

BURN AWARENESS WEEK 2006

RESIDENTIAL FIRE SPRINKLER SYSTEMS

Burn Prevention Committee

American Burn Association

December, 2005



American Burn Association  
Campaign Kit for Burn Awareness Week 2006  
Residential Fire Sprinkler Systems

## TABLE OF CONTENTS

- I. Purpose
  - a. Goal
  - b. Target Audience
  - c. Objectives
  
- II. Instructor Guide
  - a. Introduction
  
  - b. Fire Safety Program
    - i. Smoke Alarms
    - ii. Carbon Monoxide Alarms
    - iii. Portable Fire Extinguishers
    - iv. Escape Plan
  
  - c. Residential Fire Sprinkler Systems
    - i. History
    - ii. Components
    - iii. Design and Installation
    - iv. Effectiveness
    - v. Advantages
    - vi. Sprinkler Myths
  
- III. Media Guide
  
- IV. Sample Public Service Announcements
  
- V. References
  
- VI. Resources
  
- VII. User Survey

## **RESIDENTIAL FIRESPRINKLER SYSTEMS CAMPAIGN 2006**

### **GOAL**

The topic of the American Burn Association (ABA) Burn Prevention Committee's 2006 Campaign is residential fire sprinkler systems. The goal of this campaign is to provide information and education about the individual and community benefits of installing fire sprinklers in the home.

### **TARGET AUDIENCE**

- Home Owners
- Home Buyers
- Home Builders
- Fire Fighters
- General Public

### **OBJECTIVES**

- Educate target audience on the benefits of residential fire sprinkler systems.
- Provide public education material.
- Provide a PowerPoint® presentation that may be utilized by the burn prevention community to provide education to homeowners, elected officials and the general public.
- Provide a list of print and on-line residential fire sprinkler information resources.

## **INSTRUCTOR GUIDE**

### **Introduction and Overview**

Home is where we should feel the safest. Unfortunately, from a fire point of view, home is the most dangerous place to be. Most fires and burn injuries occur in the home. Every year, there are an estimated 405,000 fires in residential structures, which cause nearly 3,600 fatalities, 18,600 injuries and \$4.7 billion in property loss.<sup>1</sup>

More importantly, the home is where you are most likely to die as a result of a fire. More than 80% of all fire deaths occur in the home setting.<sup>2</sup> These deaths can result from smoke inhalation injury or flame injury. Although most home fires start in the kitchen, serious or fatal house fires usually start in the living room or bedroom, often as a result of carelessly discarded smoking materials.<sup>3</sup> Fires resulting in fatalities usually start late at night when home occupants are asleep.

The incidence of house fires, along with the number of deaths each year from house fires has significantly decreased since the 1970s. A number of factors are responsible for these decreases, including improvements in building codes and construction. Perhaps the greatest factor is the widespread installation and use of smoke alarms.

Fire-detection technology in the form of heat sensors has been around since the 1920s, but it was not until the 1970s that inexpensive technology to detect smoke made its way into the home. The number of homes equipped with smoke alarms has rapidly increased since their introduction. It is estimated that 94% of all homes in the US have at least one smoke alarm.<sup>4,5</sup> This percentage has not appreciably changed over the last 10 years and is probably at the saturation point. The few remaining homes without alarms account for up to 77% of all annual fire deaths.<sup>3</sup> Homes with smoke alarms have a fire-death rate 50% lower than homes without smoke alarms.<sup>5</sup> While smoke

alarms have an impressive record, it would be dangerous to rely solely on these devices for fire and burn prevention. There is no guarantee an alarm will actually work when smoke is present. One study demonstrated that smoke alarms didn't alarm in 32% of house fires generating enough smoke to have caused it to alarm.<sup>1, 4</sup> Millions of smoke alarms are beyond the 10 year estimated service life and many are non-functional because of dead or missing batteries. The number of homes with smoke alarms that don't work now outnumber the households with no alarms by a wide margin.<sup>5</sup> Fifty-nine percent (59%) of homes with smoke alarms have only one alarm, meaning there is no protection if the alarm fails.<sup>1</sup> Eighty-seven percent (87%) of homes with smoke alarms have either one or two alarms meaning the home is incompletely protected.<sup>1</sup> The current recommendation of the National Fire Protection Association (NFPA) is to have one alarm on each level of the home, in addition to one alarm inside of each bedroom.<sup>6</sup> Finally the impressive reduction in fire deaths attributed to smoke alarm installation is unlikely to continue as the percentage of homes with smoke alarms has not appreciably changed in 10 years and there are fewer homes without alarms left to equip.

The final limitation of smoke alarms is they detect, rather than fight fires. For certain groups at high risk of fire injury, this difference is critical. For those under age 5 or over age 65, the chances of dying in a house fire are twice the national average. This rises to three times the national average at age 75 and four times the national average at age 85.<sup>3</sup> The elderly, who may be hearing impaired, sometimes do not hear smoke alarms. Studies have shown children who are sleeping may not awaken when smoke alarms sound. The mobility-impaired are at similar high risk, as are those who abuse alcohol or illicit drugs. In the United States, the most common fatal-fire scenario (nearly 30% of all fire deaths) is an intoxicated person falling asleep in a chair or bed while smoking.<sup>3</sup> For all of these groups, knowing a house is on fire is not synonymous with the ability to escape from

fire. Because the elderly, the young, the mobility impaired and substance abusers are all over-represented in the burn population, it can be argued smoke alarms are the least useful to the people who need them the most.

Finally, smoke alarms reduce injury when building occupants are alerted to the presence of fire and are able to escape. But property loss from fire is seldom impacted by smoke alarm activation if the fire department is not promptly notified of the fire, or if response time is lengthy.

Fortunately, a technology exists to complement the strengths of smoke alarms. This technology is the residential fire sprinkler system. According to the National Fire Protection Association, the installation of both smoke alarms and residential fire sprinkler systems reduce the risk of death in a home caused by fire by 82% compared to having neither system.<sup>2</sup>

In 1864, Henry Parmalee invented automatic fire sprinklers for the purpose of protecting commercial and industrial buildings from fire. In more than 100 years of use, fire sprinkler systems have proven to be both effective and reliable. While designed and intended primarily for protection of property, a side benefit is life safety. With the exception of terrorist attacks, there has never been a major loss of life (3 or more fatalities) in any building fully protected by fire sprinkler systems.

The life-safety aspects of industrial or commercial fire sprinkler systems prompted interest in transfer of this technology to the home, and in 1976 the United States Fire Administration funded research to develop sprinkler technology for the home.<sup>7</sup>

Residential fire sprinkler heads are different from their commercial counterparts in several respects. They are designed to be fast-reacting, as fires must be controlled in earlier stages with less available water.<sup>7</sup> They have special water distribution patterns to provide fire control with only one sprinkler head per room. They must be capable of delivering water to all walls of the room in which they are installed, and must flow high enough to prevent fire from getting above the water

flow.<sup>7</sup> While originally designed to cover a maximum of 144 square feet, modern designs allow coverage of up to 400 square feet with one sprinkler head.<sup>7</sup>

Residential fire sprinkler systems put water on the fire immediately. This often buys extra minutes for occupants to escape from a burning building, and allows control or extinguishment of the fire at a much earlier stage, using much less water. Residential fire sprinkler systems respond much sooner than even the closest fire department, and may be thought of as having a 24-hour a day live-in firefighter.

Fire department response times are increasing. The response time from the nearest fire station to your home is a combination of *alarm time*, or time from ignition to discovery; *dispatch-time*, or the time between the call to the dispatcher and the time the responding units are notified; *turnout time*, or the time it takes for firefighters to don gear and get on the apparatus; and *travel time*, or the elapsed time between leaving the fire station and arriving on scene. An NFPA survey in 2001 documented most fire departments in all sized communities do not have enough fire stations to provide sufficiently rapid response.<sup>2</sup> A series of articles in the Boston (MA) Globe in 2005 reported fire departments across the country are under-equipped, under-staffed, and reporting increased response times. Over the last 30 years, firefighters have taken on the additional roles of hazardous materials responders, emergency medical care providers, specialty rescue units, and homeland security experts. Fire suppression is now one of many tasks required from the fire service.

The advantages of residential fire sprinkler systems to the homeowner are obvious. Sprinkler installation also offers advantages to the community. Residential fire sprinkler systems may not reduce the number of calls a fire department responds to, but they do reduce the severity of the fire, may delay flashover conditions (sufficient heat to cause combustion of all materials in the room) and may delay the need for interior fire and rescue, reducing danger to firefighters.<sup>2</sup>

Communities with residential fire sprinkler legislation find they can increase property density, reduce residential street width, increase cul-de-sac lengths, reduce the number of fire hydrants needed, and simplify building codes.<sup>8</sup> When residential fire sprinkler system installation is widespread, the cost can drop to pennies per square foot, putting the cost of fire sprinklers in new construction on a par with wall-to-wall carpeting, hardwood floors or other upgrades.

## **REVIEW: THE COMPONENTS OF A HOME FIRE SAFETY PROGRAM**

Residential fire sprinkler systems are designed to complement rather than replace the other elements of home fire safety program. These elements include the installation of smoke alarms and carbon monoxide alarms, a home escape plan, and the possible use of home fire extinguishers.

### **SMOKE ALARMS**

Fire produces smoke and heat. Smoke is the product of combustion and contains gases and particulate matter. The components of smoke are toxic or irritating causing direct damage to airways and eyes, which makes it difficult to see. A byproduct of combustion is carbon monoxide. Early detection of smoke and carbon monoxide can alert you to get out of your home.

The installation of smoke alarms in residential structures is required by law in many states, but specific requirements vary from state to state. Smoke alarms have been required in the National Building Code of Canada since the early 1980s. Over that same period, there has been a dramatic change in fire death rates. The fire death rate per 100,000 residential units dropped by 25% from 1980 to 1984, and by 75% by 1999.<sup>9</sup> A large part of this was due to smoke alarms.

Smoke alarms may be battery powered, powered from house electricity circuits or both. Depending on the design and installation, smoke alarms may sound locally when activated; may cause all other smoke alarms in the house to alarm; or may be connected to a central monitoring station that will alarm the fire department.

Ionization smoke alarms utilize a small (and harmless) amount of Americium 241 (a radioactive isotope) to monitor the level of ions (electrically charged particles) in the air. Ionization alarms react quicker than other designs in the detection of rapidly developing or fast flaming fire. Photoelectric smoke alarms use beams of light and sensors. Large smoke particles deflect light and

activate the sensor. Photoelectric smoke alarms detect slow smoldering fires faster than ionization alarms. Each type has advantages, and a well-designed smoke alarm system typically contains both photoelectric and ionization units.

Smoke alarms should be installed in compliance with the National Fire Alarm Code, NFPA 72. The current NFPA recommendation for smoke alarm installation in new homes includes a smoke alarm in each bedroom; a smoke alarm outside the bedroom that can be heard in the bedroom; and a minimum of one smoke alarm on each level of the house. For existing construction, the requirement is a smoke alarm outside of bedrooms and on each level of the home. Because smoke alarms do not function in extremes of hot or cold, installation in unheated attics or garages is not recommended. To avoid nuisance alarms, smoke alarms should be installed at least 20 feet from the cooking areas. Photoelectric smoke alarms are less likely to false-alarm in cooking areas.

Young children may not understand the significance of the alarm when activated. One new design of smoke alarm allows parents to record escape instruction in their own voices. The elderly, mobility-challenged, or intoxicated may not be able to escape when a smoke alarm activates, and for these populations, installation of a residential fire sprinkler system is especially important.

## **CARBON MONOXIDE ALARMS**

Carbon monoxide (CO) is a colorless, odorless, tasteless poisonous gas that is a product of combustion of fuels such as coal, wood and gases such as propane. Burning these substances in a poorly ventilated location can lead to high levels of carbon monoxide in the air. In house fires, the complete combustion of hydrocarbons at optimal mix of fuel and oxygen produces water and carbon dioxide. Most combustion, however, is incomplete, leading instead to production of significant levels of carbon monoxide. The presence of toxic amounts of carbon monoxide should

be assumed at nearly all house fires.

Malfunction of natural gas / propane powered hot water heaters, furnaces, or kerosene space heaters, or blocked chimneys or flues can result in dangerous accumulations of carbon monoxide. Internal combustion engines on vehicles or generators produce carbon monoxide, which may become lethal when operated indoors or within a garage.

The effects of carbon monoxide exposure depend on the concentration of carbon monoxide in the air. Low-level exposure may produce headache, nausea and drowsiness. High carbon monoxide levels can quickly lead to coma and death. Most people will not exhibit any obvious external signs of carbon monoxide poisoning, and persons affected will likely have no indication they are being poisoned. They may simply fall asleep and expire. In the United States there are approximately 500 fatalities per year from carbon monoxide poisoning in the home.<sup>10</sup>

Because people cannot detect the presence of carbon monoxide with normal senses, electronic carbon monoxide detectors have been developed. Similar to smoke alarms, they may be battery or line-current powered. Smoke alarms cannot detect carbon monoxide and carbon monoxide detectors cannot detect smoke. For this reason, a well-designed home safety program will utilize both. The installation of carbon monoxide detectors should follow NFPA Recommended Practice 720 'Recommended Practices for the Installation of Household Carbon Monoxide Equipment'. The detectors utilized comply with Underwriters Laboratory standard 2034 for manufacture of single and multiple station carbon monoxide alarms.

## **PORTABLE FIRE EXTINGUISHERS**

Used properly, a portable fire extinguisher can save lives and property by putting out or containing a small fire until the fire department arrives. Portable extinguishers for home use,

however, are not designed to fight large or spreading fires. Even against small fires, they are useful only under certain conditions.

The use of home fire extinguishers by non-professionals is controversial. Before using an extinguisher on a home fire, the operator must make sure that everyone has left or is leaving the building; that the fire department has been called; that the fire is confined to a small area and is not spreading; and have a clear and unobstructed escape path. The operator must be completely familiar with the operation of the extinguisher, as this is a poor time to read directions. The extinguisher must be within easy reach, fully charged and in working order. Finally, the extinguisher must match the type of fire being fought, and must be large enough to put out the fire. When all of these conditions cannot be met, evacuating the fire building is the safer course.

When using a fire extinguisher, keep your back to an unobstructed exit, stand six to eight feet away from the fire and follow the four-step **PASS** procedure:

- PULL** the pin: This unlocks the operating lever and allows you to discharge the extinguisher. Some extinguishers may have other level-release mechanisms.
- AIM** low: Point the extinguisher nozzle (or hose) at the base of the fire.
- SQUEEZE**: Squeeze the lever about the handle to discharge the extinguishing agent. Releasing the lever will stop the discharge. Some extinguishers have a button instead of a lever.
- SWEEP**: Sweep from side to side, moving carefully toward the fire, keep the extinguisher aimed at the base of the fire and sweep back and forth until the flames appear to be out. Watch the fire area. If the fire reignites, repeat the process.

Extinguishers should be installed in plain view, above the reach of children, near an escape route, and away from stoves and heating appliances. Extinguishers require routine care and should be regularly inspected and maintained following the operators manual and manufacturers instructions. Rechargeable models must be serviced after every use. Service companies are listed in

the Yellow Pages under "Fire Extinguishers". Disposable fire extinguishers can be used only once and must be replaced after use.

Finally, fire extinguishers are not a replacement for the fire department. Always be sure the fire department is notified and responds to inspect the fire site, even if you think you've extinguished the fire.

## **ESCAPE PLAN**

When the smoke or carbon monoxide alarm sounds, every member of the family must know how to respond. Each family should develop an escape plan. The escape plan should include a floor plan of your home, marking two ways out of every room -especially sleeping areas. Discuss the escape routes with every member of your household.

Once out, family members should never re-enter a burning building. Agree on a meeting place where every member of the household will gather outside your home after escaping a fire to wait for the fire department. This allows you to count heads and inform the fire department if anyone is missing or trapped inside the burning building.

The escape plan should be practiced at least twice a year in your home. One family member should be designated as a monitor and everyone else should participate in the drill. The drill should be realistic. For example, the drill can assume that some exits are blocked by fire or that the lights are out. This allows practice of alternative escape routes.

Part of the escape plan is to insure that everyone in the household can unlock all doors and windows quickly and in the dark. Windows or doors with security bars need to be equipped with quick-release devices and everyone in the household should know how to use them

Occupants of multi-story houses should insure that escape from upper story windows can be accomplished. Fire-resistant escape ladders should be available where needed. Special

arrangements may be required for children, older adults, and people with disabilities. The mobility-challenged should have a phone in their sleeping area and, if possible, should sleep on the ground floor. To facilitate pre-planning, the Fire Department should be notified in advance of any family member requiring special rescue assistance.

## **RESIDENTIAL FIRE SPRINKLER SYSTEMS**

Residential fire sprinkler systems are an outgrowth of the success of sprinkler systems in commercial structures. The key difference between commercial and home sprinkler systems is the design of the residential fire sprinkler head and the fact that existing plumbing may be utilized to supply the heads in home systems. Residential fire sprinkler heads are designed to be fast-reacting; have special water distribution patterns; provide fire control with only one sprinkler head per room; and must be capable of delivering water to all walls of the room in which they are installed.

Residential sprinkler systems are designed and installed in a variety of ways to meet the needs of the individual homeowner. Likewise, legislation requiring residential fire sprinkler systems has written and been implemented in a variety of ways to meet the needs of various community groups and local political realities. The following section provides background information for those interested in installing a residential fire sprinkler system or in creating community interest or legislation.

### **HISTORY**

Henry Parmalee created the automatic fire sprinkler system in 1864 as a method to protect his Providence, Rhode Island piano factory from fire. Following a number of modifications, Parmalee settled on a heat-activated system, as is used today. His patent in 1874 was for a wet pipe system, with a heat activated fusible link -an automatic sprinkler system.

In November 1896, the National Fire Protection Association was formed. One of the first activities of the newly formed organization was the establishment of a standard for sprinklers. Today, there are three NFPA standards covering sprinklers: NFPA 13, Installation of Sprinkler Systems; NFPA 13D, Installation of Sprinkler Systems in 1 and 2 Family Dwellings and Manufactured homes; and NFPA 13R, Installation of Sprinkler Systems in Residential Structures up

to and Including 4 Stories in Height. The current edition of NFPA 13 is the 58<sup>th</sup> revision of the original document. A trade group, The National Fire Sprinkler Association was founded in 1905. There is a wealth of sprinkler information on the websites of this group and the American Fire Sprinkler Association, which was founded in 1981.

In 1973, the National Commission on Fire Prevention and Control published their report *America Burning*. This report highlighted the fact that the majority of fire deaths occurred in residences. In response to this report, the NFPA 13 Subcommittee on Residential Sprinklers systems was formed in July 1973. The goal was to develop a system that was less elaborate and therefore less costly than described in NFPA 13 but with a goal of life safety, "To prevent flashover in the room of fire origin when sprinklered and to improve the chances of occupants to escape." They developed the first NFPA 13D (dwellings) standard in 1975. In 1976, the U.S Fire Administration led the development of fast response residential sprinklers. The first UL listed residential sprinkler became available in 1981.

San Clemente, California was the first jurisdiction to require residential fire sprinkler systems in all new properties in 1978. Since then a number of communities have enacted legislation requiring residential fire sprinklers in new construction or in all homes.

At the 1985 Annual Meeting of the American Medical Association, a resolution was passed to urge government to produce legislation requiring smoke detectors and rapid response automatic sprinklers in all new residential and commercial buildings, and in all existing high-use buildings. The resolution was published in the Journal of the American Medical Association March 27, 1987 issue.

New York City passed Local Law 16 in 1987. This law required that all new and substantially renovated hotels be completely protected with automatic sprinklers. Prior to this, only

commercial residential occupancies were required to be protected by fire sprinklers. Recognizing the need for increased fire safety in hotels, the sprinkler committee of the NFPA developed NFPA 13R (Standards for the Installation of Sprinkler Systems in Residential Occupancies up to and including Four Stories in Height) in 1989.

In December 1998 in New York City, 3 firefighters and 4 city residents lost their lives in two separate fires in high rise residential occupancies. The first fire occurred on the 10<sup>th</sup> floor of 17 Vandalia Avenue in Brooklyn, where 3 firefighters were overcome by a fireball that swept down a corridor. The fire sprinklers had not been inspected or tested and had been shut off. Five days later, 4 occupants were overcome with smoke at an apartment fire. In response, Local Law 10 was passed in March 1999. This required that all new and substantially renovated dwellings housing with 4 or more families be completely protected with automatic fire sprinklers. Other provisions require periodic sprinkler system inspection.

## **COMPONENTS OF A RESIDENTIAL FIRE SPRINKLER SYSTEM**

A typical residential fire sprinkler system includes a water supply, water meter, valves, piping, alarm devices, and sprinkler heads.

### **1) Water Supply**

The street main, which supplies domestic water, will be the source of water for most systems. Depending on pipe size, some systems use the existing home water main, while others will require installation of larger diameter supply lines. Where city water is not available, a storage tank and a pump or pressure system is utilized. A 300-gallon tank will supply the 10 minutes of water supply required by NFPA standards.

### **2) Meters, Valves & Piping**

A check valve or backflow valve allows water flow in only one direction, and is installed to

prevent contamination of the domestic water by water used for sprinklers. A control or shut off valve may be built into the system. A water meter and pressure gauge are also typical components of a residential fire sprinkler system. Depending on local requirements, this may be a meter separate from the regular water meter. The system is usually pressurized to 7 psi (pounds per square inch).

The riser is the control center of the system that includes the pressure gage, flow switch, backflow and control valve. A test and drain assembly may be present. Piping is commonly plastic, which is lightweight, easy to assemble and inexpensive.

### 3) Alarms

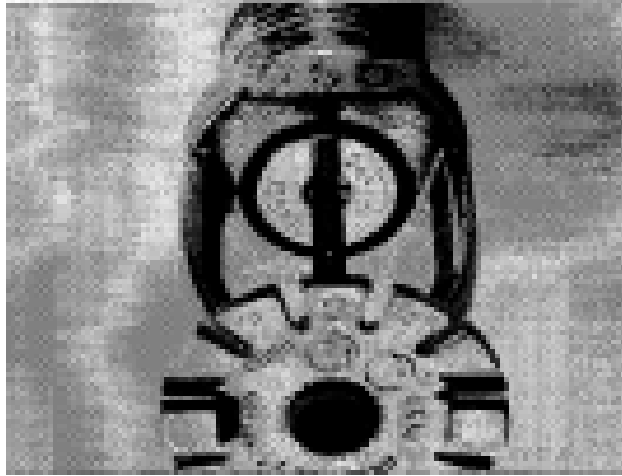
Water flow alarms are present on all residential fire sprinkler systems. The alarm activates when water flows in the sprinkler system in response to activation by fire. The alarm component of a sprinkler system should be audible in all living areas and outside of the building. It can also be connected to a central monitoring company, facilitating notification of the local fire department .

### 4) Residential Sprinkler Heads

The key component of a residential fire sprinkler system is the residential fire sprinkler head. A variety of devices are on the market and are approved by various groups such as Underwriters Laboratories or Factory Mutual.

Residential sprinklers have a "fast-response" link compared to standard sprinklers and are activated by either a fusible link or glass bulb. Fusible link heads utilize solders designed to melt at a certain temperature, releasing a cap over the sprinkler, allowing water to be released. Glass bulb heads utilize a bulb that shatters allowing the release of water. In either case, the head is designed to be activated at a temperature of 135-165°F. To comply with NFPA 13D, on activation, a sprinkler head should flow 18 gallons of water per minute at a minimum operating pressure of 7 psi for a

minimum duration of 10 minutes. Residential sprinkler heads are designed to cover an area of 144 square feet (12 x 12ft room). Extended sprinkler heads can cover up to 400 square feet (20 x 20 ft).



Note the UL approval mark and the activation temperature stamped onto a typical residential sprinkler head.

## **DESIGN AND INSTALLATION**

The national standard for installation of home fire sprinkler systems is NFPA 13D: Standards for Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, 2002 edition. This standard is available for purchase, and downloadable at the NFPA website ([www.nfpa.org](http://www.nfpa.org)). There may be local adaptations of NFPA 13D or local building code variations that installation professionals will be aware of.

NFPA 13D requires water sprinklers to run for at least 10 minutes. It also requires sprinklers be installed in living areas of the home; they are not required, for instance, in small bathrooms, clothing closets, pantries, garages, carports, attics, crawl spaces, or entrance foyers.

Sprinkler systems can be either stand alone systems with their own dedicated water supply or multi-purpose systems in which the water supply is shared between domestic use and fire-protection needs.

Residential fires sprinkler systems may also be either wet or dry systems. In a wet system, water is in the piping system up to the sprinkler head and immediately flows when the head is activated. In a dry system, the pipes are charged with air. When the air is released by sprinkler head activation, a valve then allows water to flow. Dry systems are normally utilized in unheated or non-insulated areas of buildings. By keeping standing water out of the pipes until needed, freezing and bursting of the plumbing is avoided.

Home fire sprinkler systems should be installed by professional fire sprinkler contractors with the requisite knowledge and experience to produce a safe and cost- efficient system. In most states, sprinkler installers must be licensed. Local contractors can be found by checking with the State Licensing Board or by searching the contracting directories on the websites of the National Fire Sprinkler Association or the American Fire Sprinkler Association.

## **EFFECTIVENESS**

The effectiveness of sprinklers in commercial buildings is beyond question. In over 100 years of commercial use, with the exception of the 2001 terrorist attacks, there has never been a multiple loss of life (>3 persons) fire in any fully fire sprinkler system equipped building. The fire death rate in hotels and motels is 1.6 deaths per thousand fires in fire sprinkler- equipped properties versus 9.1 deaths per thousand fires where no fire sprinkler systems existed.

The greatest number of lives lost and injuries from fires occur in residential buildings, especially one and two story dwellings. More than 80% of all fire deaths occur in the home setting.<sup>2</sup> The success rate in residential structures is equally impressive. A National Fire Protection Association (NFPA) report indicates fire deaths per 1000 fires were reduced by 57% in homes with fire sprinklers.<sup>11</sup> The NFPA also reports people who have smoke alarms in their home have a 50% improved chance of surviving a fire. Fire sprinklers coupled with properly working smoke alarms

can reduce the risk of fire death by 82%.<sup>12</sup>

A number of communities require installation of residential fire sprinkler systems, usually in new construction. In Napa, California, and Cobb County, Georgia there has not been a single residential fire fatality in any residence equipped with fire sprinklers. There has not been a single fire fatality in Prince George's County, Maryland in any building with a fire sprinkler system. Scottsdale, Arizona credits fire sprinkler systems with saving up to 52 lives since residential fire sprinkler legislation was passed in 1985.<sup>11</sup>

The City of Columbia and surrounding Richland County in South Carolina reviewed their experience with apartment fires.<sup>13</sup> Between January 1, 1991 and December 31, 2000, there were 1304 apartment fires. In these, nine occupants died and 95 were injured. Seventy-six fire fighters were injured fighting these fires. There was \$17.5 million in property damage. Smoke alarms were present and operating in about 50% of the cases. They were present and not operating in about 25% and not present at all in about 25%. Fire sprinkler systems were present in only 14 incidents. In seven of these incidents, the fire was too small to activate the fire sprinkler head. In these 7 cases there were zero deaths, two injuries to occupants (in contact with the fire), no injuries to firefighters, and only \$1,695 per case in property damage. In seven incidents where fire sprinkler heads were activated, there were no injuries or deaths among occupants or firefighters and \$8,800 in property damage. With a fire incidence of 5,762 residential fires over a 10-year period 1991-2000, the Columbia Fire Department estimates that residential fire sprinklers could have saved 51 lives, prevented 291 injuries to occupants, and 214 injuries to fire fighters over that period. Fire sprinklers would have saved approximately \$38 million in property loss from fire, smoke and water.

While the primary purpose of residential sprinklers is life safety, a side benefit is reduction in property loss. According to the NFPA, the average property loss in homes with fire sprinklers is

38% lower than in homes without fire sprinklers.<sup>11</sup> Scottsdale, Arizona mandated sprinklers in 1986. In a report documenting 15 years of experience, the average fire loss in homes with fire sprinklers was \$2,166 compared to \$45,019 for homes without fire sprinklers.

## **ADVANTAGES OF RESIDENTIAL FIRE SPRINKLER SYSTEMS**

### **A good investment for homebuilders and developers**

Through building code alterations, construction trade-offs and alternatives for development site plans, homebuilders and developers can achieve reduced construction costs to offset the costs of including residential fire sprinkler systems. Building code alternatives can reduce the need for fire retarding requirements in walls, attics and doors, decreasing construction costs. Site plan alternative for developments with residential fire sprinkler systems can allow increased housing density and variations in street width.

### **A good investment for the homeowner and buyer**

The primary benefit of a residential fire sprinkler system is that the lives of the occupants are protected, particularly in households with children, senior citizens and or the mobility challenged. The secondary benefit is that property is protected. A number of insurance companies provide premium reduction of up to 30% for homes protected by fire sprinklers. Like any other household improvement, the installation of a residential fire sprinkler system adds value to the home.

### **A good investment for the community**

In communities where installation of residential fire sprinkler systems is encouraged or mandated the actual number of fires may not be reduced, however the severity of the fires will be less, with a concomitant decrease in the extent of personal injury and property damage. Fire fighter calls will be to smaller fires, taking less time and fewer firefighters to control the fire. There is also

a greatly reduced risk of injury to the firefighters. Since fire responses are only one of many activities of firefighters, they will have more time to spend on medical calls, public education, hazardous material response and homeland defense. Their resources can be better allocated and communities will be able to make better utilization of available land and thereby increase their tax base.

## **SPRINKLER MYTHS**

There are many misconceptions surrounding residential fire sprinkler systems. These myths may hinder homeowner acceptance of residential sprinkler systems and are often used by opponents of sprinkler legislation

### **NONE OF THE FOLLOWING MYTHS ARE TRUE**

#### **Residential fire sprinkler systems flood the house or cause extensive water damage.**

Because sprinklers activate early and control or contain the fire, water flow from the residential sprinkler systems actually causes *much less* water damage than a fire department. In the event of a fire, a sprinkler head will come on immediately and will typically discharge 18 gallons of water per minute until the fire is suppressed. The fire department will arrive later, when there is more fire to extinguish and will typically apply 300 gallons of water per minute at high pressure for longer periods of time. The difference on property damage costs:

- Average loss in a home equipped with a residential fire sprinkler system: \$2,166.00
- Average loss in a home without a residential fire sprinkler system: \$45,019.00

A further consideration is that the water flow on the sprinkler system can be connected to a central monitoring station, allowing immediate fire department notification when the system activates. If no one is at home, the time saved in fire department notification will be substantial.

**If one sprinkler head activates, then all the heads will go off.**

Sprinkler heads operate independently of each other and can only be activated by heat exceeding 135-165 °F. Residential sprinkler systems are designed with the goal of one sprinkler head per room or per 400 square feet. In the event of a fire, water from the activated sprinkler head suppresses the fire so that normally no other sprinkler heads are activated.

**Sprinkler systems can leak or malfunction or discharge in the absence of a fire.**

In truth, the incidence of sprinkler head activation in the absence of heat is extremely low. Factory Mutual Insurance Company suggests the incidence of false activation is 1 in 16 million sprinkler heads per year. The leak rate of residential sprinkler systems is significantly below that of the remainder of the home plumbing. Unlike normal plumbing, there is no significant wear and tear from constant use.

**Sprinkler heads are unsightly.**

Modern fire sprinkler heads can be almost invisible, blending in with the ceiling. They come in colors to match your ceiling and walls. Recessed models are available that are hidden by a faceplate.

**Sprinkler systems are expensive to install.**

The cost for installation of residential fire sprinkler systems varies by geographic region. The average cost is between \$1.00 to \$1.50 per square foot in new construction. In most cases this will be less than the amount it would cost to add wall to wall carpeting or to install a watering sprinkler system for the lawn. Retrofitting sprinkler systems to existing structures will cost approximately 20% to 30% above the cost of new construction. This cost may be offset by reduction in insurance premiums.

## **MEDIA GUIDE/PUBLIC EDUCATION MATERIALS**

### **MEDIA GUIDE**

A key factor determining the success of your burn prevention campaign is your ability to generate media interest and news coverage. The media is one of your most powerful links to the community. One news story can reach more people than the hardest-working volunteers could ever reach in person or at the local health fairs. By gaining the interest and respect of the media, you can increase awareness in a large portion of your local community.

Your campaign activities will be more interesting to various media sources if you augment national statistics with local data on fire deaths, injuries and property damage. Injury data, however, does not have to be statistics alone. Information about the experiences of being burned, the pain of treatment and rehabilitation, and the long-term emotional effects of burns are also compelling and meaningful story angles. Your first step should be to gather this and other data. This will enable you to create your own local residential fire sprinkler system fact sheet.

### **Publicizing the residential fire sprinkler systems campaign**

There are many ways to publicize your residential fire sprinkler system campaign. These include:

- Holding press conferences and providing written supplemental information.
- Sponsorship of an event, perhaps in partnership with a local residential fire sprinkler system supplier, installer or local building supply store.
- Suggesting a story idea to local newspaper health reporters.
- Sending timely news releases to reporters and media contacts.
- Providing firefighters or burn care professionals for interviews or guest appearances on local radio and TV talk shows.
- Maintaining a list of burn survivors who are willing to share their experiences and who have the attributes necessary to make good spokespersons.

It is strongly suggested that you plan a local event and hold a press conference at the beginning of your campaign. You may want to hold your press conference to kick-off National Burn Awareness Week (the first full week in February of each year). It must be emphasized, however that this "week" is only a kick-off - burn awareness must continue to be promoted all year long. Do not stop at doing just one event. Perhaps you can plan a quarterly event and thereby reach the public four times a year.

### **TIPS ON WORKING WITH THE MEDIA**

1. It is very important to establish a close relationship with all varieties of news media in your region -newspapers, magazines, radio and television (especially cable). If you do not already have a media list, develop a complete list including the names, addresses, telephone and fax numbers, and email addresses of all media contacts. Be sure to get the name of the media representative at that publication or station that handles health and medical issues. These people change positions and/or responsibilities quite often, especially in the larger cities, so try to update the list at least twice a year. (Note: Your organization's public relations department may already have this information, which could be made available for you to use).
2. Establish deadlines with each contact. Know how much lead-time they need to receive articles for publication, for calendar listings, and for news conferences.
3. Be concise but informative when using press releases. Make it of interest. Use local statistics when possible. Use quotes of key people involved. Be certain to include the date, contact names, and telephone numbers for further information.
4. Allow sufficient time for a news release to be received and then follow up by telephone.

Offer additional information if needed. You can make it easier for the interviewer (few notes) by providing supplemental written information or press packets. This also reduces the likelihood that you will be misquoted.

5. Sample public service announcements (PSAs) have been included in this campaign kit. Issue these and/or build your own (using local and /or regional data or incidents when possible). A quote from the medical director of your local bum center and your local fire chief will definitely add credibility and interest to the PSA.

## **Sample Public Service Announcement (PSA)**

**Contact Name:**

**Organization:**

**Telephone:**

**Buzz phrases:**

Residential sprinklers save lives

Residential sprinklers are the most effective fire life saving tool /fire prevention tool

If you think Residential sprinklers are expensive, look at the cost of a funeral

Residential sprinklers reduce the devastating effects of fires

Let's get the message out

**Sample messages to attach to above:**

1) This years Burn Prevention Campaign is aimed where the majority of fire deaths occur -where we live. Public education and other safety measures can reduce the incidence of these fires, but unfortunately they will continue to occur. Residential fire sprinkler systems have the ability to not only detect a fire, but to begin the job of putting it out. In doing so, they can significantly reduce the incidence of death or injury to the occupants and firefighters, and to reduce the extent of property damage.

2). Firefighters and others who see the devastating effects of fire know the value of residential fire sprinkler systems. Despite this the public awareness of the benefit of sprinkler systems is poor and misconceptions are common. The facts: residential fire sprinkler systems do not go off accidentally. If there is a fire, the water damage from sprinklers will be minimal compared to the amount of water that firefighters will have to use because the fire will be larger. And sprinklers can blend in to the decor of your home.

3) Two weeks ago, the Smiths moved into their brand new 2000 square foot home. They spent \$10,000 dollars on a counter-top, \$4,000 dollars on wall-to-wall carpeting and \$5000 dollars on a lawn sprinkler system. Today, their house burned to the ground. Too bad they didn't spend \$4,000 on a residential fire sprinkler system. For more information contact your local Fire Department (insert local identification).

4) Residential fire sprinkler systems save lives, property and money. For more information contact your local Fire Department (insert local identification).

## REFERENCES

1. Smith LE Fire incident study: National smoke detector project. US Consumer Product Safety Commission January 1995
2. Nicholson, J: Welcoming sprinklers into the home. NFPA Fire Journal 2005; July-August pp38- 43
3. Petraglia, JS: Fire and the aging of America. NFPA Journal 199 1, March-April, 3 7-46
4. Smith, LE, Smith CL & Ayes JL: When detectors don't work. NFPA Journal 1997 Sept/Oct 41-45
5. Ahrens, M: US experience with smoke alarms and other fire detection/alarm equipment. National Fire Protection Association, November 2004
6. National Fire Alarm Code, NFPA 72, 2002 edition. Quincy MA: National Fire Protection Association, 2002.
7. Cote, AE & Fleming, RP: Fast-response sprinkler technology. In Cote, AE & Linville, JL, eds: Fire Protection Handbook, 18<sup>th</sup> Edition. Quincy, MA: National Fire protection Association, 1997
8. Wolf, A: A Tough sell. NFPA Journal, March-April 1998 59-63
9. Research Highlights, Canada Mortgage and Housing Corporation Series 04-004, Aug 2004. Available at [www.crnhc.ca](http://www.crnhc.ca)
10. US Fire Administration: Smoke and carbon monoxide alarms for your manufactured home. Available at [www.usfa.fema.gov/safety/atrisk/manufactured](http://www.usfa.fema.gov/safety/atrisk/manufactured)
11. National Fire Sprinkler Association: The Case for Residential Sprinklers. [www.nfsa.org/info/thecase.html](http://www.nfsa.org/info/thecase.html)
12. Dewar, B: Residential Sprinklers for Life Safety. National Fire Sprinkler Association, 2001
13. Data from the Columbia SC Fire Department ([www.columbiasc.net/fire](http://www.columbiasc.net/fire))

## RESOURCES

### General

- 1) BURN PREVENTION: <http://www.burnandfireprevention.org>
  - This is an invaluable source of information about burn prevention issues.
- 2) AMERICAN BURN ASSOCIATION: <http://www.ameriburn.org>
  - The official web site of the American Burn Association. Under "Prevention" (<http://www.ameriburn.org/Preven/Prevention.htm>) are all of the previous Burn Awareness Week campaigns.

### Smoke Detectors and Carbon Monoxide Detectors

- 1) SMOKE ALARM PERFORMANCE IN RESIDENTIAL STRUCTURAL FIRES:
  - US Fire Administration, Topical Fire Research Series, Volume 1, Issue 15, March 2001. Available at USFA or burnandfireprevention websites
- 2) SMOKE ALARMS / SMOKE DETECTORS
  - Residential Fire Safety Institute [www.firesafehome.org](http://www.firesafehome.org) or direct link at <http://www.firesafehome.org/detection/smokealarms.asp>
- 3) IT'S YOUR HEALTH: SMOKE DETECTORS
  - Available from Health Canada at [www.hc-sc.gc.ca/english/iyh/products/smoke\\_detectors](http://www.hc-sc.gc.ca/english/iyh/products/smoke_detectors) or at the direct link of <http://www.hc-sc.gc.ca/Jiyh-vsv/prod/detecte.html>
- 4) U.S. FIRE ADMINISTRATION: SMOKE AND CARBON MONOXIDE ALARMS
  - <http://www.usfa.fema.gov/safety/alarms/> (Smoke alarms)
  - <http://www.usfa.fema.gov/safetyco/> (direct link to CO alarms)

### Sprinklers

- 1) THE AMERICAN FIRE SPRINKLER ASSOCIATION (AFSA):  
<http://www.sprinklernet.org>
  - There is a large amount of sprinkler related information primarily aimed at Sprinkler professionals. There is information about conventions, education, technical information, and general sprinkler information. It lists up-to-date news items related to sprinklers and follows legislation related to sprinklers.
- 2) U.S. FIRE ADMINISTRATION (USFA):  
<http://www.usfa.fema.gov>
  - This has a number of downloadable documents on the development, deployment and effectiveness of residential sprinkler technology.

3) HOME FIRE SPRINKLER COALITION (HFSC):

<http://www.homefiresprinkler.org>

- HFSC members include: American Fire Sprinkler Association (AFSA), Canadian Automatic Sprinkler Association (CASA), National Fire Protection Association (NFPA), National Fire Sprinkler Association, Fire Sprinkler Public Education Foundation, Underwriters Laboratories Inc. and the US Fire Administration (USFA).

4) RESIDENTIAL FIRESAFETY INSTITUTE (FWSI):

<http://www.firesafehome.org>

- RFSI is a public interest group created in 1982 to provide fire safe homes through built in fire protection and fire safety education. Originally known as Operation Fire Safety, the name was changed in June 1999.

5) NATIONAL FIRE SPRINKLER ASSOCIATION (NFSA):

<http://www.nfsa.org>

- Information includes articles, case studies, technical data, sprinkler Contractor Safety bulletins, and video clips.

6) NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):

<http://www.nfpa.org>

- NFPA is a non-profit association whose mission is to reduce the worldwide burden of fire.
- It represents a cross section of the industry -firefighters, architects, engineers, insurance companies, manufacturers, code officials, and inspectors and equipment installers.
- NFPA is responsible for developing Sprinkler Codes among many others.

## **Books**

1. The Design and Layout of Fire Sprinkler Systems; Browann, M. Technomic Publications 1997.
2. Automatic Sprinklers and Standpipe Systems; Bryan, J.L.; NFPA 1997
3. Automatic Sprinkler Systems Handbook, 8<sup>th</sup> Ed.; Puchovsky, M.T.; NFPA 1999

## **OTHER REFERENCES**

1) COLUMBIA, S.C. FIRE DEPARTMENT:

Columbia, S.C Fire Department. <http://www.columbiasc.net/fire/>

Under statistics are good articles and about fire incidence, safety, some alarms, and sprinklers.

([http://www.columbiasc.net/fire/FIC2000\\_Frarneset.htm](http://www.columbiasc.net/fire/FIC2000_Frarneset.htm)) and

([http://www.columbiasc.net/fire/apt\\_cov.htm](http://www.columbiasc.net/fire/apt_cov.htm))

2) WELCOMING SPRINKLERS INTO THE HOME; John Nicholson. NFPA Journal

Direct web address to article:

<http://www.nfpa.org/publicJournalDetail.asp?categoryID=1029&itemID=24968&src=NFPA>

Journal NFPA Journal July /Aug 2005 (<http://www.nfpa.org> NFPA home page)

3) THE CASE FOR RESIDENTIAL SPRINKLERS (4/25/2005 )  
<http://www.nfsa.org> (home page National Fire Sprinkler Association)

4) CANADA HOUSING FIRE STATISTICS (August 2004): <http://www.cmhc.ca>

The project developed statistical benchmarks and examined indicators related to fire losses in housing in Canada to provide better understanding of fire risk. The project considered broad benchmarks such as fire incidence, population and number of residential units, and looked at data on the type and age of residential units, ages of victims, urban vs. rural location, size and crowding of households and ignition scenarios. Recommendations are offered for the improvement of data collection to support improved analysis of fire risk in the future.

5) RESIDENTIAL FIRESPRINKLERS FOR LIFE SAFETY; AN ECONOMIC AND INSURANCE PERSPECTIVE : Buddy Dewar, NFSA (Feb 25,2001)

Buddy Dewar, Director of Regional Operations  
<http://www.nfsa.org> (home page National Fire Sprinkler Association)

6) SUBSTANCE ABUSE IN VICTIMS OF FIRE. D. Barillo and R. Goode.  
Journal of Burn Care and Rehabilitation 17(1):7 1-76. 1996.  
(<http://www.tf.org/tf/alcohol/ariv/iniury5.html#4>)

Direct link to article (<http://www.burncare rehab.com>) Web site to Journal of Burn Care and Rehabilitation

7) AUTOMATIC SPRINKLERS, A TEN YEAR STUDY.

A detailed history of the effects of automatic sprinkler code in Scottsdale Arizona; produced with HFSC 1997.

<http://www.homefiresprinkler.org/ResourcesScottsdale.htm> (see right hand side of page)

## USER SURVEY

We appreciate your suggestions and recommendations for future Burn Awareness Week campaigns. Please use the reverse side for additional comments. Please complete this form and return to:

American Burn Association  
625 N. Michigan Ave., Suite 2550  
Chicago, IL 60611  
Fax: 312-642-9130

Date:

Profession (circle): Nursing    Fire/Life Safety Educator    Public Health Educator    Other

1. Did the content covered in the campaign kit meet your learning needs? Yes    No  
If you answered no, please specify what we can include to meet your needs.
2. Was the length of the subjects adequate to cover all information you feel you needed? Yes    No
3. Were the resource materials helpful? Yes    No
4. What did you like most about the campaign?
5. What did you like least about the campaign?
6. How did you hear about the Burn Awareness Week Campaign Kit? Check all that apply.
  - ABA website
  - Postcard mailed to institution
  - Journal of Burn Care and Rehabilitation
  - Word of mouth
  - Other:
7. How did you obtain the materials?
  - Obtained hard copy (of PowerPoint presentation) from the ABA Central Office
  - Downloaded from the ABA website
  - Other:
8. What parts of the campaign kit did you use? Please check all that apply.
  - Educator's Guide
  - Public Education Materials
  - Statistics Fact Sheets
  - Press Releases
  - Publicity
  - Public Service Announcements

## **ACKNOWLEDGEMENTS**

**This Campaign Kit was developed by the  
American Burn Association Burn Prevention Committee  
Burn Awareness Week Campaign Sub-committee, 2005-2006**