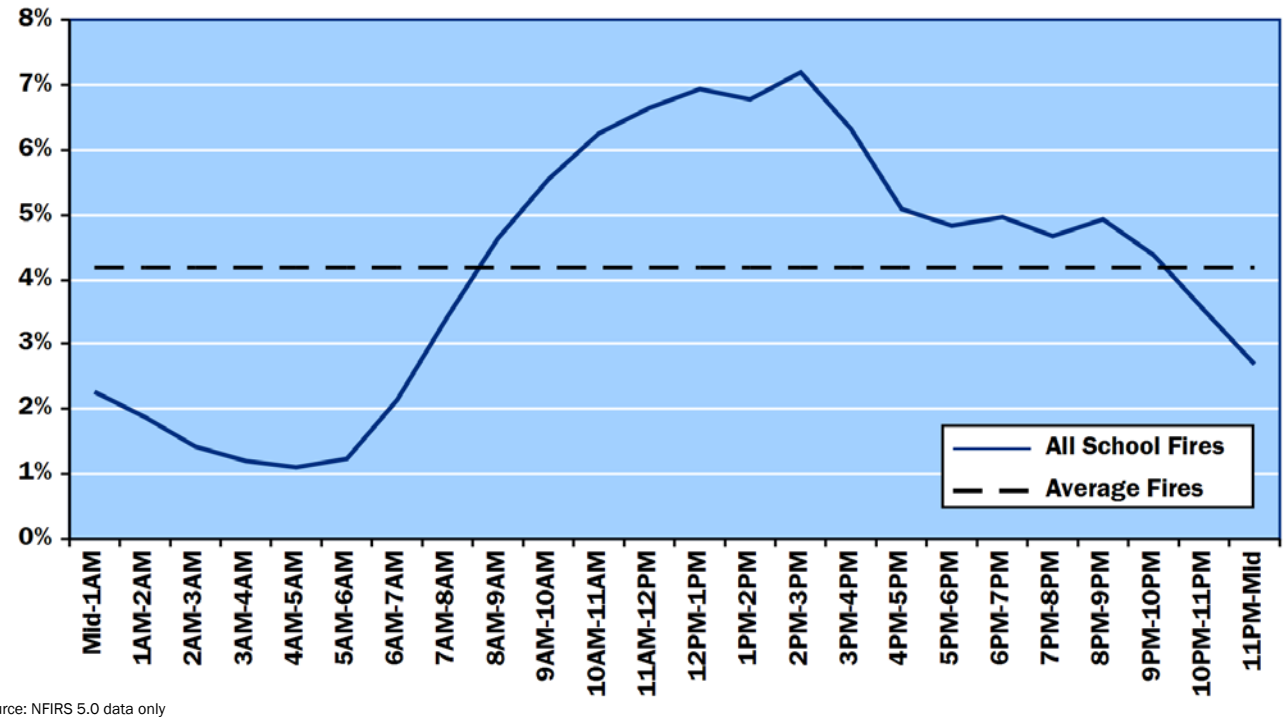
Source: NFIRS 5.0 data only

Figure 2. Fires on School Properties by Month and Type (percent, 3-year average, 2003-2005)



Source: NFIRS 5.0 data only

Figure 3. Fires on School Properties by Time of Day (percent, 3-year average, 2003-2005)



Source: NFIRS 5.0 data only

fewer school staff monitor the premises. Middle, junior, and high schools had above average fire incidence in the spring and fall—typically the end and beginning of the academic year (Figure 2). Fifty-five percent of fires on school properties occur between 8 a.m. and 5 p.m., the hours students are most likely to be in school, as shown in Figure 3. Thirty percent of fires occur between 5 p.m. and midnight; 15% occur between midnight and 8 a.m.

Causes of School Structure Fires

Structure fires in preschool and day cares are predominantly due to cooking (64%) followed by heating (7%) and electrical distribution (6%), as shown in Figure 4. The causes for fires in kindergarten or elementary schools mostly involve cooking (27%), incendiary or suspicious activity (25%), and heating (12%). The primary cause of fires in middle, junior, or high school is due to incendiary or suspicious activity (47%), followed by cooking (15%), and heating (7%).[8]

Children may be the ones involved in setting arson fires in schools; unfortunately this cannot be determined from NFIRS data alone. As shown in Figure 5, the highest percentage of fires occurs in middle and high schools, followed by elementary schools. This distribution does not imply an associated age for a juvenile involved in the firesetting, but does suggest the potential for middle- and high- school-age involvement.

Juvenile Firesetters

Forty-seven percent of all middle and high school structure fires and 25% of all elementary school structure fires are incendiary or suspicious in origin. Fifty-one percent of school structure fires occur in middle and high schools and 25% occur in elementary schools. This could explain the difference between intentional firesetting of older students and outdoor fireplay in younger students. In order to discourage fires initiated by young people, many studies and fire education programs target juveniles under the age of 18 years.

Juvenile firesetters, including elementary and high school students who exhibit fireplay or firesetting, generally fall into three basic classifications: 1) curiosity/experimentation, 2) reactionary, and 3) delinquent.[9] The first group involves younger children who experiment out of curiosity with common sources of ignition such as matches or lighters, and lack supervision. These children usually do not understand the danger associated with fireplay. Children who play with fire once are five times more likely to

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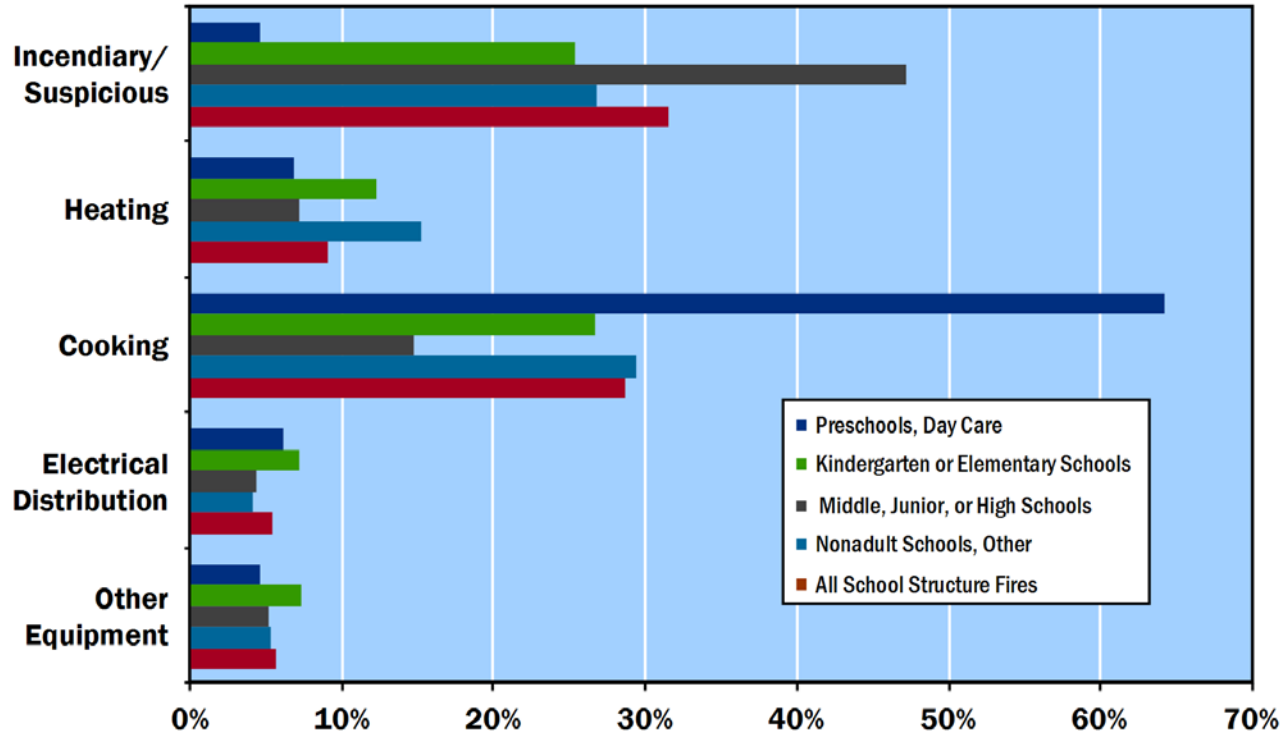
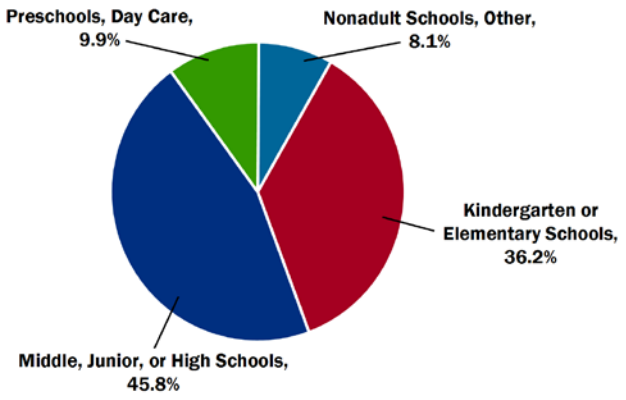
Figure 4. Causes of School Structure Fires (percent, 3-year average, 2003-2005)



Source: NFIRS 5.0 data only

Figure 5. Fires on School Properties by School Type (percent, 3-year average, 2003-2005)



Source: NFIRS 5.0 data only

experiment with fire again unless professional intervention takes place.[10]

Second, youth who do not have adequate problem-solving skills or cannot express their feelings send warning signals when they use fire in a reactionary way to convey their feelings. This group also lacks supervision and has easy access to sources of ignition.

The third group, classified as delinquent and typically comprised of older children, set fires for an assortment of reasons that usually are peer-driven, such as pranks or dares, and showing off. Most members of this group do not realize the legal repercussions associated with setting fires.

However, adolescents who do understand the legal repercussions, yet continue to set fires, represent a growing problem. These fires qualify as intentional, with little respect for life or property. Youth in this group are more likely to associate with gangs and other gang-like activity, and may possess a potential for future violent behavior.[11]

A partnership among teachers, fire service, and the judicial system allows early identification of firesetters. In particular, teachers should report all fires immediately to the local fire service. Quick and full reporting helps the community recognize children using fire in inappropriate and unsafe ways. By providing fire education and, if necessary, psychological intervention, the chances for reducing juvenile-set fires increase substantially.[12]

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Where School Structure Fires Start

The three leading areas of fire origin in school structure fires are the bathroom, kitchen, and small assembly areas. One quarter of school structure fires start in bathrooms. These fires typically start in bathroom trash cans and are primarily of an incendiary or suspicious origin. Older students smoking in bathrooms also may increase the risk of such fires — over three quarters of fires in school bathrooms (78%) occur in high school, junior high school, or middle school bathrooms. Bathrooms present children and young teens with a place to set a fire without having to contend with constant adult supervision. Kitchens (7%) are the second leading area of origin for structure fires, reflecting cooking fires. Most of these kitchen fires, 43 percent, occur in preschool and day care kitchens. Small assembly areas for less than 100 people are the third most frequent place for school structure fires and typically occur in high schools, junior high schools, or middle schools.

Table 2. Leading Areas of Fire Origin of School Structure Fires by Type of School (percent of fires, 3 year average, 2003-2005)

	Area of Fire Origin		
Type of School	Bathroom	Kitchen	Assembly area < 100 persons
Overall	25	7	6
Preschool and Day Care	4	43	9
Kindergarten and Elementary	13	27	29
High School/Junior High School/Middle School	78	24	53
Other Nonadult School	6	7	8

Source: NFIRS 5.0 data only

Material Ignited in School Structure Fires

The most common materials ignited in school structure fires are paper (25%), plastic (14%), wood[13] (11%), and fabric (9%). These materials, reflecting the high incidence of both incendiary and trash fires, are consistent with materials frequently used by juvenile firesetters and are accessible materials found in and around schools.

Examples

Each year, newspapers are filled with stories regarding school fires. Below are four examples of such fires:

- On April 23, 2007, a 16-year-old Needville High School student in Fort Bend County, Texas confessed to setting the fire that destroyed two Needville High School buildings.[14]
- On March 26, 2007, a possible arson fire tore through the courtyard of Peralta Elementary School in Oakland, California, damaging parts of the office, library, and adjacent classrooms, causing an estimated $500,000 in damage.[15]
- On May 22, 2007, two teenagers were charged with trying to burn down Wake Forest-Rolesville High School in Wake Forest, North Carolina, so they wouldn't have to go to school. The teens tried to burn toilet paper rolls and a garbage can in a bathroom.[16]
- On June 26, 2007, a fire destroyed the playground at Edgemere Elementary School in El Paso, Texas. Witnesses reported seeing three teenagers flee the scene. Damage was estimated at $100,000.[17]

Conclusion

School security must not compromise fire safety. Both school safety and security needs should be addressed through cooperation between school security and the local fire service.

Early identification of young firesetters through teacher, fire service, and judicial system partnerships gives communities the opportunity to provide fire education and, if necessary, psychological intervention, which will reduce future juvenile-set fires.

Like most fires, those in schools are largely preventable through increased fire safety education, supervision, intervention, and technological innovation. For further information, particularly on juvenile firesetter intervention programs, contact your local fire department or the U.S. Fire Administration.

To request additional information or comment on this report, visit http://www.usfa.dhs.gov/applications/feedback/

Notes:

[1] For purposes of this report, "fires on nonadult school properties" include all fires occurring on property used for nonadult education, from day care through high school.

[2] NFIRS 5.0 contains both converted NFIRS 4.1 data and native NFIRS 5.0 data. This topical report includes only native 5.0 data and excludes incident type '110' since it is a 4.1 conversion code.

[3] National estimates are based on 2003-2005 native version 5.0 data from the National Fire Incident Reporting System (NFIRS) and national fire loss estimates from the National Fire Protection Association's (NFPA) Annual Survey of fire loss. Fires are rounded to the nearest 100, deaths to the nearest 5, injuries to the nearest 25, and loss to nearest $M.

[4] Distribution statistics and per-fire losses are based on 2003-2005 NFIRS 5.0 data.

[5] Ninety-six percent of school structure fires are fires in the building itself (versus other built structures such as fences). As a result, the analyses are easily applied to school building fires.

[6] Our Lady of the Angels School Fire, http://www.olafire.com/

[7] National Association of State Fire Marshals. "Catastrophic Fire Prevention Task Force, School Fires," http://www.firemarshals.org/mission/catastrophic/docs/school_fire_project.pdf, October 2001.

[8] The cause percentages reflect the revised cause methodology implemented by the USFA as of May 2007. The revised methodology takes advantage of data elements available in NFIRS 5.0. Comparisons to cause distributions prior to May 2007 may not be appropriate.

[9] Jamie Fry, SOS Fires: Youth Intervention Programs. "Youth firesetting: Collaboration Between Teachers and Fire Service Personnel for Early Identification and Intervention," http://www.sosfires.com/Collaboration%20Between%20Teachers%20and%20Fire%20Service.htm

[10] Office of the Washington State Fire Marshal, "Reporting School Fires," http://www.wsp.wa.gov/fire/rptschfr.pdf

[11] Jamie Fry, SOS Fires: Youth Intervention Programs. "Youth Firesetting: Collaboration Between Teachers and Fire Service Personnel for Early Identification and Intervention," http://www.sosfires.com/Collaboration%20Between%20Teachers%20and%20Fire%20Service.htm

[12] Office of the Washington State Fire Marshal. "Reporting School Fires, A Step-by-Step Guide for Teachers and School Administrators," http://www.wsp.wa.gov/fire/rptschfr.pdf

[13] Using the NFIRS 5.0 definition of type of material first ignited. Wood is defined as wood or paper, processed, other (60) and wood chips, sawdust, and shavings (61).

[14] Fort Bend Now. "Needville Teen Confesses to Setting Fire That Destroyed Two High School Buildings," http://www.fortbendnow.com/news/2880/, May 07, 2007

[15] Oakland Tribune. "Possible Arson Fire Damages Peralta Elementary," http://findarticles.com/p/articles/mi_qn4176/is_20070327/ai_n18760474, March 27, 2007

[16] The News & Observer. "Teenagers Arrested in School Fires," http://www.newsobserver.com/news/crime_safety/story/582519.html, May 28, 2007

[17] Newschannel 9, KTSM-TV. "School Fires The Work of Arsonists," http://www.ktsm.com/news/local/8198072.html

Related Topics:

- **School Fires: Volume 4, Issue 6, December 2004, http://www.usfa.dhs.gov/downloads/pdf/tfrs/v4i6.pdf**
- **School Fires: Volume 2, Issue 9, March 2002, http://www.usfa.dhs.gov/downloads/pdf/tfrs/v2i9-508.pdf**