A CASE FOR RESIDENTIAL SPRINKLERS FOR SINGLE FAMILY DWELLINGS

Leading Community Risk Reduction

A Case for Residential Sprinklers for Single Family Dwellings in

Anne Arundel County, Maryland

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Appendices Not Included. Please visit the Learning Resource Center on the Web at http://www.lrc.dhs.gov/ to learn how to obtain this report in its entirety through Interlibrary Loan.

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ABSTRACT

The problem was that without a residential sprinkler ordinance for single family dwellings, Anne Arundel County has experienced on average six fire deaths and tens of millions of dollars in property damage due to residential structure fires. The research purpose was to identify existing sprinkler legislation for single family dwellings, issues that have prevented such legislation, as well as, the cost and benefits of such legislation. Research questions included: What codes, issues, costs, and benefits regarding sprinklers for single family dwellings currently exist in Anne Arundel County? Historical and descriptive research methods including: an interview, survey, and data analysis were utilized to identify these issues. Recommendations included specific steps that should be taken within the department for future initiatives.

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A Case for Residential Sprinklers for Single Family Dwellings in Anne Arundel County, Maryland

Since the beginning of time, fire has served as both a tool for survival and a devastating force of destruction that takes a countless number of lives every year. Sprinkler systems have been used in the United States to save lives and combat the ravaging effects of fire for more than 100 years. However, despite such proven technological advances, many jurisdictions have failed to enact codes/ordinances requiring the use of residential sprinklers for single family dwellings in our country. Without the use of residential sprinklers to combat fires in single family dwellings, residents of these structures, as well as, the emergency service personnel charged with mitigating such incidents will continue to be at risk of serious injury and death in the event of a fire in these occupancies.

The research problem is that without a residential sprinkler ordinance for single family dwellings in place, Anne Arundel County has experienced on average six fire deaths per year and tens of millions of dollars in property damage due to residential structure fires, the leading cause of fire deaths and property damage in the County.

The purpose of this research was to identify and describe existing residential sprinkler legislation for single family dwellings, issues that may have prevented the introduction/enactment of such legislation, as well as, the cost and benefits resulting from the enactment of such legislation. Utilizing the historical and descriptive research methods, the researcher will answer the following questions:

1. What, if any, residential sprinkler codes/ordinances exist that apply to sprinklers for single family dwellings in Anne Arundel County?

2. What issues, if any, have prevented the introduction and/or enactment of residential sprinkler legislation for single family dwellings in Anne Arundel County?
3. What are some of the costs of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County?
4. What are some of the benefits of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County?

BACKGROUND AND SIGNIFICANCE

The United States has one of the worst fire problems among all industrialized nations with one of the highest rates of death, injury, and property loss. (Fuller, 1991, p.143). In 2005, the National Fire Protection Association (NFPA) reported that there were over 1.6 million fires in the United States that resulted in 3,675 civilian deaths, 17,925 civilian injuries, and more than 10 billion dollars in property damage (NPFA 2005). Unfortunately, many of these fires and resulting fatalities continue to occur in the home where people seem to feel the safest (Carter, 1999). In fact, a review of home fire trends in the United States compiled by the NFPA for the year 2005, revealed that there were 381,000 residential fires resulting in 3030 civilian deaths, 13,300 civilian injuries and 6.7 billion dollars in property damage (NFPA 2005).

The fire problem has also been significant for specific targeted age groups. The NFPA has reported that children between the ages of 1-5 make up 7% of our country's population, but they have accounted for more than 14% of all deaths in home fires and that elderly residents ages 65 and older have a risk twice that of other ages groups (NFPA 2005). Although significant emphasis has been placed on public education and new technology in the recent years to combat

fire deaths in the home, it is estimated that approximately only 3% of residential homes in the United States are protected by residential sprinklers (FEMA 2001).

Anne Arundel County, Maryland is a unique and diverse community covering more than 419 square miles. Anne Arundel County is located in the Baltimore/Washington corridor and is bordered on its east side by the Chesapeake Bay. The County encompasses over 500 miles of shoreline and contains urban, suburban, and rural areas. The county's infrastructure includes: an international airport, military base, military academy, sports stadium, industrial areas, a state capital, major interstate highways, and numerous other federal/state agencies. Although very distinct, Anne Arundel County is primarily a residential bedroom community with a population that exceeds 508,000.

The Anne Arundel County Fire Department is an all hazards response organization that provides emergency medical, fire suppression, technical rescue, fire inspection, fire investigation, public education, hazardous materials, communications, training, and emergency management functions from 31 fire stations and 3 support facilities. The department has an annual operating budget of $88 million, and is staffed by a combination of more than 1200 career and volunteer personnel who responded to over 73,000 calls last year (Anne Arundel County Fire Department [AAFD] 2005 Organizational Abstract).

The Anne Arundel County Fire Department has experienced on average approximately six fire deaths per year and an estimated annual fire loss of $14.1 million (Division Chief Stuart McNicol, personal communication, August 20, 2006) . The County's fire problem is very similar to the nation's fire problem with most fires and the resulting fire deaths, injuries, and property loss occurring in residential structures. The issue of not having a residential sprinkler

ordinance for single family dwellings has been an ongoing problem that directly affects the department's mission and increases the workload of other county agencies such as police, building inspectors, and utilities department who assist during the mitigation/recovery phase of an incident, as well as, the Inspection/Permits Department, Office of Economic Development, Office of Workforce Development, and the Office of Human Services all of which assist displaced residents after an incident.

Over the years, the Anne Arundel County Fire Department has attempted to correct this deficiency. In the late 1970's, the department worked with a developer of a 75 unit single family housing project in the western area of the county to offer residential sprinklers as an option to home buyers in the community. A model home was outfitted with a sprinkler system as an exhibit and all perspective buyers were informed of the benefits of such a feature. The cost of this option at the time was approximately $2500. Mr. Bruce Hisley, a retired Division Chief of the Fire Marshal Division and department member who spearheaded this effort at the time advised that this two year project ultimately failed due to the added expense that was passed on to the home buyer (Mr. Bruce Hisley, personal communication, September 1, 2006).

In 1989, the Department's Fire Marshal Division acquired a travel trailer from the National Fire Academy. This travel trailer was outfitted with residential sprinklers and used to educate the general public, as well as, the county's public and elected officials at many different events and venues. Mr. Ray Phillips, a retired Fire Inspector who participated in this event stated that this program was utilized to build support for legislation that was being introduced for both single family and multi-family residences. He advised that the program was somewhat effective; since, a statewide ordinance requiring residential sprinklers for multi-family dwellings

was passed even though the legislation for single family dwellings was amended out due to opposition of the home builders industry (Mr. Ray Phillips, personal communication, September 4, 2006).

In 1994, the department formed a committee in response to a report that was conducted on the department for then, County Executive Robert Neale. The Turner Commission Report recommended that the department and local government not be intrusive by supporting a mandatory residential sprinkler ordinance for single family dwellings. As an alternative, they suggested that the newly formed committee study the matter and consider the introduction of legislation requiring that residential sprinklers be offered as an option for newly constructed single family dwellings (Turner Commission Report, 1994). The committee did study the matter and forwarded recommendations to the County Executive, who took no further action on the matter.

In 2003, members of the Anne Arundel County Fire Department participated in a three day Fire and Life Safety Summit at the University of Maryland's Fire and Rescue Institute in College Park, Maryland. Representatives from all of the Baltimore Washington metropolitan area fire department's were in attendance at this event. The purpose of the summit was to bring to the forefront the increasing number of fire deaths in the area, promote the need for public awareness, fire safety education, and the benefits of residential sprinkler systems. Although this process was very informative, no formal action was taken by the department to move forward with a residential sprinkler initiative for single family dwellings.

Presently, the department is participating in and providing support for an initiative that is being spearheaded by the State Volunteer Fireman's Association and the State Fire Marshal.

This group has engaged in a statewide public awareness/education campaign to educate the public and elected officials regarding residential sprinklers for single family dwellings. Although there has not been any legislation as a result of this effort in Anne Arundel County, other counties and local municipalities across the state of Maryland, have successfully passed ordinances requiring sprinklers for all newly constructed single family dwellings. Even though the department has taken some proactive steps to address this problem, it is likely that this problem will continue until a local ordinance/code is passed requiring residential sprinklers for single family dwellings .

There is also the potential for this problem to become even more crucial in the near future. Currently, Anne Arundel County has approximately 197,000 dwelling units and that number is expected to grow (Census 2005). The County's General Development Plan projects that Anne Arundel County will see an additional 30,000 dwelling units and an additional 46,000 residents by the year 2020 (AACO General Development Plan 2005). Mr. Kavi Maddula, Planner/Demographer for the Anne Arundel County Government has advised that the trends in the County's population growth has shown that three-quarters of all new residents will be children and grandchildren of existing residents with the most significant change occurring in the age 65 and older age group; which, is expected to double to near 83,000 (Mr. Kavi Maddula, personal communication, August 30, 2006).

The problem of Anne Arundel County not having a residential sprinkler ordinance for single family dwellings directly relates to two of the United States Fire Administration's Operational Objectives: 1) Reduce the loss of life from fire in the age group 14 years and under and 2) Reduce the loss of life from fire in the age group 65 years and older (National Fire

Academy [NFA], 2004, p.3). In addition, the ability to identify risks, evaluate plans, develop solutions, and apply new technologies to influence fire safety in the community directly relates to the objectives in the Intervention Strategies Unit, of the National Fire Academy's *Leading Community Risk Reduction* Course, as well as, the mission statement of the Anne Arundel County Fire Department, where members are sworn to eliminate threats to life and property through research, education, professionalism, and the application of new technologies (AAFD Rules & Regulations, Mission Statement, 2004).

The researcher will investigate other fire departments throughout the state to identify different initiatives that have been employed with regards to residential sprinkler codes/ordinances for single family dwellings, as well as, barriers that may have hampered their efforts. Information gained as a result of this process can be used to assist the Anne Arundel County Fire Department with future endeavors regarding the possible enactment/introduction of residential sprinkler legislation for single family dwellings in Anne Arundel County.

The researcher will carry out this investigation through the utilization of historical and descriptive research methods, as outlined in Module 2 of the National Fire Academy's *Executive Development Course Self-Study Guide* (NFA, 2004, p.13). Through this process the researcher will attempt to attain information regarding residential sprinkler systems for single family dwellings and expostulate how these findings will affect the introduction of such a process in the Anne Arundel County Fire Department.

LITERATURE REVIEW

The literature review was organized around the four specific research questions being explored. The first question asked what, if any, residential sprinkler codes/ordinances exist that

apply to sprinklers for single family dwellings in Anne Arundel County. The review revealed that there were many jurisdictions that have codes/ordinances requiring residential sprinklers for single family dwellings. In the text book, *Managing Fire Services*, the author points out that San Clemente, California, was one of the first jurisdictions in the United States to pass a residential sprinkler ordinance for single family dwellings in 1978 (Coleman & Granito 1988). Whiting (2005) reported that Scottsdale, Arizona, has had a residential sprinkler ordinance in place since 1986 and that other Arizona communities such as: Avondale and Goodyear have recently passed similar ordinances in 2005. In 1987, Prince George County, Maryland, was one of the first jurisdictions on the East coast to pass an ordinance requiring residential sprinklers in single family dwellings constructed after January 1989 (Siarnicki, 2002). The National Fire Sprinkler Association (NFSA) reports that there are now hundreds of jurisdictions in more than 17 states that currently have residential sprinkler ordinances for single family dwellings (NFSA 2006).

Residential sprinkler ordinances are also being considered and passed in many other countries around the world. Holgate (2001) reported that the City of Vancouver, British Columbia, enacted a residential sprinkler ordinance that included single family dwellings in April of 1990. The British Automatic Sprinkler Association (BASA) reported that as a result of a new local ordinance, 212 properties at the Studley Green Estate, located near Trowbridge, England, will be the first homes in the area to be equipped with residential sprinklers (BASA, 2004). O'Brien (2003) reported that in 2002, a residential sprinkler ordinance was passed by the New Zealand Government to help lower the incidence of civilian and firefighter deaths.

The literature review also revealed that there were many professional organizations that published standards regarding the use of residential sprinklers in single family dwellings. In

1973, the National Commission on Fire Prevention and Control recommended in its report, *America Burning*, that the proposed U.S. Fire Administration support the development of new technology for cost-effective automatic extinguishing systems for residential occupancies (FEMA, 1973). In 2003, the National Fire Protection Association's (NFPA) Standard 13D, *Standard for the Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, 2002 edition*, was published/updated to provide the minium general requirements for the installation of sprinklers in single family dwellings (NFPA, 2002). In 2003, the International Code Council, released an updated version of the *International Building Code, 2003 edition*. This update included a recommendation that automatic sprinkler systems be installed in all residential occupancies including those classified as Group R-3, single family dwellings. (International Code Council [ICC] 2003). In 2006, The NFPA Standard 101, *Life Safety Code, 2006 edition*, was updated and required that all new one and two family dwellings be protected throughout by an approved automatic sprinkler system (NFPA, 2006).

In 1996, at the fourth *Wingspread Conference- Statements of National Significance to the Fire Problem in the United States*, significant emphasis was placed on fire and life safety systems, particularly the need for the fire service to support and pursue the adoption of codes and ordinances that mandate the use of automatic sprinkler systems in residential properties (Johnson Foundation, 1996). In 2004, the National Fallen Fire Fighters Foundation (NFFF) hosted the first ever, *Firefighter Life Safety Summit*, in Tampa, Florida. During this summit the NFFF unveiled 16 firefighter life safety initiatives; one, of which included a recommendation of the group to support fire code enforcement and the installation of home fire sprinklers to help prevent firefighter fatalities (NFFF, 2004). In 2006, the NFPA also updated its standard NFPA -

1, *The Uniform Fire Code, 2006 edition*. This update also included a change that now requires an approved automatic fire sprinkler system be installed in all newly constructed one and two family dwellings (NFPA, 2006). In summary, the literature affirmed that there is a substantial amount of support from many jurisdictions and organizations for the use of residential sprinkler systems in single family dwellings.

The second question asked what issues, if any, have prevented the introduction and/or enactment of residential sprinkler legislation for single family dwellings in Anne Arundel County. This review verified that there are many issues that can hamper and prevent the introduction and/or enactment of residential sprinkler legislation for single family dwellings. Coughlin (2000) reported that the political climate in a jurisdiction is a very important factor that must be taken into account when considering a sprinkler ordinance. The Mesa, Arizona Fire Department learned first hand that the introduction of sprinkler legislation was one of the most arduous political challenges their department had ever faced as a result of stiff opposition from many special interests groups who opposed the proposed ordinance in their jurisdiction (Bruno 2000, p.16). Lacey & Valentine (2006) advocated educating all elected officials who may be involved in the legislative process and getting them on board long before any sprinkler legislation is proposed to increase a department's chance of success. In a report for the U.S Fire Administration, the National Association of Home Builders (NAHB) cited politics as one of the many principal barriers preventing the acceptance of residential sprinklers in single family dwellings (NAHB, 1995).

The review also revealed that cost of residential sprinkler systems was also a major factor in the pursuit of a residential sprinkler ordinance for single family dwellings. Ford (1997) in a

report to the City of Scottsdale, Arizona, cited that cost was the most consistent barrier that had to be overcome in Scottsdale, when their ordinance was proposed. Fuller (1991) reported that the number one reason homeowners choose not to sprinkler their home was the substantially high purchase and installation costs associated with this type of safety feature. In fact, many contractors argue that sprinklers are not a cost effective solution to our current fire problem and that the added cost of sprinklers will price first time home buyers out of the market (Romero, 2005). In an applied research project for the National Fire Academy, Thomas Wood, of the Boca Raton, Florida Fire Department reported on other associated costs that can hamper fire sprinkler initiatives. He reported that utility/water departments in many jurisdictions had imposed user fees and/or stand-by fees for residents who had home fire sprinklers (Wood, 1995). Dewar (2001) reported that many jurisdictions have imposed impact fees and the installation of a separate, mandatory water metering devices for homes equipped with residential sprinkler systems which have hampered sprinkler initiatives in many localities.

Public education/awareness is also another issue that must be studied when considering a residential sprinkler ordinance in many jurisdictions. In a report for the Public Entity Risk Institute's 2004 Symposium, Stephen Thorne reported that if a community wants to be successful at incorporating a residential sprinkler program into their fire protection strategies a commitment must be made to educate the public (Thorne, 2004). Nicholson (2005) reported that a major obstacle to the increased use of residential sprinklers in single family dwellings is the uneducated homeowner; who, in many cases is unaware that this type of safety system is available. In the North American Coalition for Fire and Life Safety Education (NACFLSE) report entitled, *Solutions 2000*, the importance of educating the public regarding the benefits of

residential sprinklers was highlighted as part of their overall goal in order to promote sprinklers for residential occupancies (USFA, 2002). The American Fire Sprinkler Association (AFSA) has reported that community education/awareness, especially that of the homeowner, is paramount to the success of any sprinkler initiative (AFSA, 2004). In summary, the literature revealed and affirmed that there are many factors that can prevent the enactment of a residential sprinkler ordinance for single family dwellings.

The third question asked what are some of the costs of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County. The direct installation costs (engineering, materials, labor, and permits) associated with sprinkler systems must always be taken into account when considering a sprinkler initiative. The U.S. Fire Administration (USFA) estimates nationally that the average cost to install a sprinkler system in a new single family dwelling is approximately $1.50 per square foot and between $2.50 to $5.00 per square foot for a retro fit (USFA). The American Fire Sprinkler Association (ASFA) has reported that the average cost to sprinkler a new home is roughly equal to 1% of the total home price (AFSA, 2006). The Residential Fire Safety Institute (RFSI) has reported that the cost of installing sprinklers in a residential home is comparable to that of an upgrade in quality carpeting; however, they are quick to point out that unlike carpeting that typically needs replacing every 10-15 years, a sprinkler system lasts a lifetime (RFSI, 2006).

New technology and better codes have also helped to make residential sprinkler systems affordable. Ford (1997) reported that the average cost to sprinkler a new home in Scottsdale, Arizona when their ordinance first took affect was around $1.14 per square foot; however, that price has now dropped to about $.59 a square foot since, mandatory codes/ordinances have

resulted in the creation of a competitive market and competition between individual contractors keeping prices reasonable. The initial installation price of a residential sprinkler system in Prince George County, Maryland, was about $1.50 per square foot when their ordinance was passed in 1987 (Siarnicki, 2003). Welch (2005) has reported that as a result of a sprinkler guide that the USFA has developed and tested that the new installation price of residential sprinklers has dropped approximately $.80 per square foot in Prince George County, Maryland, as well as, eight other locations around the country when the guide was used.

The literature review revealed that there are other subjective costs that should be considered as part of a sprinkler initiative. Lacey and Vallentine (2005) reported that there is a substantial cost difference to the homeowner in the event of a fire in homes equipped with sprinklers compared to those that are not. In Scottsdale, Arizona, a ten year study of fire incidents in sprinklered homes has resulted in an average cost of $2,166 versus an average cost of $45,019 for fire incidents in a non-sprinklered home (Ford, 1997). Siarniki (2003) has reported that similar results have been seen in Prince George County, Maryland, where the cost to homeowners from fire incidents in sprinklered dwellings averaged $3,000 versus $80,000 in non-sprinklered dwellings. Welch (2005) has reported that the value of lives saved and decreased injuries to both occupants and emergency personnel in residential homes equipped with fire sprinklers is an important subjective cost that deserves mentioning when considering a sprinkler initiative. The RFSI suggests that costs for community infrastructures such as: water mains, storage tanks, and fire stations in many jurisdictions could also be reduced; since, fire flow requirements will be decreased in communities equipped with residential sprinklers (RFSI, 2006). In summary, the literature review revealed that there were many cost factors that should

be taken into account when considering a residential sprinkler initiative for single family dwellings.

The fourth question asked what are some of the benefits of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County. A review of literature revealed that there were substantial benefits to the homeowner, contractors, and the local jurisdiction when sprinklers were utilized in single family dwellings. The number one benefit is the improved survival of the occupants in the event of a fire since sprinklers control and/or extinguish a fire in the incipient phase (Nicholson, 2005). The NFPA has reported that sprinklers in the home will increase an occupants chance of survival by as much as 82%, as opposed to a home not equipped with sprinklers or smoke detection systems (NFPA, 2006). Coughlin (2000) reported that occupant survival is increased in homes protected with sprinklers because sprinkler systems prevent flashover (which usually occurs before the fire department's arrival), as well as, prevent the build up of toxic gasses such as carbon monoxide. Thus, preventing tenability limits from exceeding critical threshold limits.

Another benefit to the home owner is economic savings. Madrzykowski (2002) reported that the State of Alaska implemented a real estate tax reduction of 2% of the assessed value for all structures in the state that were protected with a sprinkler system. Carlson (2004) reported that federal legislation was introduced in congress to amend the tax code to allow home owners to amortize the cost of residential sprinkler installations in their home over a five year period. In Montgomery County, Maryland, a one time tax credit of 50% of a resident's property taxes was enacted for all new homes with sprinkler systems that were installed after February 1, 2000 (Freestone, 2000).

Insurance savings was also another benefit that home owners obtain as a result of installing sprinkler systems in their home. The Home Fire Sprinkler Coalition (HFSC) has reported that seven major insurance companies across the United States currently offer discounts between 5%-18% in their homeowner policies for homes equipped with residential sprinkler systems (HFSC, 2005). Thorne (2004) reported that the average discount afforded to residents in Scottsdale, Arizona for the installation of an approved residential sprinkler system in their home was 10%. The RFSI reports that insurance savings to homeowners who install approved residential sprinklers can range from 5%-20% in the United States and up to 40% in Canada (RFSI, 2006).

Contractors and developers also reek benefits from the installation of sprinklers in single family dwellings. Welch (2005) has reported that site plan alterations such as: unit density, set back changes, increased hydrant spacing, decreased water main size, and decreased road width has benefitted contractors/developers in Cobb County, Georgia. The NFPA Standard 1, *Uniformed Building Code, 2006 edition,* has built in provisions allowing for design and construction alternatives to off set the additional cost of sprinkler installation in a home (NFPA, 2006). FEMA (2004) reported that home fire sprinklers are a good investment for contractors/developers since, the installation of sprinklers can qualify them for trade-offs that could result in reduced construction costs.

Local jurisdictions also benefit from the installation of residential sprinklers in single family dwellings. Jelenewicz (2005) reported that a community that adopts a residential sprinkler ordinance for single family dwellings can expect reduced fire deaths, reduced injuries, and increased property protection as a benefit. Siarniki (2001) reported that as a result of a

twelve year study conducted in Prince George County, Maryland, the total fire loss was $401,000 as compared to the estimated potential fire loss of $38.2 million if single family dwellings were not protected by residential sprinklers. Bukowski (2002) reported that sprinklers also benefit a local jurisdiction by affording additional protection to firefighters during emergency incidents. Couglin (2000) reported that sprinklers offer cost savings to local jurisdictions and reduce the demands placed on fire departments especially, in bedroom communities that historically have a small tax base.

In summary, the results of the literature review revealed that there was a substantial amount of support in all of the sources for residential sprinkler systems in single family dwellings. It also affirmed the need to gain political support, educate the public, and be aware of the potential cost/benefits, as well as, any opposition that may be encountered during residential sprinkler initiatives.

In addition, the results of the literature review also influenced and played a major role in the decision to expand my research to other jurisdictions within the State of Maryland. This was done so that their experience with previous and ongoing sprinkler initiatives involving single family dwellings could be compared, contrasted, and included in this research.

PROCEDURES

The research for this project was accomplished in three steps. The first step began with an analysis of relevant literature to answer the four research questions. This review began at the National Fire Academy's Learning Resource Center (LRC) in Emmitsburg, Maryland, in June, 2006. Web searches of the LRC card catalog were completed utilizing key words such as: sprinkler systems, residential sprinklers, residential fire sprinklers, sprinkler codes, and sprinkler

ordinances. After a review of the literature obtained from the LRC, additional expanded web searches were completed employing the key words: residential sprinkler costs, fire sprinkler benefits, and residential sprinkler barriers utilizing the search engines google, google scholar, and yahoo. Specific web sites of the NFPA, IAFC, USFA, AAFD, AFSI, HFSC, RFSI, Maryland Law Library, and the Anne Arundel County Government were also used to research applicable codes, regulations, laws, standards, and other related documents. A review of fire service and other related text, as well as, departmental policies, procedures, and regulations relevant to the four research questions was also accomplished through the use of the department's reference library located at the Anne Arundel County Fire Department's Training and Research Facility.

A limitation of this research was the lack of departmental documentation with regards to residential sprinklers for single family dwellings in Anne Arundel County. Although many of the literature sources referenced residential sprinklers for single family dwellings; many, local and state documents/records failed to reference these particular attributes.

The second step in the process involved the utilization of a survey. The guide for "Conducting Surveys" as outlined in Module 3 of the National Fire Academy's *Executive Development Course Self-Study Guide* was used as a reference for this process (NFA, 2004). The survey for this research project was developed after the completion of the literature review to ensure that information revealed during this process could be used in the design of the instrument. EMS/Fire/Rescue Departments from all of Maryland's 23 counties were surveyed to obtain information regarding sprinkler initiatives within their communities.

Maryland is unique as compared to many other jurisdictions in the country. Although

Maryland only has 23 counties, the types of government vary depending on location. The county governments are either a charter based (metro/suburban areas) or a commission formed government (suburban/rural). To ensure that all fire departments in all of the counties were surveyed, the distribution of surveys varied according to the type of government in each individual county. Counties with a charter form of government (Anne Arundel, Baltimore, Frederick, Howard, Montgomery, and Prince George) all have countywide career fire departments who are charged with providing fire protection for their jurisdictions under their respective county charter. Thus, in these charter government counties, only one survey was required to solicit the required information regarding residential sprinkler initiatives within their jurisdictions. Counties with a commission form of government (Allegany, Calvert, Carroll, Caroline, Cecil, Charles, Dorchester, Garrett, Hartford, Kent, Queen Anne, Somerset, Talbot, St. Mary's, Washington, Wicomico, and Worcester) have no career fire departments and fire protection is provided by numerous individual volunteer fire departments in each town or municipality. Thus, in these commission government counties, each individual volunteer fire department was surveyed to solicit information regarding sprinkler initiatives within their respective jurisdictions.

The departments chosen to participate in the survey were selected from the fire department census menu option, located on the United States Fire Administration's (USFA) website. This option was chosen since it is one of the most accurate and all inclusive up to date listing of fire departments for the State of Maryland.

The survey solicited information to the following questions:

1. Does your department/jurisdiction (County/Municipality) currently have a fire

code or ordinance that requires residential sprinklers for single family dwellings?

2. Does your code/ordinance apply to new construction, old construction or both?
3. How long has your code and ordinance been in affect?
4. What is the estimated cost of installation for new construction?
5. What is the estimated cost of installation for old construction (retro fit)?
6. Were there any costs to your department as a result of this code/ordinance?
7. What barriers did your department have to overcome to enact this type of code and/or ordinance?
8. What benefits has your department seen as a result of this type of code and/or ordinance?
9. Does your department /jurisdiction plan on introducing/enacting a residential sprinkler ordinance for single family dwellings?
10. Has your department attempted to introduce and/or enact sprinkler legislation for single family dwellings in the past?
11. If yes, what factors prevented the introduction and/or enactment of sprinkler legislation for single family dwellings?

The surveys were sent to the Fire Chief in each of the participating departments via U.S. Mail and included a self addressed stamped return envelope. A blank sample survey form can be found in Appendix A. Departments who had not returned the survey by the required deadline were contacted by phone and a survey was completed at that time to ensure that a valid sample size was provided. Two limitations were noted as a result of this research. The first was the number of respondents that participated in the survey. Only 109 of the 145 or 75% of the

departments surveyed responded to the survey within the allotted time frame. A second limitation was that the survey was limited to fire departments in the State of Maryland.

The third step in this process was an interview. The guide for "Conducting Personal Interviews" as outlined in Module 3 of the National Fire Academy's *Executive Development Course Self-Study Guide* was used as a reference for the interview (NFA, 2004). A questionnaire was developed after the completion of the literature review to ensure that information revealed during that process could be used in the design of the instrument. The interview was conducted to determine if any existing residential sprinkler legislation for single family dwellings in Anne Arundel County was in place, identify if any issues may have prevented the introduction/enactment of such legislation, and determine the cost and benefits resulting from the enactment of such legislation.

The interview was conducted with retired Deputy Chief Mark J. Pfister, of the Anne Arundel County Fire Department. Deputy Chief Pfister was selected for the interview based on his background and experience with previous residential sprinkler initiatives within Anne Arundel County. On August 20, 2006 the researcher contacted Chief Pfister and provided him with background information relating to his request. Chief Pfister agreed to the researchers request for an interview and a date, time, and location was established. Chief Pfister has been involved with many fire department initiatives in his 35 years of service including the chairperson of a department task force regarding residential sprinklers. Chief Pfister possesses an Associates degree in Fire Protection Technology, from the Community College of Baltimore and a Bachelors degree in Fire Service Management from the University of Baltimore. A questionnaire was e-mailed to Chief Pfister prior to the interview to provide an opportunity for

the interviewee to become familiar with the information that the author was requesting. The interview with Chief Pfister was conducted on August 27, 2006 at his residence in Pasadena, Maryland. A limitation to this research was that there may have been other subject matter experts within the department that I was not aware of.

The questionnaire used in the interview contained the following questions:

1. Does the Anne Arundel County Fire Department have a residential sprinkler code/ordinance for single family dwellings?
2. What steps if any, has the Anne Arundel County Fire Department taken to enact a residential sprinkler ordinance for single family dwellings in the past?
3. Did previous initiatives apply to new or old construction?
4. Were other stakeholders (community groups, builders, appointed and elected officials) represented/involved in the process?
5. What barriers, if any, have prevented previous attempts to enact a residential sprinkler ordinance in Anne Arundel County?
6. What costs were associated with previous sprinkler initiatives?
7. Were there any potential costs to the department?
8. What benefits were expected as a result of previous sprinkler initiatives?
9. Should the department continue to pursue a residential sprinkler ordinance in Anne Arundel County?

The researcher reviewed the questionnaire with the interviewee and utilized a pen and pad of paper to record additional information that was deemed relevant during the interview process. A sample blank questionnaire can be found in Appendix B.

RESULTS

Through the use of historical and descriptive research methods the researcher was able to obtain a significant amount of information to answer the four research questions. The first question asked what, if any, residential sprinkler codes/ordinances exist that apply to sprinklers for single family dwellings in Anne Arundel County. A review of internal departmental documents, an interview of a key staff member, and a statewide fire department survey provided relevant information regarding this question.

A review of the Anne Arundel County Code and Maryland Annotated Code affirmed that no residential sprinkler code or ordinance for single family dwellings exists at the present time in Anne Arundel County. The Maryland Annotated Code, *Public Safety Section, Title 9, Fire Protection and Prevention* requires that: all multi-family dwellings built after 1990, and all townhouses constructed after 1992 be protected by an approved sprinkler system. In fact, the only requirement that could be found regarding single family dwellings under this article was the requirement for all single family dwellings constructed after 1990 to have hardwired smoke detectors with a battery back-up in each living area of the home. The review of the Anne Arundel County Code revealed that there was no reference at all to residential sprinklers for single family dwellings.

During the interview with retired Deputy Chief Mark Pfister, he communicated that on four different occasions, beginning in the late 1970's, the Anne Arundel County Fire Department had either sponsored and/or participated in numerous sprinkler initiatives that would have required residential fire sprinklers in single family dwellings. The first initiative occurred in the

late 1970's, and involved the department working with a developer in the western region of the county to offer residential fire sprinklers as an option to homeowners in a new 75 home development. A model home was outfitted with a sprinkler system and prospective buyers were informed of this safety feature as an option.

A second initiative involved the department's fire marshals office utilizing a trailer equipped with a sprinkler in the late 1980's. The trailer was utilized as part of a public education/awareness campaign to educate the general public, fire service personnel, local and state elected officials regarding the effectiveness of sprinklers, as well as, to build support for pending state legislation that would have required sprinklers in all residential occupancies. In 1989, legislation was passed requiring all multi-family units (townhouses, condos, etc.) constructed after July 1, 1990 to have sprinklers; however, the legislation requiring sprinklers in single family dwellings was amended out due to opposition from some stakeholder groups.

The third initiative occurred in the early 1990's when a committee was put together by the reigning County Executive to study the current issues of importance in the Anne Arundel County Fire Department. The Turner Commission, over a two year period, studied current fire department issues, interviewed departmental personnel, held community meetings, and ultimately published a report outlining its findings and proposed recommendations in 1994. As a result of this report, a departmental committee/work group was established to study the optional residential sprinkler initiative that the Turner Commission recommended. The departmental committee/work group that was established included membership from key stakeholder groups such as: citizen/community groups, builders, utility representatives, real estate professionals, and local appointed/elected officials. Recommendations from the departmental committee were

forwarded to the Fire Administrator for review; however, no resulting legislation was ever introduced making residential sprinklers an option. The forth initiative is a project being sponsored by the State Fire Marshal Office and the State Volunteer Fireman's Association. This initiative is ongoing and our department is supporting the project; however, a recent work session with members of the county council has not resulted in their support for and/or legislation for this type of initiative.

The results of a statewide survey of 145 fire departments in the State of Maryland's 23 counties has revealed that 21 departments or four counties and seven local municipalities currently have a residential sprinkler ordinance requiring sprinklers in newly constructed single family dwellings. Overwhelmingly, 21 or 100% of these jurisdictions reported that their residential sprinkler ordinance only covered new construction and that 19 or 90% have been in affect for less than five years. However, one department reported having a residential sprinkler ordinance for single family dwellings in place for more than 15 years and another department has reported having an ordinance in place for more than 11 years. A table depicting the results of the survey can be found in Appendix C.

The second research question asked what issues, if any, have prevented the introduction and/or enactment of residential sprinkler legislation for single family dwellings in Anne Arundel County. During an interview with Retired Deputy Chief Mark Pfister, cost, stakeholder opposition, and a lack of political support were all cited as key issues that have prevent the enactment of a residential sprinkler ordinance for single family dwellings in Anne Arundel County. The issue of cost was cited as a main reason for the failure of a departmental initiative in the late 1970's. During this time it was estimated that the cost of a sprinkler system for a new

home in the candlewood development was approximately $2,500.00. An expensive option considering that the average cost of new home was only $30,000-$40,000 during this time period.

The interview also revealed that stakeholder opposition and lack of political support has been a substantial barrier during the other departmental initiatives. In 1989, stakeholder opposition primarily from the builders and community organizations was responsible for an amendment to state legislation that prevented the enactment of a code/ordinance that would have required sprinklers in single family dwellings during this time. The lack of political support was cited as a main reason why departmental initiatives in 1994 and 2005 had failed. During these time periods departmental initiatives failed to gain political support or a sponsor of legislation for a code/ordinance requiring sprinklers in single family dwellings from the county administration or council members during these time periods.

A statewide survey of Maryland fire departments revealed that this was also a common theme in other jurisdictions. Of the 21 departments/jurisdictions that reported that they had a residential sprinkler ordinance for single family dwellings 19 or 90% of the respondents listed builder opposition as the number one issue that had to be overcome in pursuit of their initiatives. This was followed by political climate (52%); real estate industry opposition (24%); citizen opposition (24%); utility department opposition (19%); economic cost factors (10%); and development/zoning changes (5%).

The third research question asked what are some of the costs of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County. An interview with Retired Deputy Chief Mark Pfister disclosed that most of the cost associated with a residential

sprinkler system for single family dwellings in past initiatives proposed in Anne Arundel County were the responsibility of the homeowner. These cost were for the engineering, design, permits, material, and labor costs associated with these types of systems. There was also a difference in cost to the homeowner depending on the type of water system that they had in their home. Since, both public and private water systems were present in the Anne Arundel County, homeowners who had a private water system would have been required to install an additional pump and water storage tank in the design of their system. A statewide survey revealed that 20 or 95% of the jurisdictions in Maryland who currently have a residential sprinkler ordinance for single family dwellings reported an average cost of $1.00-$2.00 per square foot for installation in new construction.

The interview also revealed that through negotiated tradeoffs contractors would have received a substantial cost savings if a mandatory sprinkler ordinance was enacted in Anne Arundel County. Most of these savings would be in the form of infrastructure requirements that would allow for increased density of the development area, smaller water mains, increased hydrant spacing, and the elimination of an underground water tank that is required in areas of the county not serviced by a public water system.

There were also some costs that the fire department and/or permits department would have endured had a code or ordinance been enacted requiring sprinklers for single family dwellings in Anne Arundel County. These costs would have been in the form of salaries for additional inspectors and plans review personnel who would be responsible approving the design and installation of these systems. A statewide survey of fire departments in Maryland revealed that 20 or 95% of the departments who reported that they currently have residential sprinkler

ordinances in their jurisdictions said that all costs associated with these systems were absorbed by the homeowner. Only one department who responded to the statewide survey reported an increased cost to their department in the form of additional personnel (inspectors/plans review); however, this additional cost was actually offset by additional fees implemented by the department .

The last research question asked what are some of the benefits of enacting residential sprinkler legislation for single family dwellings in Anne Arundel County. Since, Anne Arundel County does not currently have a residential sprinkler ordinance for single family dwellings a statewide survey of other departments throughout Maryland was utilized to answer this question. Results of this survey revealed that of the 21 departments who currently have a residential sprinkler ordinance, 18 or 86% of them listed firefighter and occupant safety as the number one benefit for having a residential sprinkler ordinance for single family dwellings. This was followed by reduction in insurance rates (67%); a reduction in the department/jurisdictions annual fire loss (62%); and a reduction in growth needs of the department (52%). It is important to note that none (0%) of the 21 departments who currently have sprinkler ordinances for single family dwellings listed a reduction in the Insurance Services Origination (ISO) rating for their department as a benefit.

In addition, more than half (58%) of the 88 departments who reported that they did not have a residential sprinkler ordinance for single family dwellings said that they planned on embarking on such an initiative in the future. In fact, a small number of these departments (19%) that currently do not have a residential sprinkler ordinance for single family dwellings reported that they have attempted to enact legislation in the past with no success and that 75% of

these departments cited political climate as the number one reason for the failure of such initiatives.

DISCUSSION

The literature review and study results confirmed the need for residential sprinklers in single family dwellings to combat fires in these structures, as well as, improve occupant and firefighter safety. Nicholson (2005) reported that the number one benefit of a home outfitted with a residential sprinkler system was improved occupant safety; since, sprinklers usually control a fire in its incipient stage. The NFPA has also reported that homes equipped with fire sprinklers and smoke detectors increase an occupants chance of survival in the event of a fire by as much as 82% (NFPA). The control of a fire in its incipient stage by a sprinkler system also helps firefighters by reducing risks, as a fire is more readily and easily controlled during this phase. The NFFF (2004) has recognized this fact and recommended as one of their life safety initiatives to support residential sprinkler programs as one method of preventing firefighter fatalities.

Occupant and firefighter safety was also a very important factor to fire departments across Maryland. A statewide survey of fire departments in Maryland revealed that 86% of those departments who currently have a residential sprinkler ordinance requiring fire sprinklers in single family dwellings reported that occupant and firefighter safety was the number one benefit of having such an ordinance. In addition, 58% of those departments surveyed who do not currently have a residential sprinkler ordinance for single family dwellings stated that the have plans on enacting an ordinance in the near future.

Other benefits associated with residential sprinklers for single family dwellings are a

reduction in insurance premiums, reduction in growth needs of the fire department, and a reduction in a department's annual fire losses. The HFSC (2005) has reported that seven insurance carriers across the United States recognize the benefits of residential sprinklers and offer a savings of 5%-18% on their homeowners insurance policy premium for homes equipped with a fire sprinkler system. Results of a statewide survey of fire departments in Maryland also found this to be a benefit with 67% of those departments who currently have a sprinkler ordinance covering single family dwellings reporting that this was offered in their jurisdictions.

The reduction in growth needs of a department is also a benefit of residential sprinklers. Coughlin (2000) reported that sprinkler systems for single family dwellings also reduce the demands placed on local fire departments; thus, increasing life safety and property protection without increasing operational staff. A statewide survey of Maryland fire department's affirmed this assertion. More than half or 52% of the survey respondents who currently have sprinkler ordinances for single family dwellings listed a reduction in growth needs of the department as a benefit of their ordinance.

The reduction of a departments annual fire loss is also a benefit worthy of discussion. Ford (1997) reported that over a 10 year period, it was estimated that the city of Scottsdale, Arizona, reduced its fire loss by $20 million due to their sprinkler ordinance. In comparison, Siarniki (2001) reported that a seven year study conducted by the Prince George County, Maryland Fire Department had resulted in an estimated fire loss reduction of $37.5 million in his department as a result of their residential sprinkler ordinance. A statewide survey of Maryland fire departments who currently have residential sprinkler ordinances revealed that 62% of these departments listed a reduction in their annual fire loss statistics due to their ordinances.

Tax savings is another benefit that was mentioned in much of the literature. Madrzykowski (2002) reported that residents in the state of Alaska currently receive a 2% reduction in their real estate taxes for structures equipped with a sprinkler system. Freestone (2000) reported that Montgomery County Maryland, provides a one time tax credit of 50% of a residents property taxes for all new homes equipped with a sprinkler. However, it is important to note that no department/jurisdiction (0%) in the statewide survey or the interview of a key staff member in Anne Arundel County cited that a tax reduction was offered as a benefit to home owners who had a home equipped with a residential sprinkler system.

Although it is plain to see that residential sprinklers provide much needed protection for both occupants and firefighters alike, it is deplorable that such proven engineering solutions and new technologies are not more readily employed in single family dwellings to combat the fire problem. In 2005, the NFPA reported that there were 3030 civilian deaths and 13,300 civilian injuries as a result of residential fires. More importantly, is that children ages 1-5 have accounted for more than 14% of these fire deaths and adults age 65 and over have twice the risk of dying in a residential fire than all other age groups (NFPA). However, the USFA estimates that less than 3% of all residential homes in the United States are protected by residential fire sprinklers (FEMA, 2001).

An interview with Retired Deputy Chief Pfister, as well as, a statewide survey of fire departments across Maryland has supported this assertion. In Anne Arundel County, their currently is no residential sprinkler ordinance requiring fire sprinklers in single family dwellings. A statewide survey of 145 departments in Maryland revealed that of the 109 departments who participated in the survey, only 19% (four counties and seven local municipalities) reported

having a residential sprinkler code and/or ordinance that required the installation of sprinklers in single family dwellings. In addition, 90% of these departments reported that their codes and/or ordinances have been in affect for less than 5 years and that all (100%) of these ordinances impacted new construction only.

The implementation of a code or ordinance requiring sprinklers in single family dwellings may be easier said than done. An interview with Retired Deputy Chief Pfister revealed that this department has been involved in and unsuccessful with three different sprinkler initiatives over the past 25 years. This highlights that fact that there can be many barriers in the pursuit of a fire sprinkler ordinance for single family dwellings. One of these barriers is the opposition from the building industry. Ford (1997) reported that the building industry was just one of the many barriers that the city of Scottsdale, Arizona, had to overcome during the implementation of their residential sprinkler ordinance. A state wide survey of fire departments in Maryland substantiated this claim. In Maryland, 90% of the departments who reported that they currently have a residential sprinkler ordinance covering single family dwellings cited builder opposition as the number one barrier in their initiatives.

Another barrier to the implementation of many sprinkler ordinances for single family dwellings is politics. Lacy & Valentine (2006) advocated that elected officials should be brought on board in the early stages of an initiative to gain their support and increase the chances of passing legislation requiring sprinklers in single family dwellings. In an interview with Retired Deputy Chief Pfister, the lack of political support for previous sprinkler initiatives was cited as one of the main barriers preventing success in that jurisdiction. Results from a statewide survey in Maryland also corroborated this assertion; whereas, 52% of the respondents

reported an unfavorable political climate as a major barrier during their sprinkler initiatives. In addition, 5% of the departments who responded to the statewide survey stated that they had attempted unsuccessfully to introduce sprinkler initiatives in the past and that 75% of them cited politics as the main reason for the failure of their initiative.

Public education is another barrier that must be overcome if a department is going to be successful with a residential sprinkler initiative. Thorne (2004) reported that a commitment must be made to educating the public if a community wants to incorporate residential sprinklers into their fire protection strategies. Likewise, Nicholson (2005) has reported that a major obstacle to the increased use of residential sprinklers is the uneducated homeowner who is unaware of these safety systems. In a statewide survey of fire departments in Maryland, 24% of the departments who currently have a residential sprinkler ordinance for single family dwellings reported citizen and community opposition as a barrier that had to be overcome in their jurisdictions.

The survey results also revealed that real estate professionals can also be a barrier to many sprinkler initiatives in Maryland. In the statewide survey 24% of those departments who currently have a sprinkler ordinance for single family dwellings reported that they had to overcome objections from real estate professionals in pursuit of their initiatives. However, in contrast, an interview with Retired Deputy Chief Pfister, as well as, the review of literature sources did not support the survey results. The argument that the installation of sprinklers will price first time home buyers out of the market and drastically add to the overall price of a home is solely a building industry argument.

The cost associated with residential sprinkler systems for single family dwellings may also impact the success of a departments initiative. Ford (1997) reported that cost was the most

consistent barrier that had to be over come in Scottsdale, Arizona, during the implementation of their sprinkler ordinance. The NAHB also reported that the low perceived economic value and the relatively high cost of sprinkler installations appear to be the main reason why residential sprinklers have not gained acceptance (NAHB 1995). However, results of a statewide survey of fire departments in Maryland have revealed that 95% of those departments who currently have a residential sprinkler ordinance reported that the installation price to be between $1.00-$2.00 per square foot in new construction. This is well within the national average of $1.50 per square foot reported by the USFA (USFA). The RFSI (2006) has reported that sprinklers are an affordable choice for home buyers; since, the installation is comparable to optional upgrades such as carpeting.

Although cost associated with a sprinkler system is usually thought of as a barrier, it can also be a benefit. Welch (2005) reported that site plan alterations such as: unit density, set back changes, increased hydrant spacing, decreased water main size, and decreased road width sizes have benefitted developers/contractors in Cobb, County, Georgia. FEMA (2004) also reported that fire sprinklers are a good investment for contractors; since, the installation of sprinklers can qualify them for trade-offs that could result in reduced construction costs. This was true in previous initiatives that the Anne Arundel County Fire Department had proposed. In an interview with Retired Deputy Chief Pfister, it was revealed that contractors in Anne Arundel County would have been eligible for trade-offs for infrastructure requirements allowing for increased density of the development area, smaller water mains, increased hydrant spacing, and the elimination of an underground water tank that is required in areas of the county that are not serviced by a public water system.

The researcher's interpretation of the study results substantiated his belief that residential sprinkler systems for single family dwellings should be part of every fire departments' fire reduction and life safety program. Automatic suppression systems are clearly needed to help reduce the fire problem and the resulting injuries, deaths, and property loss. I was surprised to learn that this was not a new problem and that sprinklers have been used successfully in the residential setting for more than 40 years. I was also saddened to discover that such a large number of departments statewide have done very little to correct this deficiency. This was evidenced by the small number of departments that currently have residential sprinkler programs that include single family dwellings. Fire departments should make the implementation of codes and/or ordinances requiring residential sprinklers for single family dwellings a priority; since, the largest number of fires and the resulting deaths and injuries occur in residential occupancies. This is especially true considering children ages 1-5 and adults ages 65 and older have an increased risk of injury or death as a result of a fire in these occupancies.

I found it refreshing to see that a small number of departments (four counties and seven local municipalities) within the State of Maryland have taken the lead and enacted codes/ordinances within their jurisdictions even though there is no state law mandating this type of protection system. These departments have worked hard to promote these systems and are now helping to silence the critics through the use of relevant data that they have been able to obtain.

The implications of these research findings should be applied to benefit both the citizens of Anne Arundel County and the members of the Anne Arundel County Fire Department. The application of new technologies such as the use of residential sprinkler systems in single family

dwellings will help prevent needless injuries and deaths that directly result from fires in the types of structures.

RECOMMENDATIONS

The research presented in this study has demonstrated the need for residential sprinklers for single family dwellings to help reduce the injuries and deaths associated with fires in these structures. Based on this research it is recommended that the Anne Arundel County Fire Department consider the following recommendations with the goal to enhance occupant and firefighter safety, as well as, reduce its annual fire loss within their jurisdiction:

1. The department should consider including a goal for a residential sprinkler initiative for single family dwellings in their fire reduction and life safety programs. Currently, there is no such initiative within the department.
2. The department should consider making a residential sprinkler initiative for single family dwellings part of the department's master planning process. This would ensure that the appropriate planning, support, and resources are committed to this initiative.
3. The department should consider working with other neighboring jurisdictions to learn what obstacles/barriers that they were faced with during their initiatives and what steps they had taken to overcome these issues. This will prevent costly time delays by shorting the learning curve for this type of process. It will also help identify what stakeholder groups should be represented on the sprinkler task force that will be put together by the Fire Chief in conjunction with the County Executive. Maybe the NFFF should put together a national network of resources

to achieve this goal.

4. The Fire Chief in conjunction with the County Executive, should consider appointing and convening a formal task force to study the implementation of a residential sprinkler ordinance for single family dwellings within the jurisdiction. This task force should include various stakeholders with representation from the following groups: county council, chamber of commerce, utilities department, community associations, builders/construction Industry, real estate professionals, business owners, planning and zoning officials, sprinkler contractors, local/state sprinkler coalition, local fire department officials, state fire marshal, and general citizens. Although it is the fire departments or local jurisdictions decision to implement a sprinkler initiative, it would be the tasks force's goal to recommend what road the group takes to make it a reality.

5. The department should consider implementing a public education/sprinkler awareness campaign to gain business and citizen support for the initiative. This could be accomplished through printed pamphlets/brochures, press releases, press conferences, public service announcements, town hall/community meetings, and demonstrations.

6. The department should consider working with local appointed/elected officials to develop and draft legislation for the proposed code/ordinance requiring residential sprinklers in single family dwellings. This would ensure that final legislation would have a sponsor and that it would be ready for a final vote at the earliest opportunity.

There are many benefits that the Anne Arundel County Fire Department could derive through the implementation of these recommendations. First, occupant and firefighter safety could be improved leading to a reduction in injuries and deaths as a result of residential fires. Second, survival rates for at risk groups such as: children ages 1- 5 and adults 65 years and older would be greatly improved for those living in a home protected by sprinklers. Third, the fire department could over time experience a significant decrease in their jurisdictions annual fire loss. Fourth, the fire department could, over time, see a reduction in growth needs of the department. And fifth, working relationships and communications would be enhanced with all stakeholder groups and other county agencies as a result of their combined efforts in this type of initiative.

These changes should be implemented in three phases. The first phase should include goal setting and discovery (recommendations 1, 2, and 3). The second phase should be phased in within 4-6 months after the start of phase 1 to ensure that the all pertinent information is included in the appointment/convening of members for the task force (recommendation 4). This phase should be concluded within one year of its commencement. The last phase should include the implementation of a public awareness/education program, as well as, drafting and passage of a code and/or ordinance (recommendations 5 & 6). This phase should be implemented 10 months after the commencement of phase two and continue until the draft legislation has been approved by the governing body.

Additional research on this subject should be conducted in an attempt to seek additional information on the different types of codes and/or ordinances that have already been established by other departments and/or organizations nationally. This information can then be used in the

creation and development of a code/ordinance that can be pursued within the Anne Arundel County Fire Department.

It is suggested that future researchers consider the advances in new technologies and the different designs that may be afforded to many jurisdictions in the future. New technology has recently allowed residential sprinkler initiatives to be enacted in many different jurisdictions. These new technologies can help ensure that this type of effort will be continued and that both the citizen and jurisdiction benefits.

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