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University of Tennessee

**Fire Safe
Student Housing**



**Presentation
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Introduction

As a campus or fraternal housing administrator, you have the duty to provide a safe environment for the college students housed in your facilities. You are faced with a number of different issues competing for your attention and for the limited resources available to address them. You must decide how to best allocate available resources among competing demands and interests. To make these decisions wisely, you need to understand the risk factors involved, the alternatives available to you and the relative costs and benefits of the different options.



Fire is one of the deadliest perils that threaten student safety. A fire in a student housing facility can quickly rage out of control if appropriate safeguards are not in place to stop it. While fatal fires in student housing are not an every day occurrence, they can and do happen, perhaps more frequently than you recognize. These fires do not make the headlines unless a number of students are killed, so it is easy to underestimate the risk of fire in student housing facilities. It is important for you to recognize that fire safe student housing does not just happen by chance, nor can it be taken for granted. It requires an ongoing commitment on the part of the community, the institution and the administration. Careful planning, implementation and maintenance are all essential ingredients of a successful fire safety program for student housing.

The purpose of this report and the accompanying video is to provide campus housing administrators, fraternal organizations and others responsible for housing college students with an overview of the elements of fire safe student housing. The goal is to present a balanced approach that will permit housing administrators to make risk-informed decisions regarding the costs and benefits associated with different fire safety features and levels of fire protection. Additional resources that are available to help in the development of a comprehensive program for fire safe student housing are also identified.

Ultimately, student-housing administrators need to seriously consider the installation of automatic sprinkler systems in the residential facilities they manage. These systems have an established record of preventing catastrophic fires in residential facilities, making sprinkler protection perhaps the single most effective weapon in the residential building fire safety arsenal. Over the past 15 years, the hospitality industry in the United States has embarked on an ambitious program to install sprinkler protection in most hotels and motels. As part of this effort, various technologies have been developed to reduce the costs, aesthetic impacts and inconveniences associated with the installation of automatic sprinklers in existing residential facilities. These technologies translate directly to both new and existing student housing facilities, providing the opportunity for college students to enjoy the same high level of fire protection as the traveling public.

Background

On any one campus or in any one college community, building fires are relatively rare events. As a result, it is easy, perhaps even natural, to become complacent about fire safety, to confuse good luck with good practice. But when fires do occur, and they do, they can develop with incredible speed and have devastating consequences. When deaths and disfiguring burn injuries result, the consequences last forever, impacting on not only the victims and their families, but on the entire college community as well. For example, an arson fire that killed two students in a dormitory at Ohio State University in 1968 is still remembered – 30 years later – as perhaps the worst tragedy to ever strike the OSU campus community.



A fire in a fraternity house at the University of North Carolina on Mother's Day in 1996 further illustrates the type of devastation that fires on campus can wreak. Following a celebration during the spring graduation weekend, a fire developed in the basement recreation room of the fraternity during the wee hours of the morning. Fed by the combustible interior finish and furnishings, the fire reached hazardous proportions while residents slept. The fire swept through the structure, leaving five students dead and one student, the only survivor, injured in its wake. What had started as an annual spring celebration ended with a somber memorial service.

The fire at the University of North Carolina is just one example of campus housing fires. Table 1 presents a summary of a review of student housing fires that received news media attention during the 20-year period from 1979 to 1998. Reports of these fires were obtained primarily from the Lexis-Nexis® Academic Universe website. Unfortunately, these reports tend to be preliminary and sketchy. Nonetheless, as indicated in Table 1, multiple death fire scenarios are not very common in student housing; most fatalities occur by ones or twos. This is similar to the general population, where most fire fatalities occur by ones or twos in private residences. Table 1 also indicates, however, that fires in campus housing can displace many students at one time, creating a logistical problem during the middle of a school term.

Dr. John L. Bryan, Professor Emeritus in the Department of Fire Protection Engineering at the University of Maryland, recently completed a detailed examination of selected college dormitory and fraternity house fires in connection with this project. Bryan selected fifteen fires, including nine dormitory and six fraternity house fires, from 1967 to 1996 for detailed analysis. These fire incidents were selected based on the occurrence of fatalities or injuries to occupants along with the availability of a published report for each incident. These fifteen fire incidents resulted in 44 reported fatalities and 143 reported injuries. Bryan's comprehensive report is attached as Appendix A to this report for reference.

Table 1. Student housing fires from 1979 to 1998 that received news media attention.

University	Date of Fire	Housing Type	Cause of Fire	Property Loss (\$)	# Students Displaced	Fatalities/Injuries
Nebraska Wesleyan Univ.	Oct. 8, 1998	Off-Campus Apartment	Cigarette	50,000	6	1 / 0
Alfred U. (NY)	Oct. 10, 1998	Dormitory	Light bulb	NA	140	0 / 0
Kalamazoo College (MI)	Sept. 18, 1998	Dormitory	Arson	NA	NA	0 / 0
Murray State (KY)	Sept. 18, 1998	Dormitory	Arson	NA	+100	1 / 16
Ohio State Univ.	Sept. 2, 1998	Off-Campus Apartment	Arson	28,000	+4	0 / 0
Univ. of Buffalo (NY)	July 26, 1998	Dormitory	Unknown	100,000	25	0 / 0
Univ. of Arizona	July 14, 1998	Fraternity	Arson	NA	39	0 / 0
Greenville College (IL)	Dec. 9, 1997	Dormitory	Unknown	NA	40	1 / 7
Johns Hopkins U. (MD)	Aug. 31, 1997	Off-Campus House	Cigarette	NA	+3	1 / 0
Lindenwood College (IL)	April 17, 1997	Dormitory	Electrical	10,000	NA	0 / 0
School of Visual Arts (NY)	Feb. 21, 1997	Dormitory	Cigarette	NA	+50	1 / 0
U of C Berkeley (CA)	Jan. 9, 1997	Fraternity	Candle	NA	+15	0 / 2
Central Missouri St. Univ.	Jan. 3, 1997	Dormitory	Arson	NA	NA	1 / 0
Ohio Wesleyan U. (OH)	Oct. 19, 1997	Fraternity	Unknown	NA	NA	1 / 0
Ohio State U. (OH)	Aug. 13, 1996	Off-Campus Apartment	Electrical	20,000	1	0 / 0
William Jewell College (KS)	Aug. 8, 1996	Fraternity	Cigarette	500,000	+5	0 / 0
Univ. of N. Carolina	May 12, 1996	Fraternity	Cigarette	NA	+10	5 / 3

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University	Date of Fire	Housing Type	Cause of Fire	Property Loss (\$)	# Students Displaced	Fatalities/Injuries
Mesa State (CO)	Dec. 21, 1995	Off-Campus Apartment	Unknown	NA	3	1 / 3
Marshall College (PA)	Aug. 5, 1995	Fraternity	Arson	NA	NA	0 / 0
Univ. of Florida	March 10, 1995	Fraternity	Unknown	NA	+6	0 / 0
Ohio State Univ	Nov. 22, 1994	Fraternity	Suspicious	+20,000	+25	0 / 0
U of C Berkeley (CA)	Aug. 15, 1994	Fraternity	Unknown	200,000	25	0 / 0
Univ. of Wisconsin	Oct. 26, 1993	Sorority	Unknown	+100,000	10	1 / 2
Ohio State Univ	May 1996	Fraternity	Unknown	500,000	NA	0 / 1
Drexel Univ. (PA)	Feb. 18, 1993	Fraternity	Unknown	NA	NA	0 / 1
State Univ at Stony Brook	Feb. 25, 1992	Dormitory	Unknown	NA	200	0 / 1
San Jose State (CA)	Oct. 19, 1990	Dormitory	Unknown	NA	178	0 / 20
U of C Berkeley (CA)	Sept. 1990	Fraternity	Unknown	NA	NA	3 / 0
Univ. of Washington	July 20, 1990	Sorority	Spontaneous Combustion	130,000	NA	0 / 0
Rutgers Univ. (NJ) *	July 18, 1990	Fraternity	Arson	NA	NA	0 / 0
Northern Illinois Univ. (IL)	Feb. 25, 1989	Dormitory	Suspicious	+1,000	+50	0 / 0
Univ. of Mississippi	Aug. 4, 1988	Fraternity	Suspicious	100,000	NA	0 / 0
Columbia Univ.	Jan. 1, 1987	Fraternity	Electrical	NA	+5	0 / 5
Univ. of South Carolina	Sept. 5, 1986	Fraternity	Electrical	450,000	-58	0 / 3
Indiana Univ.	Oct. 22, 1984	Fraternity	Arson	NA	+30	1 / +30
George Washington Univ. (DC)	April 20, 1979	Dormitory	Unknown	NA	+35	0 / 35

*Represents a string of arson fires that occurred simultaneously in three fraternity houses on the campus. Fortunately there were no injuries reported from the incident.

Bryan analyzed a number of variables associated with these incidents, including ignition and propagation variables, construction variables, occupant behavior variables and fire protection system variables. He also analyzed two sets of data compiled by the National Fire Protection Association regarding dormitory, fraternity and sorority fires. The first set of data, published in 1955, was based on fires during the period from 1944 to 1954. The second set, published in 1995, covered the period from 1990 through 1994. Bryan notes the significant social and cultural differences in the campus environment between these two surveys, particularly changes in the supervision of residential facilities and the restrictions placed on student residents.

Some disconcerting trends arise from the data. Bryan notes that the occupant behavior activities of incendiary fire setting, cooking and smoking appear to be the primary causes of student housing fires, with alcohol consumption being a significant factor. Most troublesome is the increase in the incidence of incendiary and suspicious fires between the first and second data sets. Such causes constituted about 10 percent of the fires in the 1955 data, but jumped to almost 20 percent of the fraternity and sorority fires and 30 percent of the dormitory fires in the 1995 data. In 1955, incendiary or suspicious fires ranked fifth as a causative factor; in 1995, incendiary or suspicious fires ranked first. While arson can never be condoned, neither can it be ignored when it comes to fire safe student housing.

Bryan further notes the significant role of highly combustible upholstered furniture in the student housing fires he analyzed. Upholstered furniture, predominately sofas, were the fuel material ignited first in seven of the fifteen fires he analyzed. Because of this, Bryan concludes that procedures should be initiated to regulate the inclusion of new highly combustible upholstered furniture into dormitories, fraternities and sororities. Based on his analysis, Bryan also concludes that procedures should be initiated to provide for the installation of smoke alarms in student rooms and automatic sprinklers throughout new dormitories, fraternities and sororities, as well as in existing facilities when they are renovated.

Fatal fires are always difficult to accept; when they occur in student housing, they are particularly devastating. There are a number of reasons for this. Most college students, particularly those in campus or fraternal housing, are living away from the security of their parents' homes for the first time. Parents, sending their children off to college, do so with a mixture of pride and trepidation, but certainly with the expectation that the college community will provide a reasonably safe environment for their loved ones.

On the part of the students, a certain sense of immortality seems to come with the territory as they embark on this exciting period of independence. Many students do not yet have the maturity or experience to recognize real threats to their personal safety; consequently, they sometimes indulge in foolish, even dangerous, behavior without realizing the risks or potential consequences. When it comes to fire safety, most students are uneducated; that is, unless they have been properly trained in fire prevention and response should a fire occur.

Because of the relatively rare occurrence of building fires, few people outside the fire profession have the experience or knowledge to appreciate sometimes subtle differences between fire safe structures and those that will become hazardous when a fire occurs. Fewer still, even among fire professionals, fully appreciate the incredible speed with which fires can develop in buildings or how quickly escape routes can be blocked if appropriate fire safety features are not present or are compromised. **Accidental fires in residential facilities can reach deadly proportions in less than three minutes after ignition, incendiary fires even faster!**

As a campus or fraternal housing administrator, you are probably aware of the local and state fire safety regulations that apply to your student housing facilities. These regulations impose specific minimum requirements with respect to the building fire safety features required by law. What you may not know is that the Hotel and Motel Fire Safety Act of 1990 (PL101-391) also applies to your campus if it is used for federally funded meetings and conferences.

The Hotel and Motel Fire Safety Act of 1990 (PL101-391) was passed into law by Congress to save lives and protect property by promoting fire and life safety in hotels, motels and other places of public accommodation. The law encourages and eventually mandates that federal employees on travel must stay in public accommodations that adhere to the life safety requirements in the legislation guidelines. PL101-391 also states that federally funded meetings and conferences cannot be held in properties that do not comply with the law.

PL101-391 is applicable to all places of public accommodation, and requires that such properties are equipped with:

- hard-wired, single-station smoke detectors in each guestroom in accordance with the National Fire Protection Association (NFPA) standard 72;
- an automatic sprinkler system, with a sprinkler head in each guest room in compliance with NFPA standards 13 or 13R.

Properties three stories or lower in height are exempt from the sprinkler requirement.

Realistically, it can be difficult to obtain the resources to install fire protection systems if prevailing regulations do not require such systems. Therefore, if existing state and local regulations or the federal Hotel and Motel Fire Safety Act do not provide sufficient incentive, it may be necessary to pursue the local adoption of regulations requiring such systems. A number of communities have already instituted regulations requiring the installation of automatic sprinkler systems in college housing facilities. Many of these ordinances have been adopted in response to local tragedies, but the lessons learned should not be restricted to any one campus or community.

A number of resources are available to aid in the development and implementation of local ordinances for sprinkler protection. Some of these can be obtained at the following websites:

- www.nfpa.org
- www.nfsa.org
- www.firesprinkler.org

Many of the concepts discussed here are the same in principle as those contained in nationally recognized standards, but specific standards adopted by law should be consulted to assure at least a minimum level of regulatory compliance.

Fire Safe Student Housing

The Essential Elements of
Fire Safe Student Housing:
PODS

PODS


- Prevention
- Occupant Awareness and Training
- Detection and Alarm
- Suppression

Prevention:

Three Elements for Fires to
Occur:

- Fuel
- Air
- Ignition Source

Prevention:
The Fire Triangle: Air – Fuel – Ignition




Prevention:

- To prevent fires, one of the three elements must be removed.
- Air is not an option ...
- Let's look at Fuel and Ignition

Prevention: Fuel


Fuel


- Some fuel already present
 - Mattresses
 - Desks, bookcases, furniture
 - Combustible wall, ceiling or floor finishes

 **Prevention: Fuel**


Students add plenty of fuel

- Draperies, decorations
- Books, papers, etc.
- Clothing
- Storage, trash, recycling materials

 **Prevention: Fuel**


Mattresses, upholstered furniture may contain polyurethane foam. 

When this type of foam burns, it is **very deadly**.


 **Prevention: Ignition**

Typical Sources of Ignition:


- Smoking materials – including Cigarettes, matches, lighters
- Candles and Incense
- Cooking equipment and appliances
- Electric lamps and other appliances
- Building services – electric, gas, etc.
- Arson

 **PODS**

- **Prevention**
- **Occupant Awareness and Training**
- **Detection and Alarm**
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 Occupant Awareness and Training

1. **Occupant Awareness**
2. **Training**

Occupant Awareness and Training

Awareness:

- Posters about Fire Safety
- Flyers for each Student
- View Video "Get out – Stay Out"

Occupant Awareness and Training

Training:

- Fire Prevention
- Fire Response

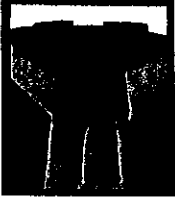
Occupant Awareness and Training

Students should recognize the potential hazards of:

- Smoking, smoking in bed
- Open flames – candles, cooking
- Poor housekeeping, excessive decorations
- Blockage of Exits

Occupant Awareness and Training

What should we teach residents about Fire Response?




Occupant Awareness and Training

- 1. Evacuation Behavior !!!!**
- 2. Fight or Flee?**

Occupant Awareness and Training


Evacuation Behavior

- 1. Know your Exits (2 or more)**
- 2. Don't Ignore Fire Alarms**
- 3. Check Path – Heat or Smoke**
- 4. Stay Low – deliberate speed**
- 5. Do not re-enter Building**


 Occupant Awareness and Training

Fight or Flee:

1. Notify Other Residents
2. Notify Fire Department
3. Use Fire Extinguisher if safe – small fire.

 **PODS**

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Detection & Alarm

- Automatic Detection
- Single Station Smoke Detectors
- Multiple Station Detectors
- Zoned Systems
- Addressable Detection



PODS

- Prevention
- Occupant Awareness and Training
- Detection and Alarm
- Suppression



Suppression:

- Sprinkler Systems
 - Commercial
 - Residential
- Fire Department



PODS

- **P**revention
- **O**ccupant Awareness and Training
- **D**etection and Alarm
- **S**uppression
