

Cost Effectiveness of Fire Sprinkler Equipment

*Report to the General Assembly
Pursuant to T.C.A. § 68-120-101(a)(9)*



Department of Commerce & Insurance

May 14, 2010

TABLE OF CONTENTS

Introduction	1
Fire Deaths in Tennessee	1
Report Methodology	4
Scope of the Report	7
Operation of a Fire Sprinkler System (NFPA 13D Standard)	10
Costs	12
Increases to the Costs of Residential Construction	12
National Study	12
Pleasant View	14
Nolensville and Piperton	15
Nashville/Davidson County	16
Cheatham County	17
Germantown	17
Non-Jurisdiction Specific Cost Data	17
Rural Areas/Low Pressure Areas – On Site Water Supply	18
Maintenance of a Sprinkler System	19
Sprinkler Discharges for Reasons other than Fires	19
Benefits	20
Reducing the Loss of Life	20
Reduction in Property Damage and Insurance Premiums	21
Construction Incentives	23
Effectiveness of Sprinklers	24
Conclusion	25
Appendix A: 2009 Fire Death Rates and Structure Loss by County	27
Appendix B: Tennessee Communities with Fire Sprinkler Requirements ...	28
Appendix C: Notice of Solicitation of Public Comments	29
Appendix D: Sprinkler Information Sheet for Homeowners	30
Appendix E: ISO Fact Sheet	32
Appendix F: Home Builders Association of Tennessee Response	33
Appendix G: Fire Coalition Response	36
Appendix H: Tennessee Manufactured Housing Response	43

Cost and Effectiveness of Fire Sprinkler Equipment
Report to the General Assembly
Pursuant to T.C.A. § 68-120-101(a)(9)

Introduction

Fire Deaths in Tennessee

Nearly 3,000 people die in home fires nationally each year. Eighty-four percent of the people who died in fires in 2005 did so in one- and two-family homes, an increase from the previous year. Eighty-five percent of fire fighter deaths occurred in one- and two-family residences.¹

Tennessee has a fire death rate that is of concern to Tennessee's legislative and executive leaders. Tennessee's fire death rates have been stated in various forms:

- More than 100 people die annually in Tennessee from fires.²
- According to statistics from the United States Fire Administration in 2006, Tennessee ranked 3rd in the nation on the number of fire deaths per capita.³
- In 2009, Tennessee had 67 fire-related fatalities, down from 73 in 2008. Seventy-four percent of these 67 occurred in one- and two-family dwellings. There were seven multiple-fatality fires reported in the media in 2009, resulting in 16 civilian deaths. At least two of these incidents involved arson, resulting in six fatalities.⁴

While Tennessee's ranking varies from year to year, Tennessee continually ranks among the five worst states in fire death rates. Those at greatest risk to die in a fire are adults over 65 and children under 5. Regardless of which statistic is examined, year after year Tennessee's fire death rate is too high.

The Southeast is the nation's most populous region and contains nearly half the total U.S. rural population. Rural communities, defined by the U.S. Census Bureau as communities with populations of fewer than 2,500, have a fire death rate of twice the national average.⁵ The primary defining characteristics of rural America are poverty and separation, separation of communities from one another and separation of residents from

¹ *Protect What You Value Most*, Home Fire Sprinkler Coalition citing NFPA data.

² Comments of Chief Marty Bowers, President, Tennessee Fire Chiefs Association, and Mr. Charlie McFarland, President, Tennessee Firemen's Association.

³ Comments of Wayne Waggoner, Executive Director, Tennessee Fire Sprinkler Contractors Association, dated January 5, 2010, and Chief Shane Ray, Pleasant View Volunteer Fire Department, dated 12/31/2009.

⁴ *2009 Media-Reported Fire Deaths in Tennessee*, submitted by Mr. Wayne Waggoner, Fire Team Tennessee. Data relating to victim age and gender and county of death are included in the report.

⁵ *Mitigation of the Rural Fire Problem, Strategies Based on Original Research and Adaptation of Existing Best Practices* (FEMA U. S. Fire Administration, December 2007) at page 1.

one another. The low density of rural communities means a loss of economies of scale and of concentration making it difficult to support a full-time fire department. (Poverty is also a characteristic in the largest urban areas.)⁶ Rural areas are very likely served by an all, or mostly volunteer, fire department which typically has less of the needed equipment and needed training, insufficient personnel and fewer fire prevention programs, greater travel distances and travel time and often do not meet the NFPA 1720 standard for fire department operations. To state it another way, rural fire departments are often underfunded, undertrained and understaffed. In addition, many rural areas do not have fire and building code enforcement in effect.⁷ Attached as Appendix A is county by county summary showing fire deaths in Tennessee in 2009 and structure fire loss information. Having properly working smoke alarms is still an important factor in decreasing the fire death rates.⁸ According to Tennessee Fire Information Reporting System Data (TFIRS) collected for 2005 – 2009, 48% of Tennessee home structure fires had no working fire alarm.⁹

According to data from the U.S. Fire Administration, the rate of house fires dropped from 36.3 to 13.2 fire deaths per million persons from 1979-2006. Fire fatalities have been steadily, and even dramatically, decreasing over the last 45 years. In 1960, 7,645 Americans died as a result of fires. By 2008, the total had declined 64 percent to 2,780. As noted below, the decline in the fire death rate from house fires dropped even more dramatically. Home builders contend the trend will continue as new homes replace older homes and smoke alarms in homes are improved. Home builders' comments state that from 1980 to 2005, one- and two-family housing stock grew by more than 45% while the number of one- and two-family fires decreased by 51%. And, while the population grew by more than 30% during the same time, the fire fatalities in one- and two-family

⁶ Mitigation of the Rural Fire Problem, *Strategies Based on Original Research and Adaptation of Existing Best Practices* (FEMA U. S. Fire Administration, December 2007) , which states “The most important correlated characteristic of rural America is a greater likelihood of being poor” and “Poverty is more important than distance as a factor driving the higher fire risk in rural America.” (Discussion of amount of flame damage....page 2, greater in rural areas, i.e., extended to entire structure.)

⁷ Comments of Chief Shane Ray, Pleasant View Volunteer Fire Department, using Pleasant View and Cheatham County as examples state that because fire department deployment can not be made in time to save lives, sprinklers are the only alternative.

⁸ Mitigation of the Rural Fire Problem, *Strategies Based on Original Research and Adaptation of Existing Best Practices* (FEMA U.S. Fire Administration, December 2007) at page 3.

⁹ TFIRS information does distinguish “rural” fire fatalities, which may be a higher percentage.

dwellings decreased by 38%. Although no data is collected on the age of homes experiencing fires, home builders commented that there is sound evidence that the age of a structure is an important factor and that fire data showing the continuing decline in the rate of fire incidents are consistent with older homes being replaced by newer homes.¹⁰ Other issues besides the age of a home that impact the fire death rate are the activities of residents within the home (accidental causes), interior finishes, the combustibility of building contents¹¹, the volume of contents and the materials (and toxicity thereof) of which contents are made.¹² In order to have a more complete picture of whether newer construction is less likely to experience a fire, it has been suggested that data should be kept relating to the age of the structure at the location of the fire. The TFIRS, which uses the national (NFIRS) methodology, does not collect age of home data. TFIRS is an incident based system. Building permits cannot be tracked because the permitting of a building does not create an incident response. However, the fire service could be required to report age of structure on a structure fire report and the Department will request this information. Even if the age of the structure is reported, only the actual year the original structure was built is readily available online from the Comptroller of the Treasury's website. If and when a particular code was adopted, when additions were constructed or remodeling done, and whether or not an inspection was made on a structure that burned is not readily available

The University of Tennessee has recently begun a “Tennessee Civilian Fire Mortality Study” that will examine the death rate due to fires in Tennessee. The goals of this study will be to determine if there are factors or circumstances that are different in Tennessee than in other states and to then propose solutions aimed at reducing the civilian fire related deaths. This study is scheduled to be concluded by October 1, 2010.

¹⁰ Comments submitted by the Home Builders Association of Tennessee, stating that 89% of likely voters surveyed believe that smoke detectors already do an adequate job of protecting them in their homes and 28% do not want sprinklers at all, even if they were provided free of charge. This is in contrast to information presented by the Fire Sprinkler Coalition which stated that in a survey of more than 1000 adults, 47% said they would definitely consider installing a home fire sprinkler system if they were building a new home. (With respect to the 28% of people who did not want sprinklers noted here, public education about the operation of a fire sprinkler system and benefits should reduce this number.)

¹¹ *Built for Life*, Home Fire Sprinkler Coalition, submitted by Mr. Wayne Waggoner, which quotes Mr. Richard Bukowski, a National Institute of Standards and Technological Researcher, as saying, “...fires today seem to burn faster and kill quicker, because the contents of modern homes (such as furnishings) can burn faster and more intensely.”

¹² Comments of Chief Marty Bowers, President, Tennessee Fire Chiefs Association.

The 2009 International Residential Code adopted by the International Code Council contains a one- and two-family sprinkler requirement effective in 2011. Local governments in Tennessee may impose a sprinkler requirement but state law does not provide for a statewide sprinkler requirement.

Legislative Directive

Tennessee Code Annotated, Section 68-120-101(a)(9), which passed in the 2009 legislative session and becomes effective July 1, 2010, directs the following with regard to the Department of Commerce and Insurance:

The department shall analyze the cost and effectiveness of sprinkler equipment in one-family and two-family dwellings in areas where residential sprinklers are in use, including Tennessee¹³ and other states deemed appropriate by the department, and report the results of such analysis to the general assembly on or before May 1, 2010. In conducting such analysis, the department shall seek input from nonprofit and business groups or organizations including, but not limited to, the Tennessee Fire Chiefs Association and the Home Builders Association of Tennessee.

Pursuant to this directive, this report attempts to analyze costs (costs of sprinkler installation and maintenance offset by any savings to an owner as a result of possible insurance premium savings and, to the extent information was available, reduced cost of fire department services) and fire sprinkler system effectiveness in terms of saving of lives and property.¹⁴ Since the legislative directive did not seek recommendations, the Department limited its report providing the requested information to the extent that such information was available to the Department. Since the legislative directive did not seek recommendations, the Department limited its report to providing the requested information to the extent that such information was available to the Department.

Report Methodology

The methodology used by the Department to conduct this legislative directive utilized the following process:

1. Solicitation of Public Comments¹⁵
2. Public Comments (December 31, 2009)

¹³ A listing of Tennessee communities with fire sprinkler requirements is listed in Appendix B, provided by Mr. Wayne Waggoner.

¹⁴ Some of the materials submitted use national estimates, such as the *Built for Life*, Home Fire Sprinkler Coalition materials which state a “conservative estimate” of 1% to 1.5%, noting that increasing demand is driving down costs.

¹⁵ Copy of Notice attached as Appendix C.

3. Comment/Research Review (February 28, 2010)
4. Draft Report for Public Comment (April 15, 2010)
5. Stakeholder Meeting (April 16, 2010)
6. Final Report (May 1, 2010)¹⁶

The following is a list of parties that responded to the request for comments and provided written information to the department:

Vickie Pritchett	Project Manager, Fire Team USA
Charlie McFarland	President, Tennessee Firemen’s Association ¹⁷
Chuck Walker	Fire Chief, Ashland City Fire Department
Shane Ray	Fire Chief, Pleasant View Volunteer Fire Department ¹⁸
Marty Bowers	Tennessee Fire Chiefs Association
Roger Campbell	Assistant City Manager, Maryville, Tennessee ¹⁹

¹⁶ The final report attempted to clarify portions of the draft report that stakeholders interpreted differently that what was intended and included some of the corrections and comments from the stakeholder meeting. Additionally, each stakeholder was asked to submit up to 10 pages of response to the report.

¹⁷ Comments of Mr. Charlie McFarland, President, Tennessee Firemen’s Association, a cooperating member of the Tennessee Fire Service Coalition, in support of life safety code requirements, dated 12/31/2009.

¹⁸ Chief Shane Ray, Pleasant View Volunteer Fire Department, submitted comments and referenced the following information: United State Fire Administration Quick Stats (2006) - www.usfa.dhs.gov/statistics/state/index.shtml; *Tennessee County Fire Handbook*; Kevin Lauer – University of Tennessee County Technical Assistance Service – <http://tn.gov/commerce/sfm/documents/CTASrePort.pdf>; *Chief Fire Officer’s Desk Reference*; Edited by John M. Buckman III, (2006) Jones and Bartlett Publishing; *Making the Decision Regarding Fire Sprinklers: Homebuilders Who Say Yes!* Vickie Pritchett, Fire Team USA – www.fireteamusa.com/resources; *Population Projections for the State of Tennessee, 2010 – 2030* – A joint publication of the Tennessee Advisory Commission on Intergovernmental Relations and The University of Tennessee Center for Business and Economic Research – http://www.state.tn.us/tacir/PDF_FILES/Other_Issues/Population2010.pdf; *A Needs Assessment of the US Fire Service* – NFPA (2002) – <http://www.nfpa.org/assets/files/pdf/needsassessment.pdf>; *Mitigating the Rural Fire Problem* – United States Fire Administration (2007) – <http://www.usfa.dhs.gov/downloads/pdf/publications/MitigationRuralFireProblem.pdf>; Rural Assistance Center Statistics – <http://www.raconline.org/states/tennessee.php>; Energy Efficiency makes homes more affordable – http://www.habitat.org/env.pdf/energy_efficiency.pdf; NFPA 1720 – Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments – (2004) National Fire Protection Association; Voluntary Private Residential Fire Sprinkler Systems – Washington State – <http://sbcc.wa.gov/Page.aspx?nid=115>; – NFPA Research Foundation – *Home Fire Sprinkler System Cost Assessment* <http://www.nfpa.org/assets/files/PDF?Research/FireSprinklerCostAssessment.pdf>; *Integration of Residential Fire Sprinklers with Water Supply Systems* – NFPA <http://www.firesprinklerinitiative.org/assets/files/FSIWaterSupplyIntegration.pdf>; Residential Sprinklers IS) Fact Sheet – Insurance Services Office – <http://www.firesprinklerinitiative.org/assets/files//ISOsprinklers.pdf>

¹⁹ Mr. Roger Campbell, Assistant City Manager for the City of Maryville, commented that the matter of requiring residential sprinklers needs a thorough (sic) public discussion prior to the issuance of any

Brooks and Arlyne Euler	Sent via email (brooks3@charter.net) ²⁰
Terry Franklin	Building Official, City of Belle Meade
Susan Ritter	Executive Vice President, Home Builders Association of Tennessee, submitting information from the National Association of Home Builders
Maria Figueroa	Regional Manager, NFPA Fire Prevention Field Office
Danny Hunt	Fire Marshall, Nashville Fire Department ²¹
Joseph Graves	Sent via email (joe@ihatebuyinginsurance.com)
Ray Crouch	Consultant, University of Tennessee Municipal Technical Advisory Service, submitted by email (ray.crouch@tennessee.edu) ²²
Scott White	Southern Strategy Group ²³
Dewitt Langford	District Design Manager, CET ²⁴
Rick Piratzky	National Builder Sales Manager-South, Uponor
Jacob Gordon	Sent via email (jacob.gordon@ymail.com), Nolensville
William White	Civil engineer (states that he does not have a fire control background), submitted by email (tenn357@yahoo.com)
Wayne Waggoner	Executive Director, Tennessee Fire Sprinkler Contractors Association ²⁵

recommendations or rulemaking, and that communities' issues, such as a residential sprinkler requirement, should be the option of the local legislative bodies.

²⁰ Commented regarding balance between government passing laws that require free citizens to spend money as an example of an Orwellian "Big Brother" and expressing opposition to costs and stating that system malfunction would not be covered by insurance fully due to deductible.

²¹ Chief Danny Hunt, Metropolitan Government of Nashville and Davidson County, comments that at present Nashville has no plans to adopt a residential sprinkler ordinance, however, to make some serious steps toward reducing fire death, home sprinklers should be looked at, dated 12/4/2009.

²² Attached copies of *New Study Finds Residential Sprinkler Ordinance Does Not Hurt Real Estate Market*, National Fire Protection Agency News Release (August 11, 2009); *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (Copyright June 2003).

²³ Mr. Scott White submitted study information (*Home Fire Sprinkler Cost Assessment* from the Fire Protection Research Foundation, a fact sheet prepared by the nonprofit Home Fire Sprinkler Coalition, Inc., a listing of communities around the country that have enacted sprinkler ordinances) and provided links to: <http://www.homefiresprinkler.org/FS/FSMunicipalRports.html>; <http://www.homefiresprinkler.org/>; <http://firsprinklerinitiative.org/index.asp>

²⁴ Provided *Comparative Analysis of Housing Cost and Supply Impacts of Sprinkler Ordinances at the Community Level*, Final Report, National Fire Protection Association (June 2009); *Home Fire Safety Consumer Bulletin, Why Should You Read This?*, Ryan J. Smith (Copyright 2008 Fire Smarts, LLC); Commentary on the "Homebuilder Supporting Facts on Residential Sprinklers", IRC TAG Meeting, Maria Figueroa, Regional Manager, Fire Prevention Field Office (May 7, 2009)

²⁵ Mr. Wayne Waggoner enclosed a CD with information regarding installation, cost and requirements for sprinkler systems.

Scope of the Report

The legislative directive relates to (1) **costs** and (2) **effectiveness** of one- and two-family residential sprinklers. Costs may be construed narrowly, as in the costs to a home owner for the installation, including or not including any operational costs of a sprinkler system. Costs may be considered more broadly to consider other economic benefits to the home owner, like reduced homeowner insurance cost. Benefits can be thought of even more expansively to include economic benefits to the whole community, like reduced growth in the needs of staff and equipment for fire departments, savings on insurance rates due to improved community ISO ratings and benefits to builders in the form of development tradeoffs, which should be reflected in the price of a home to a buyer.

Voluminous written materials were filed in response to the Department's public comment request. The Department has attempted to put together comprehensive summary information of the information received, allow the opportunity to comment on a draft report, and report to the General Assembly within the required timeframe. However, more resources and qualified researchers and statisticians are needed to conduct a comprehensive report on this topic particularly with respect to economic benefits to a community as a whole.

As a nation, we have limited experience in a statewide requirement of residential fire sprinklers and in residential fires where sprinklers are installed.²⁶ California, Pennsylvania, and New Hampshire have now adopted statewide fire sprinkler requirements (when the sprinkler requirement becomes effective under the 2009 IRC).²⁷ However, residential fire sprinkler ordinances have been adopted by several hundred U.S. communities.²⁸

Enough specific data to adequately address the issue of potential savings to fire department funding in this state was not received and has not been analyzed in this

²⁶ Benefit-Cost Analysis of Residential Fire Sprinkler Systems, U. S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007) states over 2002-2005, houses with sprinklers accounted for .2% of all structure fires and houses with smoke alarms only accounted for 56% at page 29.

²⁷ Announcement of the National Fire Sprinkler Association (NFSA) dated January 13, 2010, submitted by Mr. Ray Crouch, University of Tennessee, Municipal Technical Advisory Service.

²⁸ *Home Fire Sprinkler Cost Assessment*, Final Report, Fire Protection Research Foundation (Newport Partners, September 10, 2008), which developed data from 10 communities and looked at the issue of insurance premium savings.

report.²⁹ One view is that the cost of installing fire sprinklers in one- and two-family dwellings is minimal in comparison to the cost of adequately funding a fire department.³⁰ Home builders dispute that requiring fire sprinklers will decrease taxes or fees because most fire departments also provide EMS services stating the actual time spent on house fire calls is about 3% nationally.³¹ (Other information provided states this figure at 3-5%.³²) A statewide residential sprinkler requirement could mean that other functions of the department would be performed at a higher level because firefighter resources would not be expended on residential structural fires. One approach taken in some jurisdictions is to adopt a sprinkler requirement for structures greater than a certain square footage in recognition that the first responding fire service will be faced with a fire greater than suppression capabilities. During the final drafting of this report, a major residential fire study report was issued (on April 28, 2010) which was conducted by the National Institute of Standards and Technology (NIST) relating to the effects of firefighting staffing levels and crew arrival times on residential firefighting operations. However, the report did not contain information relating to the impact of residential fire sprinkler systems on fire department staff.³³

NFPA reports that 7.6 million residential fires occur annually and that homeowners extinguish 7.2 million of them without assistance. Some argue that even if a home is sprinklered, should a fire be reported, the fire department will respond with the same number of responders.³⁴ The Department has not been able to obtain specific information as to where a sprinkler requirement lessens the taxes or fees needed to fund a fire department. Fire departments in Tennessee are generally inadequately funded and

²⁹ Comments of Chief Shane Ray describe the cost avoidance in Pleasant View and provide: “In order to have the Pleasant View Volunteer Fire Department comply with NFPA 1720, the fire tax in our fire district would have to be \$0.37 per \$100 of assessed valuation. In order to adequately deploy in a life safety manner comparable to one of the 6% of career fire departments in the state, the fire tax in our district would have to be \$1.49 per \$100 of assessed valuation. ...Since the adoption of fire sprinkler requirements in new construction, we have 494 buildings built with fire sprinklers, which results in an approximate \$2,619,987 improvement in fire protection in our community that didn’t cost the existing citizens any money.”

³⁰ Comments of Chief Marty Bowers, President, Tennessee Fire Chiefs Association.

³¹ Comments of the Home Builders Association of Tennessee.

³² *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (June 2003) submitted by Mr. Ray Crouch, University of Tennessee, Municipal Technical Advisory Service at page 1-11.

³³ *Report on Residential Fireground Field Experiments* (U.S. Department of Commerce, National Institute of Standards and Technology, April 2010).

³⁴ Comments of the Home Builders Association of Tennessee.

mostly volunteer.³⁵ Statistics maintained by the Department show Tennessee has 735 certified fire departments, which consist of 43 paid departments, 110 combined departments (paid and volunteer members) and 582 volunteer departments.

Tennessee is estimated to grow by 84% in the next 20 years.³⁶ The population increase based on this growth will place increased demands on fire and emergency services with citizen expectations that a fire truck will show up in a reasonable time with capable and competent personnel.³⁷ Funding for fire departments is a matter of local public policy.³⁸ Adoption of the sprinkler requirement will change neither the role nor the function of the fire department but could enhance its ability to perform.³⁹

Smoke alarms and their effectiveness are not the topic of this report. Both smoke alarms and fire sprinklers systems play an important role in protection from fires — smoke alarms as an early warning system and a fire sprinkler system as a fire suppression and life safety device. Smoke alarm technologies are improving, including wireless smoke detectors that have the benefits of wired smoke detector systems and those with alternative signal noises that are easier for those who are at a higher risk of fire death to hear.⁴⁰ However, because homes with sprinkler systems generally have smoke detectors too, the Department was not able to find any analysis of sprinklers regarding their effectiveness independent of smoke detectors. This issue is relevant because some question whether the cost of sprinklers is outweighed by the amount of increase in fire

³⁵ *Tennessee County Fire Handbook*, The University of Tennessee County Technical Assistance Service, by Kevin J. Lauer, Fire Management Consultant, discussed fire department funding at pages 1-5, 49-50.

³⁶ Comments of Chief Shane Ray, Pleasant View Volunteer Fire Department, citing Population Projections for the State of Tennessee (2009).

³⁷ Comments of Chief Shane Ray, Pleasant View Volunteer Fire Department, also commenting that citizens will believe when they move into new construction that it will be built to the latest safety standards and most recent technologies.

³⁸ Comments of Chief Shane Ray, Pleasant View Volunteer Fire Department, which discusses funding of the Cheatham County and the Pleasant View Fire Departments (referred to in the discussion of those communities included later in this report.)

³⁹ *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (copyright June 2003) submitted by Mr. Ray Crouch, University of Tennessee, Municipal Technical Advisory Service at page 5-25.

⁴⁰ Comments of the Home Builders Association of Tennessee. But see, “These high risk groups may be unable to exit on their own, even with working smoke alarms.” *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* by Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009). Comments of Chief Shane Ray, Pleasant View Volunteer Fire Department, points out that the reduced fire death rates in our country have reached a plateau and that smoke alarms may be ineffective for the elderly and young and that fire sprinklers ensure that all have increased escape time.

safety due to sprinklers when the home already has smoke detectors.⁴¹ Because smoke alarms alert the occupant, or the occupants see the fire and extinguish it before the need for fire sprinklers, in one- and two-family residences fire sprinklers operate and are effective in suppressing 39% of the fires in one- and two-family dwellings.⁴² Sprinklers and hardwired smoke alarms together cut the occupant's risk of dying in a home fire by 82%, as opposed to having neither.⁴³

Operation of a Fire Sprinkler System (NFPA 13D Standard)

Each sprinkler operates independently, and only the sprinkler closest to the fire will spray water. About 90% of the time, one sprinkler head will contain the fire (be activated).⁴⁴

Sprinklers activate by heat, not smoke. Burning toast or cigar smoke, for example, won't activate a sprinkler. When the temperature rises to between 135 degrees and 160 degrees, usually either a glass or solder will melt and cause the sprinkler head to activate. A fire sprinkler system operates as soon as the temperature meets the threshold and controls a fire (as opposed to smoke detectors, which provide a warning).

In 1975, the National Fire Protection Association (NFPA) introduced Standard 13D: Standard for the Installation of Sprinkler Systems in one- and two-family Dwellings and Mobile Homes (replaced with Manufactured Homes in the 1994 edition). Part of the standard is that the fire sprinkler systems be designed and installed by "persons trained and skilled in the design and installation". The system is designed to improve the chance for occupants to escape and to prevent flashover (when an entire room and its contents ignite) in the room where the fire starts.

Activation of the sprinkler system occurs in 98% of the fires reported to fire departments.⁴⁵ Typically, each sprinkler head covers an area of up to 12 feet by 12 feet

⁴¹ Comments of the Home Builders Association of Tennessee, Home builders commenting that there have been no studies to compare or demonstrate the effectiveness of fire sprinklers with smoke alarms versus smoke alarms alone. Home builders quote the National Fire Sprinkler Association, in a release "Partners for Fire Safe Homes" and agree that "[B]ut far and away the most potent weapon in fighting fire death has been the smoke detector." The most important safety measure in a house fire is to get out of the house.

⁴² Comments of the Home Builders Association of Tennessee citing The "U.S. Experience With Sprinklers" (NFPA, January 2009).

⁴³ *Build for Life*, Home Fire Sprinkler Coalition, included in materials submitted by Mr. Wayne Waggoner, citing NFPA, further stating in a recent study about 90% of home fires were controlled with only one sprinkler activated.

⁴⁴ *Now That You're Living With Sprinklers*, Built for Life, Home Fire Sprinkler Coalition.

(with extended sprinklers covering up to 20 feet by 20 feet). A typical system operates off the household water main and uses piping installed behind walls and ceilings in finished areas with unfinished areas having exposed piping.⁴⁶ The standard for residential sprinklers generally allows for both independent and multipurpose (water is shared by household cold water and the sprinkler system) water systems.

The Standard NFPA 13D system for residential fire sprinklers is designed to supply water to two sprinkler heads at 13 gallons per minute from each sprinkler head. Ten minutes of flow will provide 260 gallons of water into a room and 20 minutes would provide 520 gallons. Sprinkler systems emit less water than a fire department hose. An accidental activation or malfunction would result in damage to a home, but such are extremely rare (according to information submitted by the Fire Sprinkler Coalition, likelihood of accidental discharge is less than the chances of being struck by lightning).

Fire departments generally take at least seven to 12 minutes to arrive, and even more time in remote areas and areas serviced by volunteers. Activated sprinklers lessen the risk to firefighters when they do arrive at the scene of a fire because the fire is already controlled or kept from spreading.⁴⁷

NFPA recommends, but does not require, sprinklers in all areas of the dwelling (allowing sprinklers to be omitted from bathrooms smaller than 55 square feet; closets and pantries smaller than 24 square feet; garages; open attached porches, carports and similar structures; attic spaces not used for living purposes; covered, unheated projections at entries and exits; and ceiling pockets). The standard also includes information for installation of sprinkler systems where freezing may occur.⁴⁸ A system may have features not required by NFPA 13D, such as an outside warning system or a warning system hooked up to a monitoring service.

State law (TCA Title 68, Chapter 32, Part 1) requires fire protection sprinkler contractors to obtain a certificate of registration from the Department of Commerce and Insurance. Each registered contractor must have a responsible managing employee who is licensed by the Department. The responsible managing employee must be a registered

⁴⁵ *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* (Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009).

⁴⁶ *Build for Life*, Home Fire Sprinkler Coalition, included in materials submitted by Mr. Wayne Waggoner

⁴⁷ Public Education Materials submitted by the Home Fire Sprinkler Coalition.

⁴⁸ Overview of NFPA 13D Standard, Public Education Kit, Home Fire Sprinkler Coalition.

architect or engineer or pass an examination. As of today, there are 192 sprinkler contractors with active registrations and 234 responsible managing employees with active registrations. This process should ensure that Tennessee is served by competent installers and reduce risks associated with faulty installations.

Costs

Increases to the Costs of Residential Construction

Home builders comment that sprinkler costs have a dramatic negative impact on housing affordability and that for each \$1,000 added to the price of the home 217,000 people are not able to purchase a home.⁴⁹ Home prices, income, mortgage rates, and other similar factors don't cause the housing demand to diminish but cause a shift from ownership to renting.⁵⁰ Economic upturns and downturns (unemployment, etc.) cause significant swings in the construction industry making it difficult to single out what role sprinkler cost actually plays in industry decline.⁵¹ Others argue that a 1% increase in price will not cause a homebuyer not to afford a house (buyer income and mortgage interest rates are the decisive factors especially when you consider amortization of that cost over the time of the mortgage).⁵²

The cost of the fire sprinkler system depends largely on five factors:

- 1) The size of the residence
- 2) The construction limitations and constraints
- 3) The availability of a water supply
- 4) The piping materials being used and
- 5) The layout and arrangement of the fire sprinkler system.⁵³

National Study

One study submitted to the department presented a national perspective concerning fire sprinkler systems and obtained information on the cost of installing residential sprinkler systems in ten case study communities (nine in the United States.

⁴⁹ Comments the Home Builders Association of Tennessee

⁵⁰ *Benefit-Cost Analysis of Residential Fire Sprinkler Systems*, U. S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007).

⁵¹ *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (copyright June 2003) submitted by Mr. Ray Crouch at page 4-5.

⁵² *Residential Fire Sprinklers for Life Safety: An Economic and Insurance Perspective* (Dewar, 2001) at page 28.

⁵³ *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (June 2003) submitted by Mr. Ray Crouch.

and one in Canada). In this study, the term “sprinklered square feet”⁵⁴ reflects the total area of sprinklered spaces, including basements, garages and attics where applicable (characterizing the cost per unit of space covered by the system). This is not the same terminology used to represent normal living space, which is generally how the term is used when selling and buying a house. In the study, house sizes in terms of sprinklered square feet averaged 4,118 sprinklered square feet (ranging from 1,913 to 6,542 sprinklered square feet) and, in terms of living space averaged 3,660 square feet (ranging from 1,723 to 6,360 of living square feet). For the houses with basement foundations, the area of the basement, whether finished or unfinished, was included in the house’s habitable living space square footage. The study included this chart:

House Size for 30-Home Sample in Square Feet (SF)

	Sprinklered Area*	Living Area**
Mean	4,118	3,660
Median	4,124	3,441
Minimum	1,913	1,723
Maximum	6,542	6,360
*Sprinklered SF includes all spaces with sprinkler coverage.		
**Living areas SF includes all living spaces including basements (unfinished or finished)		

In this study, the cost of the sprinkler system to the homebuilder ranged from \$.38 per sprinklered square foot to \$3.66 per sprinklered square foot, with the average cost being \$1.61 per sprinklered square foot.

The low end of the range represented a California home in a community with a long-standing sprinkler ordinance, sprinklers in the attic and garage (in addition to the living space) and pricing benefits from a volume relationship with the sprinkler contractor.

The high end of the range represented a Colorado house on well water with a system constructed with copper piping that used anti-freeze for freeze protection during the winter. In this study they included all builder costs, such as sprinkler system design, installation, permits, equipment and increased tap and water meter fees where they applied.

⁵⁴ *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (June 2003) submitted by Mr. Ray Crouch at page 5-30, wherein cost information was criticized as misleading because of the misunderstanding of the concept of living square feet as opposed to sprinklered square feet as criticism of the sprinkler ordinance for the Village of Clarendon Hills.

Only one of the 10 communities had a credit or trade off (such as greater fire hydrant spacing), which was a credit in Oregon.⁵⁵

Pleasant View

Pleasant View, Tennessee adopted a sprinkler ordinance in 2003 and was one of the communities included in this study. In Pleasant View, Tennessee there have been 609 homes built with sprinklers.⁵⁶ It was one of two communities of the 10 studied that did not have any fee for sprinkler permit and inspection. The community is served by the Pleasant View Volunteer Fire Department. Stand alone systems are the commonly used system in Pleasant View, typically with CPVC pipe and concealed sprinkler heads. The typical house in Pleasant View ranges from 1,200 to 4,000 square feet of living space, both one and two story homes, with differing foundation types. In the case study of Pleasant View, three house floor plans were obtained from a semi-custom builder. Two of the homes were built with a basement foundation; the other home had a crawl space. The three homes had living space ranging from 1,723 to 3,326 square feet. In addition to sprinkler coverage in the living space, sprinklers were also installed in the garages. Thus, total sprinklered space in the three homes ranged from 2,612 to 3,826 sprinklered square feet. The total cost of the sprinkler systems to the builder ranged from \$2,489 to \$4,208. The cost of the system the three homes was \$1.10 per sprinklered square foot. All three homes used a municipal water source. An increased water service line size is needed in Pleasant View to allow for the potential increase in water flow associated with the sprinkler system (no costs were allocated for increased water line size because all building lots came with them in Pleasant View.)

Additional information was provided with respect to Pleasant View that states that fire sprinklers amounted to 1.3% of the construction costs of the home, with an additional \$200 cost on water utility fees due to an upsize of the residential meter from ¾” to 1”.⁵⁷

⁵⁵ It is also noteworthy that in Reese-Carr Report on Scottsdale, the final cost of fire sprinklers after savings from trade ups (reducing street width, permitting tee turnarounds, increased fire hydrant spacing) is stated as \$200 per unit.

⁵⁶ Comments of Wayne Waggoner, Executive Director, Tennessee Fire Sprinkler Contractors Association, dated January 5, 2010.

⁵⁷ *Making the Decision Regarding Fire Sprinklers: Homebuilders Who Say Yes!* Vickie Pritchett, Fire Team USA Project Manager, providing two examples using the NAHB format for homes of \$176,376 (2186 square feet and a cost for sprinklers of \$2,343, at 1.3%, and a \$200 meter upsize fee) and \$176,022 (2139 square feet with a cost for sprinklers of \$2,242 at 1.3%, and a \$200 meter upsize fee).

Nolensville⁵⁸ and Piperton

Two other Tennessee cities were discussed in another NFPA study, Nolensville (2006 adoption of NFPA 13D or 13R, public water supply) and Piperton (2007 adoption of NFPA 13D, public water supply). This study focused on how to effectively integrate a sprinkler system into a home's water supply system, which potentially can affect the sprinkler system design, operation, cost and maintenance. The report states that there are no insurmountable problems or issues found in these communities. The key issues reviewed were: whether sprinkler water flow is captured by a water meter (important because it affects the sprinkler system design and cost); whether two water service lines are required; concern over unauthorized use of water from fire sprinklers; accuracy of water meters; costs and accuracy associated with any changes in water meter size; impact on monthly service fees for water service; impact on domestic water consumption rates; change in water service tapping fee; liability associated with water service suspensions or terminations (not addressed in the Tennessee cities included in the report); reported water contaminations from sprinkler system backflow (no community included in the report was aware of a water contamination problem); post-occupancy inspection requirements; and, any changes made to the ordinance after it went into effect.

Both of the Tennessee cities included in the study metered the water flow to the sprinkler system (issues identified are meter accuracy, meter costs, increased peak flow capacity and type of meter—the NFPA 13D preferable arrangement is unmetered). Neither of the Tennessee communities included in the study required dual service lines.⁵⁹ In both Nolensville and Piperton, the sprinkler system requirements typically resulted in a larger, more expensive meter, the water meter size being 1". In Nolensville, the increased meter cost was \$500 (the price for the meter and tap fee went from \$3000 to \$3500). In Piperton, the increased meter cost was \$120 (from \$185 to \$305 in the price for the meter). In the two cities, monthly service fees were not increased and were \$12.04 in Nolensville and \$13.50 in Piperton. Water rates did not increase because of a larger domestic meter. In Piperton, while the sprinklered homes have larger taps, the tapping fees were not increased. In Nolensville, also with a larger tap, the tapping fee was higher;

⁵⁸ In Nolensville, there is an annual fee of \$40 for a backflow inspection.

⁵⁹ Integration of Residential Sprinklers with Water Supply Systems, *A Survey of Twenty U. S. Communities* (National Fire Protection Association, Prepared by Newport Partners, September 2009) at pages 5 -13.

however, both the tap fee and meter price are included in the \$500 increased cost noted above.⁶⁰ According to one comment received, the availability of potable water in Nolensville may be a problem and some homes may have sprinklers without being connected to sufficient public water source.⁶¹

The project manager for the first home built in Nolensville commented that the process was made easier through an on-site meeting at the house between the sprinkler subcontractor, local codes official, fire department officials, water department representatives and builders. The sprinkler contractor had worked extensively in Pleasant View and installed the sprinklers at \$1.25 per sprinklered square foot. The home, which had 2000 square feet of living space along with a two-car garage of 400 square feet, was sprinklered at a cost of \$3,000. There was some additional plumbing cost involved in installing 1” service lines and in running some 1” supply lines to the T splitting the house plumbing supply from the sprinkler supply. There were also some additional insulation and inspection requirements.⁶²

Nashville/Davidson County

Nashville/Davidson County does not presently have a sprinkler ordinance. Contractors in Davidson County are reportedly installing NFPA 13D compliant sprinkler systems in single family homes for \$1.25 per square foot (less than the cost of hardwood floors). According to Chief Danny Hunt of the Nashville Fire Department, the systems have the ability to save lives and property in the rural areas of the county where, with a 10- minute water supply, the sprinkler system will extinguish or contain a fire so that occupants can escape and suppression units have time to arrive and handle the situation. In Davidson County getting the necessary water supply to the home is one of the greatest obstacles. Contractors in Davidson County have said that in an average-sized home more than half of the cost of the sprinkler system is the upgrades in tap fees, larger meters and backflow prevention devices.⁶³

⁶⁰ Integration of Residential Sprinklers with Water Supply Systems, *A Survey of Twenty U. S. Communities* (National Fire Protection Association, Prepared by Newport Partners, September 2009).

⁶¹ Comments of Mr. William White submitted 1/27/10.

⁶² Comments of Mr. Jacob Gordon, who noted that he did not know if there are annual backflow tests on the sprinkler riser which would cost the homeowner.

⁶³ Chief Danny Hunt, Metropolitan Government of Nashville and Davidson County, who states he is a big supporter of sprinklers and believes that a public education campaign and addressing the water issues are

Cheatham County

In August, 2006, Cheatham County became the first county in Tennessee to require sprinklers in single-family homes in subdivisions of more than three lots. Pleasant View and Ashland City, both in Cheatham County had passed a sprinkler requirement in 2001. Kingston Springs passed a fire sprinkler ordinance in 2005. Growth has continued in Cheatham County and the policies in place ensure that fire protection is funded in part by those moving into the area.⁶⁴

Germantown

In Germantown, Tennessee, one fire sprinkler contractor is installing residential fire sprinklers in these single-family homes at a cost of \$.84 per sprinklered square foot. This amounted to a slightly more than 1% increase in construction costs of these sprinklered homes.⁶⁵

Non-Jurisdiction Specific Cost Data

Home builders dispute the accuracy of costs estimates provided by fire sprinkler proponents. Here is an excerpt from the home builder comments:

In Middle Tennessee, fire sprinkler proponents have been often quoted that sprinklers cost \$1.10 to \$1.25 per square foot to install. That amount only covers the invoice from the sprinkler installer. It does not allow for: higher water tap fee for a 1" meter - \$500; increasing the water supply line to a 1" ID - \$100 to \$150; extra deep framing for riser wall - \$150 to \$200; plumber to install riser - \$100 to \$150; electrical to run circuits to flow switch and exterior alarm - \$130; insulating water lines in attic - \$100 to \$150; drywall repair after heads are installed - \$100; delay in getting test letter before framing inspection - \$100. As you can see, this adds as much as another \$1,490 on a 1,600 square foot house fifty feet from the street. The cost per square foot is now \$2.13.

But there's more. In some localities builders are required to install sprinklers in garages and unfinished bonus rooms even though NFPA 13D does not require this work. In the above example this adds another \$1,000 to the house. The cost per square foot now increases to \$2.80 for living area. The real cost is \$4,480 for this 1,600 square foot house.

....

The average size of homes built in 2005 was 2,434 square feet, according to the U.S. Census Bureau. Even if an estimate of \$2 per square foot is used as the

needed. He also states that he believes new homes equipped with smoke detectors and sprinkler systems are preferable.

⁶⁴*Making the Decision Regarding Fire Sprinklers: Homebuilders Who Say Yes!* by Vickie Pritchett.

⁶⁵*Residential Fire Sprinklers for Life Safety: An Economic and Insurance Perspective* (Dewar, 2001) at page 6.

average price, which is conservative, fire sprinklers in that average-sized home would have cost more than \$4,800, which could hardly be characterized as inexpensive. Whole-house interconnected smoke alarm systems are now being installed for around \$50 per alarm.

...

For example, if all new homes built in 2005 were required to have sprinklers, the installation cost to builders would have been \$10,183,118,400 based on the average square foot of those homes and the average cost of sprinkler installations in jurisdictions where they are currently required (\$2.66 sq. ft.). NFPA reported the total home property loss due to fire in 2005 was \$5,781,000,000. That means that installations costs born by homebuyers would have been nearly double the loss.⁶⁶

Note that the cost figure quoted relates to a sprinkler system that should have a life span far beyond a single year and property loss savings should occur each year.

Rural Areas/Low Pressure Areas – On Site Water Supply

Homes without public water supply, for example, a home with a well, or with very low water pressure, will need a tank and pump to ensure adequate water pressure.⁶⁷

The Department requested information from the Tennessee Department of Environment and Conservation's (TDEC) Division of Water Supply regarding non-public water supply usage in Tennessee. In 1965, Tennessee started requiring the submission of driller reports for each well drilled in Tennessee. On average, there are about 3,000 wells drilled each year. There are roughly 240,000 well reports in TDEC's database.⁶⁸ However, this number includes homes that have now connected to a public water supply or have public water supply availability.

A pump and 300-gallon tank provide the 10 minutes of water supply required by NFPA 13D.⁶⁹ A house in this circumstance might be served by a tank in the basement or attic (with additional support to the ceiling joists and additional insulation to protect the tank and keep it from freezing). Another concern in rural areas without public water supplies is that a home could be without electricity which pumps require for hours or even up to weeks after inclement weather.⁷⁰

⁶⁶Comments of the Home Builders Association of Tennessee.

⁶⁷Tennessee does have communities that for religious reasons do not have electricity.

⁶⁸The database is not all inclusive since pre-1965 wells are not reported.

⁶⁹*Built for Life*, Home Fire Sprinkler Coalition, submitted by Mr. Wayne Waggoner.

⁷⁰Comments of Terry Franklin, City of Belle Meade Codes Official, dated 12/23/2009.

Maintenance of a Sprinkler System

Maintenance costs of a residential fire sprinkler system are disputed. Home builders assert that fire sprinkler systems must be checked periodically by professionals, particularly if the system requires the use of a backflow preventer. Home builders also commented that over the last 11 years, 45 million sprinkler heads have been recalled by the CPSC for failing to activate when exposed to temperatures that should have caused them to open.⁷¹ However, these heads were for commercial systems. Further, home builders express concern that home owners, who fail to remember to replace smoke detector batteries, may not be reliable to maintain a working sprinkler system.⁷² Attached as Appendix D is a copy of a sprinkler informational sheet for homeowners.

Most of the studies on sprinklers say that the maintenance costs are negligible. Homeowners can be provided with an informational packet, including a CD, demonstrating what the homeowner should do to maintain the sprinkler system.⁷³ Homeowners would be required to avoid painting or covering a fire sprinkler device because this can affect its heat sensitivity. Also, homeowners should not hang anything from the sprinkler device or the piping. Maintenance of the necessary pumps and tanks, when required, is an additional expense.⁷⁴ Another issue is that systems can be installed in such a way that turning off the sprinkler system will turn off the water to the rest of the residence.⁷⁵

Sprinkler Discharges for Reasons other than Fires⁷⁶

In 2003, there were estimates that more than 4,700 accidental sprinkler activations, of which 292 were in homes, occurred in that year.⁷⁷

With respect to insurance coverage for accidental leakage from a fire sprinkler system, the standard homeowner's policy forms provide coverage for "...accidental

⁷¹ Comments of the Home Builders Association of Tennessee, which state that there is no study to show how long sprinkler systems will last and notes recalls in 1998, 1999 and 2001.

⁷² Comments of the Home Builders Association of Tennessee.

⁷³ *Now That You're Living with Sprinklers, Here Are Answers to Some of Your Questions*, Built for Life, Home Fire Sprinkler Coalition.

⁷⁴ Comments of the Home Builders Association of Tennessee.

⁷⁵ *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (copyright June 2003) submitted by Mr. Ray Crouch at page 5-19.

⁷⁶ Factory Mutual, a nationally recognized testing laboratory, reports the chance of an accidental discharge is of odds to rival winning the California State Lottery.

⁷⁷ *U.S. Fire Experience with Sprinklers*, John Hall Jr.; Comments of the Home Builders Association of Tennessee (2009).

discharge or overflow of water...from within a...fire protective sprinkler system...” This coverage is included in the basic policy at no extra charge. Also, coverage is provided for water damage related to the suppression or extinguishment of a covered fire. The standard “Homeowners 3—Special Form” provides coverage due to damages from residential fire sprinkler system leakage provided that reasonable care has been taken to maintain heat in the building to prevent freezing of the residential fire sprinkler system (treating sprinkler piping the same as regular household plumbing with no extra charge for the coverage of the peril of sprinkler leakage). So, as with plumbing leaks, sprinkler system leakages are likely covered; whereas leakage due to a maintenance issue is likely not covered (a determination of what is accidental would be made by a claims adjuster).⁷⁸

Benefits

Reducing the Loss of Life

One written comment emphasizes that because of their effectiveness saving lives, the cost of sprinklers is priceless.⁷⁹ Assigning a value to statistical life or injury averted has become a generally accepted part of economic methodology (various approaches are used, including “willingness-to-pay”, earnings potential, court-assigned values).⁸⁰

The National Institute of Science and Technology reports a potential 82% reduction in all fire deaths if fire sprinklers are installed in all residential occupancies. Most of the 18% remaining fire deaths would occur outside of the residential setting.⁸¹ Both our citizens and our firefighters would benefit from the increased safety from the installation of sprinklers.⁸² “Home sprinkler systems respond quickly to reduce the heat, flames, and smoke from a fire, giving families valuable time to get to safety.”⁸³ This is especially important for the very young and those, due to age or other reasons, who need

⁷⁸ ISO Fact Sheet (www.isomitigation.com), attached as Appendix E.

⁷⁹ Email from Mr. Dewitt Langford.

⁸⁰ *Benefit-Cost Analysis of Residential Fire Sprinkler Systems*, U. S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007) at page 15.

⁸¹ *Residential Fire Sprinklers for Life Safety: An Economic and Insurance Perspective* (Dewar, 2001) at page 22. Note the author of this study retrofitted his 3800 square foot home and computed his payback, considering insurance premium reduction, which was 10% from State Farm, as 14.5 years. (page 27) submitted by Mr. Wayne Waggoner.

⁸² Comments from Chief Marty Bowers, President, Tennessee Fire Chiefs Association. *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* (Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009).

⁸³ *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* (Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009).

additional time to exit safely. Slowing down a fire and its highly toxic smoke, which can reach deadly proportions in only three minutes or less and faster than most fire departments can respond, allows more time for escape and may provide a safer scene once the fire fighters arrive .⁸⁴

Reduction in Property Damage and Insurance Premiums⁸⁵

When analyzing costs of sprinkler systems in residences, insurance savings should be considered as a benefit both in terms of residence specific discounts and in terms of a community's public protection classification which insurance companies use in setting rates. Insurance premium discounts are offered because fire sprinkler systems protect property from destruction by fire. Roughly 90% of the time fires in homes with sprinkler systems are contained by just one sprinkler head being activated.⁸⁶ The National Fire Protection Association (NFPA) reported in January 2009 that the average fire loss in one- and two-family homes without sprinklers was \$19,000 and that the average loss with sprinklers was \$14,000. Cost to repair a structure from fire damage is more expensive than the cost of water damage repair.⁸⁷ NFPA reported an average of 19% reduction in property loss in home fires with sprinklers versus those without them.⁸⁸ Other studies state a 32% reduction in direct property damage and further estimates a 10% reduction in non-direct costs averted (such as temporary shelter, missed work, extra food costs, legal expenses, transportation, emotional counseling and child care).⁸⁹ Irreplaceable items of sentimental value will be less likely to be destroyed when a fire is stopped before it engulfs an entire house.

Residential Sprinklers ISO Fact Sheet (www.isomitigation.com), attached as Appendix E, states that the standard home owners' insurance policy should contain a premium credit of up to a maximum of 13%(individual insurance companies may use

⁸⁴ *Built for Life*, Home Fire Sprinkler Coalition, submitted by Mr. Wayne Waggoner.

⁸⁵ Premium reduction may relate only to the fire portion of the homeowners' policy. *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (copyright June 2003) submitted by Mr. Ray Crouch.

⁸⁶ *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* (Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009) which states that sprinklers reduce the average property loss by 71%.

⁸⁷ *Residential Fire Sprinklers for Life Safety: An Economic and Insurance Perspective* (Dewar, 2001) at page 28.

⁸⁸ Comments of the Home Builders Association of Tennessee.

⁸⁹ *Benefit-Cost Analysis of Residential Fire Sprinkler Systems*, U. S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007) at page 24.

different discounts) for full installation of sprinklers in all areas of the home (including attics, bathrooms, closets and attached structures) and 8% when sprinklers exclude the attic, bathrooms, closets, and attached structures as long as fire detection equipment (smoke alarms) is installed in those areas where sprinklers are omitted. Most insurance companies consider a residential sprinkler system to be a protective device (other protective devices are smoke detectors, fire extinguishers, security systems, deadbolt locks, home location in a gated community). There may be a cap on the premium allowed for protective devices (caps ranging from 10% to 20% in the surveyed nine states, with the average protective device discount cap of 14%).

A 2007 study conducted by the National Association of Home Builders (NAHB) economics department showed that insurance companies do offer meaningful discounts for residential sprinkler systems that vary from state to state. In Tennessee, annual homeowner’s insurance premium discount percentages were obtained for this report from State Farm, Tennessee Farmers, Allstate, Travelers, and Nationwide, with discounts in the range stated below, for the residential sprinkler system required in Pleasant View, Tennessee.

Insurance Company⁹⁰	Market Share in State	Percentage Discount for Residential Sprinklers⁹¹
State Farm	26.54%	10%
Tennessee Farmers	18.30%	5%
Allstate	11.435	10%
Travelers	5.58%	10%
Nationwide	5.24%	0%

However, in one Pleasant View home, an insurance company quoted a residence with a value of \$223,612 (quoted residence value of \$224,000) without a fire sprinkler system with a premium of \$600, and a premium of \$588 with a fire sprinkler system in all areas of the home for a discount of \$12 representing 2%.⁹²

⁹⁰Note that other companies may offer discounts.

⁹¹*Benefit-Cost Analysis of Residential Fire Sprinkler Systems*, U. S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007) estimates this savings as 8%, at page 24.

⁹² This is close to the amount in the written comments of the Home Builders Association of Tennessee, which used a \$1000 annual premium receiving an average discount of \$25.

Insurance costs also benefit from an improved Public Protection Classification (PPC) in a community's ISO rating.⁹³ ISO rates a community based on three major categories: communication, fire department and water supply. Sprinklers can affect this last category.⁹⁴ Comments from Chief Chuck Walker, Ashland City Fire Department, with respect to the ISO rating of the town of Ashland City, which passed a sprinkler ordinance in 2001, stated that, in a recent ISO review, the City was given more points toward lowering its ISO rating because of the sprinkler requirements, which had required a school being renovated to be retrofitted with sprinklers. All citizens will benefit from a reduction in homeowner insurance premiums because of this improved rating.⁹⁵

Construction Incentives

Home builders comment that incentives aren't useful because they are difficult to negotiate and believe the presence of incentives tends to verify their position that current fire safety codes provide adequate protection.⁹⁶ Working with a local jurisdiction to provide incentives for developers, such as street width reduction, additional units, and increased hydrant spacing, can improve the cost analysis for builders.⁹⁷ In Pleasant View, Tennessee, incentives have been used to help offset fire sprinkler system costs in construction projects.

⁹³ *Tennessee County Fire Handbook*, The University of Tennessee County Technical Assistance Service, by Kevin J. Lauer, Fire Management Consultant (page 34-45) discusses ISO ratings and states that fire protection insurance premiums can have a savings of up to 47% for a homeowner's fire insurance based on the best ISO ratings, which also states that improved ISO ratings are substantial for commercial premiums and can be an important economic development tool and (pages 46-47) provides a list of community benefits realized by fire sprinklers. ISO sets the PPC ratings on a scale of 1 (best) – 10 (equivalent to no fire protection), which impacts every person that buys fire insurance in that community. In the following example, if a homeowner paid \$1 per year for insurance in a Class 10 rating, then

- Class 9 pays .93, a savings of 7 percent over a Class 10.
- Class 8 pays .72, a savings of 28 percent over a Class 10.
- Class 7 pays .68, a savings of 32 percent over a Class 10.
- Class 6 pays .65, a savings of 35 percent over a Class 10.
- Class 5 pays .63, a savings of 37 percent over a Class 10.
- Class 4 pays .60, a savings of 40 percent over a Class 10.
- Class 3 pays .58, a savings of 42 percent over a Class 10.
- Class 2 pays .55, a savings of 45 percent over a Class 10.
- Class 1 pays .53, a savings of 47 percent over a Class 10.

⁹⁴ *Tennessee County Fire Handbook* (Lauer, County Technical Assistance Service) discusses ISO ratings.

⁹⁵ Comments of Chief Chuck Walker, Fire Chief, Town of Ashland City.

⁹⁶ Comments of Home Builders Association of Tennessee.

⁹⁷ *Built for Life*, Home Fire Sprinkler Coalition, submitted by Mr. Wayne Waggoner.

Effectiveness of Sprinklers

Fire sprinkler systems promote life safety and further serve to safeguard property. Accurately portraying the cost and effectiveness of home sprinklers is an important and complex analysis and public education is needed. Certainly, any citizen would willingly pay the cost of a sprinkler system to save the life of a loved one if the citizen could see into the future and know that that would be the role of the fire sprinkler system. In a 15 year study of Scottsdale, Arizona, where a sprinkler ordinance was implemented in 1986 and evaluated in 2001 with more than 46,000 sprinklered homes, there were no deaths in the sprinklered homes compared with 13 deaths in fires in homes without sprinklers.⁹⁸

The risk of dying in a fire decreases by about 82% when sprinklers are present (as opposed to 50% with working smoke alarms alone).⁹⁹ One- and two-family dwellings with sprinklers were found to have a 57% reduction in injuries from fires over dwellings with just smoke alarms.¹⁰⁰ Fires that are too small to activate a sprinkler have no implications for or against requiring a sprinkler. Sprinklers also provide benefits by keeping fires small that would become large.¹⁰¹

Expecting a 100% reduction in fatalities based on use of sprinklers may be too optimistic because field tests indicate that sprinklers fail to activate 3% of the time. Another report stated that sprinklers failed to operate in only 2% of the one- and two-family dwelling fires and the reasons that they failed were due to insufficient amount of

⁹⁸ *Protect What You Value Most*, Home Fire Sprinkler Coalition, which also concludes there was less water damage in the sprinklered homes with an average loss of \$2,166 over the 49 fires in the sprinklered homes and an average of \$45,019 property loss in the 86 fires in the unsprinklered residences. It is also noteworthy that in Reese-Carr Report on Scottsdale, the final cost of fire sprinklers after savings from trade ups (reducing street width, permitting tee turnarounds, increased fire hydrant spacing) is stated as \$200 per unit.

⁹⁹ *Cost and Effectiveness of Sprinkler Systems in One- and Two-Family Dwellings* (Maria Figueroa, NFPA Fire Prevention Field Office Regional Manager, December 2009) at page 2, which states the purpose of the document is to support the adoption of fire sprinkler requirements in new homes and to provide important information about the U. S. fire problem and home fire sprinklers, specifically relating to cost and effectiveness of fire sprinklers in one- and two-family homes. Sprinkler opponents use the statistic that with a working smoke alarm, the risk of home fire death is reduced by 99.45%. NFPA states that the likelihood of surviving a home fire is over 99%, with 3000 fire death in about 400,000 reported fires.

¹⁰⁰ *Benefit-Cost Analysis of Residential Fire Sprinkler Systems*, U.S. Department of Commerce, National Institute of Standards and Technology (Butry, Brown, Fuller, 2007) at pages 21-24.

¹⁰¹ *Homebuilder Supporting Facts on Residential Sprinklers*, IRC TAG Meeting, Maria Figueroa, Regional Manager, Fire Prevention Field Office (May 7, 2009).

water released (25%), system did not reach the fire (25%), lack of maintenance¹⁰² (25%) or the system was damaged (25%).¹⁰³

Conclusion

The Department reviewed reports and public comments and released a draft report on April 15 and then met with representatives of the Home Builders Association of Tennessee and the Tennessee Fire Coalition. Both stakeholder groups agreed that fire sprinkler systems make one- and two- family residences safer but there was no agreement as to whether the cost for a fire sprinkler system was justified in new construction and whether a fire sprinkler system should be a voluntary choice or a codes mandate. The Department summarized the comments of the stakeholders meeting.

Each stakeholder group was given the opportunity to submit corrections and comments regarding the draft report and to submit responses to the draft report. These responses have been attached as Appendices F and G. Coalition advocates outlined that efforts to continually lower community risks should involve: (1) education, (2) engineering, (3) enforcement, (4) economic incentives and (5) emergency response. Consensus was reached by the stakeholders that continued dialogue would be beneficial and that additional stakeholders ought to be asked to participate in the dialogue (for example, water purveyors, economic development officials, and governmental representatives that might approve construction trade-offs and tax incentives). As part of this discussion, promotion of a “safe homes initiative”, which is being planned at a national level where a home can be certified as “safe” based on points meeting certain construction standards and which then would allow a home to be advertised as “safe” certified in a manner similar to certain “green” or “energy efficient” certifications was an area of mutual interest and one that both stakeholders were willing to pursue. Discussions should also be conducted relating to improved reporting regarding age of

¹⁰² *Residential Fire Sprinklers...A Step-by-Step Approach For Communities*, National Fire Sprinkler Association, Inc. (copyright June 2003) submitted by Mr. Ray Crouch, University of Tennessee, Municipal Technical Advisory Service at pages 5-25 states that, if the system has an inspectors test connection, it should be opened to see if water flows and an alarm rings and valves should be opened and closed just to give them some exercise once per year, which homeowners can be taught to do.

¹⁰³ *Homebuilder Supporting Facts on Residential Sprinklers*, IRC TAG Meeting, Maria Figueroa, Regional Manager, Fire Prevention Field Office (May 7, 2009) at page 5, which also states that 55% of all non-confined fires and confined one- and two-family dwelling fires never reached the temperatures that would activate the sprinkler system, citing the 2009 report, *U.S. Experience with Sprinklers*, by John Hall Jr.

residences where fires occur. The Department is willing to offer any other assistance to the General Assembly and stakeholder groups that it has the resources to provide.

Appendix A: 2009 Fire Death Rates and Structure Loss by County

County	Deaths	
Anderson	1	\$1,714,439
Bedford	0	\$3,140,450
Benton	0	\$2,108,575
Bledsoe	0	\$509,805
Blount	0	\$2,961,950
Bradley	4	\$3,593,433
Campbell	2	\$3,511,900
Cannon	1	\$1,678,200
Carroll	2	\$2,518,200
Carter	0	\$3,040,740
Cheatham	0	\$1,343,275
Chester	0	\$899,364
Claiborne	1	\$2,362,320
Clay	0	\$1,761,875
Cocke	0	\$5,898,700
Coffee	1	\$1,863,752
Crockett	0	\$473,451
Cumberland	0	\$4,825,260
Davidson	3	\$4,731,090
Decatur	0	\$460,200
Dekalb	3	\$1,784,500
Dickson	0	\$1,359,469
Dyer	0	\$1,002,350
Fayette	0	\$1,520,350
Fentress	0	\$1,166,300
Franklin	0	\$1,631,829
Gibson	0	\$2,365,455
Giles	0	\$1,649,950
Grainger	0	\$426,500
Greene	2	\$4,698,070
Grundy	1	\$4,425,825
Hamblen	1	\$3,020,903
Hamilton	3	\$8,932,742
Hancock	0	\$4,000
Hardeman	3	\$1,491,840
Hardin	1	\$1,322,100
Hawkins	1	\$3,139,925
Haywood	0	\$636,477
Henderson	2	\$1,546,155
Henry	2	\$6,093,150
Hickman	0	\$488,135
Houston	0	\$792,900
Humphreys	2	\$1,345,220
Jackson	1	\$1,227,850
Jefferson	0	\$3,982,325
Johnson	0	\$1,012,500
Knox	1	\$9,868,491
Lake	1	\$138,000

County	Deaths	
Lauderdale	0	\$1,032,060
Lawrence	1	\$1,090,611
Lewis	0	\$230,800
Lincoln	0	\$3,054,361
Loudon	0	\$1,943,900
Macon	0	\$2,051,000
Madison	1	\$4,836,145
Marion	0	\$807,100
Marshall	1	\$510,300
Maury	1	\$3,666,662
McMinn	1	\$4,811,119
McNairy	2	\$1,867,600
Meigs	1	\$714,803
Monroe	2	\$2,459,175
Montgomery	0	\$5,770,705
Moore	0	\$0
Morgan	1	\$1,107,001
Obion	0	\$3,336,640
Overton	1	\$2,344,250
Perry	0	\$722,000
Pickett	0	\$1,000
Polk	0	\$1,173,500
Putnam	2	\$2,613,380
Rhea	0	\$163,125
Roane	1	\$5,746,845
Robertson	0	\$1,576,703
Rutherford	2	\$3,859,137
Scott	1	\$1,682,800
Sequatchie	0	\$1,050,488
Sevier	2	\$4,157,000
Shelby	5	\$8,306,026
Smith	0	\$898,250
Stewart	0	\$551,200
Sullivan	2	\$3,063,481
Sumner	1	\$7,495,622
Tipton	2	\$2,476,950
Trousdale	0	\$999,300
Unicoi	0	\$2,200,000
Union	0	\$892,150
Van Buren	0	\$183,550
Warren	2	\$1,691,050
Washington	1	\$2,638,500
Wayne	0	\$859,640
Weakley	0	\$1,838,252
White	0	\$1,526,829
Williamson	1	\$4,296,747
Wilson	0	\$3,160,475

Appendix B: Tennessee Communities with Fire Sprinkler Requirements

Fire Sprinkler Requirements

Location City or Barlett	Date	New Commercial	New Residential	Additions to Commercial	Remodel Commercial	New Educational	New Institutional	Remodel Educational	Remodel Institutional
Spring Hill		>10000	RI & R2 3 stories or more	>10000 if trings existing > 10000= entire bldg or separated by 4ft	>50% of replacement cost or >50% of floor area	>1000	>1000	>50% of replacement cost or >50% of floor area	>50% of replacement cost or >50% of floor area
Franklin		>5000	N/A	if trings existing > 5000 = entire bldg	>50% replacement cost of any bldg > 5000	All	All	All	All
Collierville		>5500	All (1 R2 family >4500 or >2000 and 300ft set back)	if trings existing > 5500 = entire bldg	>50% replacement cost	All	All	>50% replacement cost	>50% replacement cost
Pleasant View	200,120,022,005	All	All	>25% floor area = entire bldg	>25% floor area = entire bldg	All	All	>25% floor area = entire bldg	>25% floor area = entire bldg
Asheband City	2001, 2005	All	All	>25% floor area = entire bldg	>25% floor area = entire bldg	All	All	>25% floor area = entire bldg	>25% floor area = entire bldg
Kingston Springs	2008	All	All	>10% floor area = entire bldg	>10% floor area = entire bldg	All	All	>10% floor area = entire bldg	>10% floor area = entire bldg
Memphis	2004	All	All	>10,000					
Barnwood		Current Code	Any district with a driveway slope greater than 15 degrees and/or home 300 feet from roadway	Current Code	Current Code	Current Code	Current Code	Current Code	Current Code
Gerardtown		All over 5,000 sq ft	All R-1 and R-2 and R-3 over 7,500 over 35 ft in height, and further than 300 ft from road	Current Code	Current Code	Current Code	Current Code	Current Code	Current Code
Chestnut County	2006	All	Subdivisions with greater than 4 lots	>25% floor area = entire bldg	>25% floor area = entire bldg	All	All	>25% floor area = entire bldg	>25% floor area = entire bldg
Shelby	2007	All	IBC						
Evansville	2007	All	IBC, including Appendix P						
Fayette County	11/27/2007	1999 SBC	All new one & two family dwellings, except manufactured						
Spartanburg	Apr-08	All except factory and industrial, which is 5,000 sqft.	5,000 sqft. in one and two family, attached units	In accordance with the IBC	50%	portables and drywals less than 2,000	All	50%	50%

Appendix C: Notice of Solicitation of Public Comments

Notice of Solicitation of Public Comments

Pursuant to Chapter 529 of the Public Acts of 2009, the Tennessee Department of Commerce and Insurance seeks written public comments relating to the cost and effectiveness of sprinkler equipment in one-family and two-family dwellings in areas where residential sprinklers are in use.

As directed by the General Assembly, the Department is conducting an analysis regarding the cost and effectiveness of sprinkler equipment in one-family and two-family dwellings in areas where residential sprinklers are in use and will report the results of such analysis to the general assembly on or before May 1, 2010.

The Department is specifically requesting input from nonprofit and business groups or organizations including, but not limited to, the Tennessee Fire Chiefs Association and the Home Builders Association of Tennessee.

It is requested that all written materials be provided to the Department by December 31, 2009.

Materials may be sent by email, addressed to Jim.Pillow@tn.gov or by mail addressed to:

Jim Pillow
Assistant Commissioner
Tennessee Department of Commerce and Insurance
ATTN: Residential Sprinkler Analysis
500 James Robertson Parkway, 3rd Floor
Nashville, TN 37243.

KNOW YOUR FIRE SPRINKLER SYSTEM

KNOW YOUR SYSTEM'S WATER CONTROLS

Your home has a built-in fire sprinkler system. If you have a fire, the sprinklers will put it out or control it with water. The system protects your family and home from the dangers of fire, 24 hours a day.

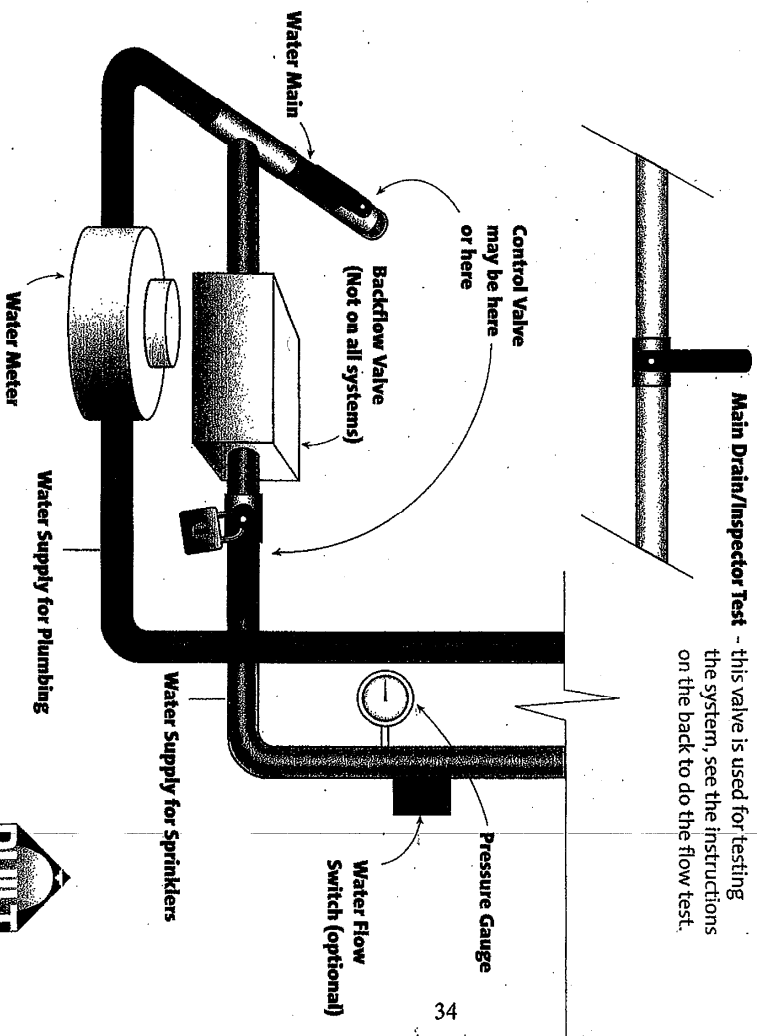
In most cases, sprinkler systems are supplied by the **Water Main**, where water comes into a home. The fire sprinkler system connects to the water main. In some systems the water flows through a **Backflow Valve**. A main water control valve is on the pipe that supplies the sprinkler system. This **Control Valve** turns the water flow on and off. Your system may have additional or different features.

Turning off the water to your home will also turn off the water to your fire sprinkler systems.

Contact your sprinkler contractor if you have questions.

fire sprinkler contractor _____

phone number _____



KEEP YOUR FIRE SPRINKLER SYSTEM WORKING THE WAY IT SHOULD

CONTROL VALVES MUST BE OPEN OR TURNED ON.

The control is **OPEN** when it is in line with the pipe.
The control is **CLOSED** ("turned off") when it makes a corner to the pipe.

Use a padlock to keep the valve **LOCKED OPEN**.

Tape the padlock key to the pipes or a wall nearby so you can find it when you need it.

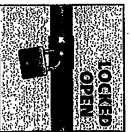
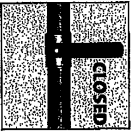
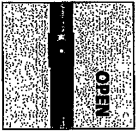
Keep the area around your water controls clear.

Do not store anything within 1 foot (30 cm) of your water controls.

If sprinkler water control valves are ever turned "off", be sure to turn them back on.

The water needs to be turned on so the sprinklers can work to protect you from a fire.

WATER CONTROLS



PROTECT YOUR FIRE SPRINKLERS.

Make sure nothing is blocking your sprinklers.

Keep pictures and large furniture away from sprinklers on walls.

Hang lamps and plants away from ceiling sprinklers.

Do not hang anything on sprinklers or pipes.

Even lightweight items can damage sprinklers.

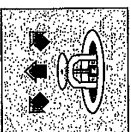
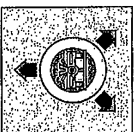
Keep paint away from sprinklers or sprinkler covers.

While doing messy work, such as painting, cover the sprinklers with plastic. Remove the plastic as soon as you are finished.

Be careful when you are moving large or tall items.

Don't bump sprinklers or exposed pipes. Teach children not to touch or play with sprinklers.

SPRINKLERS NEED SPACE



DO A WATER FLOW TEST ABOUT ONCE A YEAR.

You can do this yourself (see below). Or your sprinkler contractor can do it for you.

To do a water flow test:

1. Find your water flow test control valve. It may be labeled **main drain, inspector test or test and drain**.

2. Slowly turn the control valve on (bring the valve in line with the pipe).

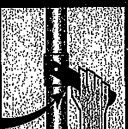
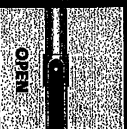
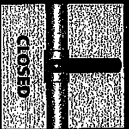
3. This will start water running. Let the water run for about 60 seconds. If your system has an alarm you will hear it.

4. Slowly turn the control valve off (the valve will make a corner to the pipe).

5. Write down the date you tested your water flow switch.

6. If your sprinklers are connected to a central alarm, inform the fire department that you are going to do a test.

FLOW TEST



Write down the date of each test here:



HomeFiresprinkler.org

Form No. LWS-Card-9/09-10M-1



INSURANCE SERVICES OFFICE, INC.

www.isomitigation.com

800-444-4554

RESIDENTIAL SPRINKLERS ISO FACT SHEET

ISO is an independent statistical, rating, and advisory organization that serves the property/casualty insurance industry. ISO is the leading supplier of underwriting information, advisory loss costs, supplementary rating information and standardized policy language to insurers in all 50 states and the District of Columbia. ISO offers the following regarding how residential sprinklers are reflected in ISO's advisory residential property programs:

PREMIUM DISCOUNTS

The standard ISO Dwelling Fire and Homeowners Programs contain available premium Credits for installation of fire sprinkler protection up to a maximum of:

- 13% for full sprinkler protection that includes all areas of a home, including attics, bathrooms, closets, and attached structures;
- 8% for fire sprinkler protection of all areas of a home excluding the attic, bathrooms, closets, and attached structures as long as fire detection equipment is installed in those areas where sprinklers are omitted;

Individual insurer programs may provide different credits.

SPRINKLER "LEAKAGE" COVERAGE

The presence of a residential sprinkler system may raise concern about the risk of accidental water leakage from the system. ISO's standard Homeowners policy forms provide coverage for "...accidental discharge or overflow of water...from within a...fire protective sprinkler system...". This coverage is included in the basic policy. There is no extra charge for this coverage.

Also, coverage is provided for water damage related to the suppression or extinguishment of a covered fire.

Individual insurer programs may provide variations to this coverage.

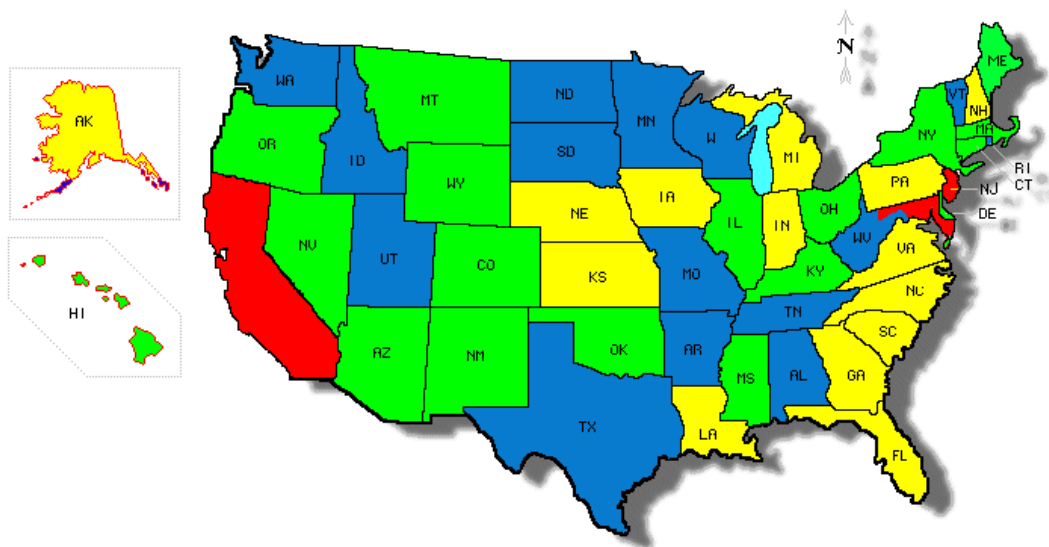
BUILDING CODE EFFECTIVENESS GRADING SCHEDULE

The ISO Building Code Effectiveness Grading Schedule (BCEGS®) is used to review public building code enforcement agencies and to develop a classification that is provided as advisory information to insurers who may use it for insurance underwriting and rating. If the requirement of the International Residential Code (2009) for automatic fire sprinkler protection of residential dwellings was removed by legislation or local ordinance, BCEGS would not provide full recognition for adoption of code without amendments. A building code enforcement agency which adopted a code with amendments that weaken hazard mitigation issues as defined in the model codes and referenced standards would not receive maximum recognition for code adoption.

Appendix F: Home Builders Association of Tennessee Response

The following information provided by the National Association of Home Builders shows what we believe is the current state of mandated requirements for residential fire sprinklers throughout the United States. From this data we believe the conclusion is that in states that have a large rural area there is a reluctance to provide for mandated residential sprinklers. As in the case of Tennessee, a number of these states provide for local jurisdictions to implement residential fire sprinklers on a jurisdictional basis.

When quoting the cost associated with residential fire sprinklers, many of the cost incurred with provision of these sprinklers in rural areas may not be properly calculated. These costs include storage tanks, additional pumps if water is supplied by wells, and overall water pressure requirements.



Last Update April 9th, 2010

Blue States	Mandatory Requirements Defeated	Yellow States	Pending Action
Red States	Mandatory Requirements Approved	Green States	No Action Reported

Legislative Action					
Status	State	Bill	House	Senate	Governor
Mandate Defeated	Alabama	HB264	Passed	Passed	Signed into Law
Mandate Defeated	Missouri	H103, S513	Passed	Passed	Signed into Law
Mandate Defeated	Idaho Bill	HB 218, HB202	Passed	Passed	Signed into Law
Mandate Defeated	North Dakota	SB2354	Passed	Passed	Signed Into Law
Mandate Defeated	South Dakota	HB1216	Passed	Passed	Signed Into Law
Mandate Defeated	Texas Bill	SB1410	Passed	Passed	Signed Into Law
Mandate Defeated	Tennessee	SB2300, HB2318	Passed	Passed	Signed Into Law
Mandate Defeated	Utah Bill	HB 0045	Passed	Passed	Signed Into Law

[Back to top](#)

Code Adoption		
Status	State	Action on Residential Sprinkler Amendment
Mandate Defeated	Arkansas	Effective October 1st, 2009 the Arkansas State Police signed a rule that would not require sprinklers in one and two family dwellings now or in the 2012 edition of the Arkansas Fire Prevention Code Rules.
Mandate Defeated	Minnesota	Minnesota Regulatory Letter
Mandate Defeated	Rhode Island	Passage of SBC-2, which removed the mandatory requirement for Sprinklers in one and two family dwellings and provides for the installation at the buyers request.
Pending Action	Virginia	Amendment to Modify "Mandate" to "Option" has currently been approved by the Building Codes Review committee and is awaiting final action.
Mandate Defeated	Vermont	The Vermont Fire and Building Safety Code has been updated and made effective as of June 15, 2009. As currently required in the State of Vermont, the requirement for residential sprinklers in one and two family dwellings has been amended by deleting the requirement from the 2006 <i>Life Safety Code</i> .

Mandate Defeated	West Virginia	The State of West Virginia completed the adoption process of the 2009 International Codes and has amended the requirements for mandatory sprinklers by deleting Section R313 from the 2009 <i>International Residential Code</i> .
Mandate Defeated	Washington	The Council completed the adoption process of the 2009 International Codes and has amended the requirements for mandatory sprinklers by deleting Section R313 from the 2009 <i>International Residential Code</i> and reinstated the adoptable Annex P for local adoption for residential sprinklers.

As with other mandated programs affecting the residential housing market, it is the contention of the housing industry that most of these are currently being addressed by market driven forces. Presently, anyone who desires to have the perceived protection afforded by residential fire sprinkler systems can request that option in their home. This option is currently available just as Green Building, Aging-In-Place and Energy Efficient homes. Providing the consumer with information regarding the availability of these type programs has proven to be the impetus for their success.

Adoption of improved building codes across the country over the last twenty years has provided our citizens with better, safer and more livable homes for their families. While always wanting to improve these codes, we do not want to do anything that will price families out of the market and keeping them from moving into these homes with higher code standards.

The following are points that we believe we can all agree on.

- More consumer education of the availability and function of residential sprinklers
- Opportunity for builder professional certification in this market
- Maintain current posture that demand be market driven
- Continue state requirement of no sprinkler mandates

Appendix G: Fire Coalitio



Executive Summary

It is the recommendation of the Tennessee Fire Service Coalition that the state fire marshal's office lead a process to establish when fire sprinklers should be included in the state residential code, because this report and all information gathered in this study and all studies across the country prove they are effective in saving lives. The process used by the state fire marshal's office should include all stakeholders with interest in this issue, not just the fire service and the homebuilders. The Tennessee Fire Service Coalition knows that fire sprinklers are effective because there has never been a documented fire fatality in Tennessee in a building protected with fire sprinklers where the person was not intimate with the fire. There has also never been a multiple fatality fire in the nation in a building protected with automatic fire sprinklers. We make this point because as stated in the beginning of this report, Tennessee is always in the top 10 fire fatality states and we have multiple fatality fires every year. The Tennessee Fire Service Coalition is a conglomerate of organizations and associations, including the Tennessee Fire Chief's Association, Tennessee Fireman's Association, Tennessee Fire Safety Inspectors Association, Tennessee Chapter of the International Association of Arson Investigators, as well as the Tennessee Fire and Burglar Alarm Association and the Tennessee Fire Sprinkler Contractors Association.

The Tennessee Fire Service Coalition recommends the following:

- A process and system be developed to bring all stakeholders to the table to develop a plan for the future.
- Establish a database immediately to track all the homes permitted in Tennessee through the new residential code. This is not only for fire protection, but also energy conservation.
- Create a task force within the state fire marshal's office that investigates and reports on every fire fatality in Tennessee.
- Commission another study on the means of providing the safest, most effective, and efficient fire protection based on the type and size of community.
- Increase the prevention and education efforts of the state fire marshal's office.
- Establish a home safety rating for the state of Tennessee to assist the citizens in being more aware and making our homes more marketable.
- Amend the law to allow the normal regulatory process for code adoption to play out with the stakeholders and that one specific item in the code not be legislated out.
- In the interim, insert all trade-offs back into the code that were granted because homes were protected with fire sprinklers.

The results of this report as directed in Tennessee Code Annotated 68-120-101(a)(9) should be the catalyst for future life safety, economic improvements, and quality of life improvements throughout Tennessee. A shift from the cost and impact to the homebuilders should occur to a more overall view with a focus on sustainable communities. A collaborative effort will move us toward this more citizen and futuristic approach.

We applaud the state fire marshal's office for the compilation of this study and most of all, the 106th General Assembly for requiring the study be conducted. A few of the stakeholders have met and realized that common ground lies ahead and that common ground being reached is vital to lives being saved in Tennessee.

Introduction

“Tennessee has a fire death rate that is of concern to Tennessee’s Legislature and its executive leaders” (Report, page 1). As experts in providing fire protection services to the citizens of Tennessee, the Tennessee Fire Service Coalition knows that in order to address this concern strong codes must be adopted, and this includes not only the minimal national code but in cases in excess of this code. It is also known that changing the fire problem in Tennessee or the country, this cannot be achieved by manual fire suppression alone, regardless of whether you are speaking of citizens or firefighters. Reacting to and responding to emergencies is a vital necessity, however, as we know from the Federal Emergency Management, preparedness and mitigation are always prior to response and recovery.

In order to make good decisions pertaining to the future of quality of life in Tennessee, we must have proper data. The fire service understands it cannot solely make the life safety argument, however, it must ensure that more lives are not lost and property consumed. It must fit into the overall delivery of service in the community and the state. Having the proper data will not only assist in building information, it will also assist in growth management, the measurement of progress, the cost to new home-owners, and the savings to existing citizens, etc. This database to track all new permits should obviously allow the gathering of information pertaining to energy savings.

An average of 100 Tennesseans perish each year from fire. The number of Tennesseans that are burned has not even been reported or addressed through this process. In order to make informed decisions to prevent these predictable tragedies, each fire death and some significant injuries must be investigated. There are many fire fatalities each year that have no autopsy conducted, no formal investigation by trained investigators, and certainly not a lessons learned report produced. There are capable and competent people within our state that have the knowledge, skill, and ability to report these events in a manner to help others in our state how to prevent similar events. To reduce the fire fatality rate in Tennessee, we must allocate the resources so that we have a complete picture of the factors impacting the problem. This would include building and occupant data so that the complete process can be better analyzed and better risk reduction strategies implemented.

“The Southeast is the nation’s most populous region and contains nearly half the total U.S. rural population” (Report, page2). This fact is going to continue as growth comes to our region. Having the opportunity to travel across the United States working on fire protection issues and assisting in the delivery of Fire Team USA workshops has allow us to realize why the growth is projected in Tennessee. When one moves out of the Southeast, taxes and fees seem to climb steadily. Our elected leaders have obviously managed our finances well because our taxes are low in comparison to all other parts of the country we have studied. Having a sustainable community is vitally important and being reactive is not part of sustainability. When times were great and growth was booming it was easier to build schools, roads, parks, and fire stations. However, when times are challenging, we struggle to incorporate sustainability. We must focus on tax tolerance and making sure that we do everything to limit taxation, fire sprinklers are part of that limiting taxation, not only from fees but also property taxes. Cheatham County and Nolensville are proof that it is working. Both communities are experiencing steady growth and additional demands for service, yet neither has implemented a career fire service delivery model. Best of all, it does not mean the citizens are not protected and expected to “make do,” they are living in the safest homes possible for their families. This same model of service delivery should be expanded in many places across Tennessee.

The State Fire Marshal’s office has one employee whose position is focused on fire and life safety education. In a state with approximately 735 fire department covering 347 cities and 95 counties with a total population over 6.2 million people, the effectiveness of this is obviously limited. The state fire marshal’s office needs to increase its role as an educator, focusing on fire prevention and education, as well as providing resources and supporting local fire departments. Insurance premiums could be utilized to fund this role and support fire department efforts to better educate our communities. Additionally, this division in the state fire marshals office could work with and coordinate all the stakeholders in order to provide education, as well as begin a home safety rating project. This would help citizens, fire department, communities, and insurance companies evaluate risks. Grant funding may be possible to start a pilot program for Tennessee.

We have many opportunities to provide a better future for the citizens of Tennessee and we are the leaders who can make it successful when directed by the Tennessee General Assembly and under the leadership of the Governor. Fire is a problem in Tennessee. It is not obvious to many because it appears as separate isolated incidents cross the state, not one large disaster. We have made a step in the right direction with the adoption of codes that impact one and two family dwellings. However, we should make steps to ensure the fire and building codes are viewed as minimum requirements, and not as maximums. As professionals responsible for the health, safety, and general welfare of the citizens, we must continually ensure that the publics’ expectations match our service delivery, while maximizing affordable, safe housing with a focus on long-term community sustainability.

Recommendations

PLAN – Our first recommendation is intended to focus on the points where the home builders association and the fire service can agree, but also expands this to other

stakeholders. The process should continue to move forward and improve upon the methodology utilized for this study. While we appreciate the efforts of the state fire marshal’s office in compiling this report and working with us, we feel the path to progress should be discussed by more stakeholders possibly including:

Tennessee Fire Service	Home Builders Association of Tennessee
Tennessee Municipal League	Tennessee County Association
Tennessee Building Officials Association	Tennessee Association of Utility Districts
Tennessee Association of Realtors	Tennessee Association of County Officials
Tennessee Manufactured Housing Association	Association of County Mayors in Tennessee
Professional Insurance Agents Associations	American Planning Association (TN Chapter)
Associations for the Disabled	AARP (TN Chapter)
State Agencies as identified	Vanderbilt Burn Center

We also recommend that the process include the following five strategies for reducing community risk.

- Education – This recognizes that all interested stakeholders need education on residential fire sprinklers, including the fire service, home builders, policy makers, utility purveyors, citizens, building officials, insurance agents, and burn survivors.
- Engineering – This is the utilization of standards for the installation and review of any alternatives that may be offered. This is not alternatives to fire sprinklers it is alternative means of providing fire protection to our citizens, which we have to provide to all of them.
- Enforcement – This is for the review process and the inspection and will require cooperation of state and local officials. This should also include the database that measures our efforts for the future.
- Economics – This should look at the incentives that could be offered to make fire protection more affordable, which doesn’t just pertain to fire sprinklers. The cost of the fire department, insurance, tax loss, etc. should be analyzed.
- Emergency Response – This should review the true capabilities of the fire departments in regards to life safety and property conservation. The majority of the fire service in Tennessee is provided by volunteers and this system is not sustainable as our communities grow.

DATABASE – There should be a database developed and implemented for the permitting process when the state fire marshal’s office begins regulating one and two family dwellings. Stakeholders should provide input as to what is to be documented and those jurisdictions that are exempt would annually upload their permit information to the state. This would allow them to remain an exempt jurisdiction. A method of processing the permits and an electronic system should be established that will create a base of information such as how many homes by type are built under the adopted code, the square footage of the home, the jurisdiction, the inspector, etc.

The Town of Pleasant View has been tracking home development over the past several years. Cooperation between the building official, city managers, mayors, and fire service will make tracking this information easier. The information indicates that over 1.2 million square foot of residential property has been protected by fire sprinklers. This correlates to over \$1.3 million invested into the fire protection infrastructure of Pleasant View without charging the existing homeowners any new fee for fire protection. Most importantly it highlights the fact that Pleasant View has limited its overall risk from fire through mitigation of risk and controlling costs. A similar statewide database would provide valuable information to base future decisions

INVESTIGATE – Every fire fatality in Tennessee should be investigated by the state fire marshal’s office. Currently, the state law requires fire departments to report fatal fires within ten days. The law should require the immediate notification of the state fire marshal’s office and require an autopsy of all fire victims. The state fire marshal’s office in cooperation with the Tennessee Chapter of the International Association of Arson Investigators should establish regional investigative teams that can respond to fire fatalities while the fire department is still on-scene of a fire fatality so that better documentation can be collected. Cooperation with medical burn centers would allow for notification of burn injuries to the state fire marshal’s office. This provides opportunity for investigators to better track the patient, especially in the event the patient dies. Currently, some of these fire victims would not be reported under the state’s fire incident reporting system unless a fire department follows up on the injury.

STUDY – While this study and the first recommendation herein focused specifically on fire sprinklers this study should be more holistic in regards to community fire protection and best practices for delivering fire protection. The total cost of fire protection and who pays should be studied. Utilizing the information compiled in Pleasant View, Tennessee, the impact of growth on the fire department should be considered beyond just fires, since most fire departments respond to more than just fire. The fire department in Pleasant View will respond to an average of 8 additional calls annually for every 100 houses constructed and occupied. Providing adequate resources for a medical call in one of these homes only requires limited staffing, however, an uncontrolled fire in one of these homes, especially if located next to another home, require at least 16 firefighters to conduct safe and effective operations on the fire scene.

An analysis of the fire service in Cheatham County was conducted based on what was available in fire department resources today versus what would be needed for a career fire department. When filling in the information on determining a full-time fire department equivalent, the total annual personnel cost savings is over \$5.8 million. The homeowner or property owner saves over \$475 per household because of the volunteer firefighters. With an inadequate number of volunteers to safely and effectively respond to house fires, departments have mutual aid agreements where multiple fire departments are called in an attempt to assemble enough transition to a fully career fire department like Nashville, Memphis, Chattanooga, Knoxville, Murfreesboro, and Clarksville is not a reality, the utilization of fire sprinklers to minimize the risk to citizens and firefighters is necessary. Any department that cannot comply with NFPA 1710, and even those departments who

can if they want to reduce citizen fire deaths, should have fire sprinklers required in all new construction because of the safety to firefighters.

PREVENTION STAFF – There must be a stronger commitment to fire prevention and public education in Tennessee. The state fire marshal’s office only has one employee dedicated to this function, which is the same as it had over twenty years ago. Most local fire departments are understaffed and may only provide fire safety education to elementary aged students. The Home Safety Council conducted a survey of fire departments nation-wide and found that fire departments lack emphasis on home safety and to correct this there should be a full-time public education person within the department. Funding from the Fire Insurance Premium Tax should at least fund a fire prevention/public education officer in each county. Funding should also be provided to counties, just as we did with emergency management in the 80’s, to encourage county mayor’s to utilize their authority under TCA 5-6-121. A state and local jurisdiction partnership will lead to reducing the number of fire victims in Tennessee through increased awareness and education.

HOME SAFETY RATING – The state fire marshal’s office, the fire service coalition, and the home builders’ association should establish a home safety rating for new homes built in Tennessee. This enables citizens to be more aware of home safety and make better decisions affecting their safety, while making Tennessee safer and positively influencing the marketability of homes. There is an opportunity for Tennessee to become a pilot state that could create a program modeled nation-wide. This is an area that the fire service and the homebuilders alike should partner with other stakeholders.

CODES – The state law that adopted codes for one and two family dwellings as well as the state energy provisions should be amended to remove the prohibition of fire sprinklers from being adopted state-wide. The fire service and the homebuilders agreed this year that fire sprinklers in the statewide code may not have been a possibility, but it isn’t a matter of if, it is a matter of when. The regulatory process should be allowed to work. The fire service didn’t introduce legislation when the state transitioned from the NFPA to the ICC families of codes and there shouldn’t be a prohibition against any one code related issue now. Once these partnerships are possible and working, the day will come when the technology available will be able to protect Tennesseans across the state. There are many jurisdictions that are exceeding the minimum code and the results are proof that safety results.

The International Residential Code was also amended beyond just fire sprinklers being removed in one and two family dwellings. There were other residential dwellings where fire sprinklers were removed. If this was going to be the case, the code should have been amended to insert any trade-offs given as a result of fire sprinklers being installed back into the code. With the increased and continued use of light-weight building components - fire sprinklers should be included not excluded. The last thing we want to see is an increase in fire fighter line-of-duty deaths as a result of reduced code adoption.

Conclusion

The Tennessee Fire Service Coalition would like to express our sincere appreciation to the Tennessee General Assembly for the foresight in requesting this study. We would also like to express our thanks to the Department of Commerce and Insurance Commissioner Leslie Newman for her leadership in allowing the fire service to participate in the processes. Finally, we would like to say thank you to Assistant Commissioner Jim Pillow for his cooperation and willingness to listen. It is the desire and the mission of the Tennessee Fire Service Coalition to “promote improvement in fire protection for the life safety of the citizens and firefighters in Tennessee”. Working together, we can fulfill this mission and move Tennessee to a more fire safe future.

APPENDIX H

Tennessee Manufactured Housing Comments

(Although timely submitted, these comments were inadvertently not considered in the preparation of this document and have been attached in their entirety.)

December 29, 2009

Jim Pillow, Assistant Commissioner
Tennessee Department of Commerce & Insurance
500 James Robertson Parkway, 3rd Floor
Nashville, Tennessee 37243

Re: Residential Sprinkler Analysis - Request for Comments

Dear Jim,

The Tennessee Manufactured Housing Association (TMHA) represents all segments of the manufactured and modular housing industries in the State of Tennessee as well as bordering states. Over the past several weeks, TMHA has reviewed hundreds of pages of data relative to the mandate and use of residential sprinkler systems and other fire safety devices such as smoke detectors and alarms.

Included in those reviews were comments and statistical compositions of data presented and/or published from the Housing and Urban Development (HUD), the Manufactured Housing Institute (MHI), Tennessee Insurance Representatives, U.S. Census Bureau, Centers For Disease Control, U.S. Fire Administration (USFA), National Fire Protection Association (NFPA), Public Opinion Strategies, National Association of Home Builders (NAHB) and the NAHB Research Center, as well as published city data information, just to name a few of the resources.

It has been interesting to find that identical statistical data may be used to solidify the viewpoints both for and against a fire sprinkler mandate for one- and two-family dwellings. It was also interesting to note that system costs are listed separately when discussing affordability. For example, when stressing safety versus costs, a moderately priced sprinkler installation cost per square foot did not also include the component cost per square foot, and vice versa. The wording is very specific and the result becomes a skewed cost related analysis standing for a proposed benefit.

It would be helpful in this subject debate for Tennessee, if the Department could provide to interested parties, the percentage of communities that currently have fire hydrants and water facilities which meet or exceed a sprinkler manufacturer's required fire flow rating in order for systems to operate properly. In reviewing city data and talking with codes officials, a high percentage of Tennessee communities, including larger metropolitan communities, currently do not meet the minimum required fire flow ratings for their existing services. Many communities need to upgrade just to meet their requirements of today. This would certainly be true for a more rural community.

Having this information would help officials as they work towards an appropriate and reasonably sound cost estimate to improve the necessary infrastructure which would be required to adequately service residents in Tennessee, in the event of a statewide residential sprinkler mandate. Officials certainly could not require homeowners to bare the system and installation costs, if the fire flow rating in their respective communities was inadequate to service the systems once installed. More rural officials and city planners will need this information to even begin a feasibility study for service upgrades; while rural residents would need to include the costs of storage tanks, pumping equipment and generators into building construction costs, as infrastructure upgrades would take some communities decades to complete, considering the state's current economic climate.

Having said that, TMHA will comment on some of the reviewed data, however there is much more than statistical data to consider from a home manufacturer perspective and focused home affordability. TMHA would like to bring forth other considerations which might not be addressed by entities unfamiliar to the process of building homes in a manufacturing setting. Little has been discussed relative to 1) the short and long term concerns relating to product liability imposed on home manufacturers, as noted from Federal attorneys in Washington; 2) cost increases to low and moderate priced homes; 3) as well as the long term requirements imposed to consumers through the sprinkler and insurance industries and their respective data evaluation process.

While no one advocates against consumer safety or safety products; as officials, we must also weigh the cost effectiveness of our requirements and mandates, to the general public. All codes and efficiency requirements must be weighed against the economical impact to the product producers and the end use consumers.

It should be noted that tremendous changes in construction technology, advancement in building codes, electrical and smoke detection alarm systems, and other home fire retardant products, combined with consumer education, have tremendously lowered the rate of residential fires, and deaths as a result of those fires. Research currently shows the number of residential fires have decreased at such a rate that fire fighters spend only about an average of 3 percent of their time on residential fire fighting activity.

Home Manufacturers and 3rd Party Product Liability

Home manufacturers would certainly see a significant increase in their product liability insurance due to a potential for any sprinkler product factory defect. Federal attorneys have already weighed in with the manufactured housing industry when adding fire sprinkler systems to their homes.

- In the event a county, state or federal law should mandate the use of a particular product, the home manufacturer is granted no waiver of liability for a product's operational performance, when it relates to personal injury or property damage. According to Federal attorneys, a product liability waiver [even a limited liability waiver] provided to a home manufacturer is unconstitutional, in order for the home owner's full rights to be preserved.
- In other words, the manufacturer of a home bears the greatest liability, should fire sprinkler components fail. Additionally, the home manufacturer is required to assume all future product liability if a sprinkler product manufacturer goes out of business.

The resulting liability to home manufacturers would require home prices to increase significantly to cover the following:

- increased insurance premiums to the home manufacturer for sprinkler installation and warranty requirements;
- the cost of retooling manufacturing facilities;
- the cost of lost production efficiencies... not every home built by a Tennessee manufacturer would be going to a county or state that requires sprinklers;
- the cost of the sprinkler product;
- the cost of sprinkler product installations; and
- the cost of estimating long term liability from the aftermarket product itself.

The Department of Housing and Urban Development (HUD) tasks the manufactured housing industry with a mandate to *provide* affordable housing. That is an impossible task if officials continue to impose the use of more and more aftermarket products, while imposing the liability costs of those products, to the home manufacturers.

These points are even more critical to a home manufacturer when noting there is no study that shows how long a sprinkler system or components will last, and in fact, the reliability of those systems and components can be argued. After smaller recalls by other companies in 1998 and 1999, a major fire sprinkler manufacturer recalled 35 million fire sprinkler heads in 2001. For the manufactured home industry, a product recall of this nature would be overwhelming. Customer notification and component repairs would fall to the home manufacturer, as would the financial burden of any additional home repairs caused by a defective system.

Product Costs to Manufacturers and Consumers

Let's breakdown two of the above related home manufacturer costs and add them to a typical low to moderate income home. Specifically, consider the sprinkler product and the cost of sprinkler product installations. According to sprinkler proponents, the cost of a sprinkler system **and** all associated installation costs may range from \$2.00 to \$3.66 per square foot, but as much as \$7.00 per square foot in some regions. This is still extremely conservative as these costs do not take in to account future liabilities, product replacements, system maintenance, insurance premiums, required annual inspections, etc. For the below examples, we will use \$2.83 as the average combined cost for the component and installation.

<u>Home Size</u>	<u>Square Footage</u>	<u>Cost of Home</u>	<u>Sprinkler Cost</u>	<u>% Cost Increase</u>	<u>New Home Cost</u>
16' x 80'	1280	\$25,000	\$3,622.40	14.5%	\$28,622.40
28' x 56'	1568	\$35,000	\$4,437.44	12.7%	\$39,437.44
28' x 80'	2240	\$55,000	\$6,339.20	11.5%	\$61,339.20

The above are examples only, but as you can see, the more moderately priced the home and square footage, the higher the percentage increase in cost to the consumer. This is an extreme financial burden for a low to moderate income homebuyer. Home fire sprinklers in one- and two-family dwellings are a significant expense and have an unreasonable impact on housing affordability.

Remember, in addition to these costs, will be the increased insurance premiums and estimated product liability. There will also be the costs of associated property upgrades in rural areas where water pressure and fire flow ratings are less than required by the sprinkler manufacturer. The costs of onsite pumping and water storage equipment in rural areas where property sits atop a hillside can be upwards of several thousands of dollars.

Also, many rural properties have wells and are not connected to community service providers. Owners of homes on well water need to consider how the sprinklers will operate if the power goes out or if water pressure is a problem - and solutions like the extra water tanks, pumps and generators, are costly. This again would target more of the rural low to moderate income homebuyer.

In rural areas where power outages may be frequent during winter storms, associated costs must also be addressed relative to freezing pipes and water damage as a result of unheated attic areas, where most sprinkler systems are installed.

Tennessee Insurance Representatives:

According to insurance representatives within the State of Tennessee, the following comments were noted:

- Fire sprinklers are not proven to reduce the number of fires and certainly not proven to reduce the property damage amounts. A partial property loss to the insurance company is treated the same whether due to fire or water damage. It is important to note that sprinklers will discharge water until the fire department has been notified,

arrives at the home, evaluates and determines the structure is safe, and then locates and turns off the water supply. Also, a partial property loss to the insurance company is just as bad on the claim payout and subsequent increased premiums to consumers, as a total property loss.

- If a county or state **REQUIRES** sprinklers, then a disclaimer is added to the insurance policy to reflect that a sprinkler system **MUST** have an annual inspection by a certified inspector. Typically, those inspection costs can go as high as \$200 annually, depending on the area. This would be an ongoing cost to the home owner, in an already distressed time. [As a note, claims against the insurance company have occurred when inspections were performed, and the systems were not reactivated by inspectors.]
- Language would also be needed to limit or totally disallow an insurance claim when power outages occur in cold weather, and pipes freeze, rupture and damage property. [Typically attics are not heated or cooled. Should an antifreeze-type system be installed, producers require the solution to be emptied and then refilled with an antifreeze solution every winter, and that monthly inspections and testing of all the water flow devices, pumps, air pressure and water level be performed. Further adding excessive maintenance expenses to homeowners.]
- Contrary to statements otherwise, insurance premiums for home consumers would not immediately drop in price, just because a home has a sprinkler system. The insurance companies need 3 - 5 years of hard data with claims processing, in a particular state, and with the particular product usage and performance. Even at that, it could take longer to assess the data.
 - In the end, if no claims were processed due to product failures or home damage, Tennessee residential customers could see a maximum 3% decrease, but not the 10% as has been published. Of course any savings here would be outweighed by the ongoing annual maintenance and inspection costs. A savings would not be applicable to any consumer which is already in a high risk bracket.
 - On the flip side, if the 3 - 5 years of study data shows any home damage by the sprinkler system which was ***not caused by a fire-related incident***, a Tennessee residential customer could actually see a minimum 3 - 5% increase in premiums, for having a working fire sprinkler system in their home.
- Also noted from insurance providers was an additional mandate listed by some producers of sprinkler systems which required certain components to be replaced every three years to ensure the system remained operable and to continue some aspects of the warranty. Homes which had these types of systems would have all damage claims denied, if the homeowner did not follow the components replacement requirement by the product manufacturer. Most consumers do not realize that even

working components must be replaced to maintain proper fire replacement coverage from their insurance provider. Most notably, annual sprinkler installation costs (not including maintenance costs) of which new homebuyers will be forced to pay, will greatly exceed property loss nationwide or in any jurisdictions where they are required.

- For example, if all new homes built in 2005 were required to have sprinklers, the installation cost to builders would have been \$10,183,118,400 based on the average square foot of those homes and the average cost of sprinkler installations in the jurisdictions where they are currently required (at \$2.66 sf).
- NFPA reported the total home property loss due to fire in 2005 was \$5,781,000,000. This means that installation costs paid by homebuyers would have been nearly double the claim loss. Also, these figures do not include insurance premiums or maintenance costs which would have been invested by the homebuyer.

General Comments

It is well documented that residential fire incidents, injuries and fatalities continue to decline substantially as a result of the fire safety provisions already included in the HUD-Code and International Residential Code (IRC) and because of better home safety education. This trend continues, even after a significant increase in population and housing stock over the last 10 years. Most if not all officials in fire safety state this can be directly attributed to technology, improved building codes and the requirement of electrical and smoke alarm systems, along with consumer education on the proper operation of those alarm systems.

In fact, USFA and NFPA data continue to affirm that the vast majority of home fire fatalities occur when there are no operational smoke alarms. Further stating that residential fires from 2001 - 2004 showed that 88 percent of the fatal fires in single-family homes occurred where there were no working smoke alarms. TMHA notes that this property and life saving device carries a cost and installation of approximately \$50 per home location requirement, and makes no demand on current infrastructure amenities.

TMHA also refers to the following organizations for specific statistical and market reporting data which continues to affirm the fire safety measures which have already been taken as it relates to residential property.

- U.S. Census data states that the population growth between 1977 to 2006 grew 36 percent, while at the same time the rate of fires per 1,000 population fell 63 percent, from 14.9 in 1977, to 5.5 in 2006.
- The Centers for Disease Control data states a 58 % drop in the actual death rate per million persons from house fires from 1979 - 2003.

- According to the most recent NFPA report on smoke alarms, it is estimated that over 890 lives could be saved annually if every home had working smoke alarms. 65% of the fire fatalities reported from 2000 to 2004 occurred in homes where smoke alarms were not present or smoke alarms were present and did not operate.
- According to NFPA reports, the number of fires that occurs in one- and two-family dwellings equipped with sprinklers are so few, they are not shown in their respective studies.

Consumer Input

- When the firm Public Opinion Strategies asked 800 likely voters if fire sprinklers should be required in new homes, an overwhelming 89 percent said that smoke detectors already do an adequate job of protecting them in their homes and 28 percent would not want sprinklers at all, even if they were provided free of charge.
- According to a Harris public opinion poll, only 38 percent of those surveyed said they would likely purchase a home that included residential fire sprinklers, leaving 62 percent indicating they would likely not purchase one.

Any city, county or state jurisdiction considering mandatory sprinklers needs to determine and thoroughly consider what the true total cost to home buyers will be in their community (including additional fees they may be charged by water purveyors) and what their constituents will pay collectively, before making any decision to mandate sprinklers.

In summary, it is well documented that the population and housing stock continues to increase while fires, and deaths as a result of those fires, are decreasing significantly. Technology, building strategies, consumer education, smoke alarms and other fire retardant products continue to drive fire-related incidents down.

Proponents for sprinkler mandates cannot dispute nor justify the negative impact on housing affordability. Mandating a single system which can cost in upwards of 15% of a total home cost, while combining ongoing maintenance costs, annual inspection costs, and increased insurance premiums will turn many consumers away. Research states for each \$1,000 added to the price of a home, another 217,000 potential home buyers are forced to remain on the sidelines. Today more than ever, we cannot afford to deny needed housing for the sake of new requirements that are not essential to a safe and healthy home.

If you would like to discuss these comments further, please don't hesitate to call. I may be reached at (615) 256-4733.

Sincerely,

Marla Y. Jackson, MHV

Executive Director

Tennessee Manufactured Housing Association