A SOLICITATION OF THE MANAGEMENT OF THE CITY OF MILWAUKEE TO INSTITUE RESIDENTIAL FIRE SPRINKLER REQUIREMENTS

By

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ABSTRACT

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A Solicitation of the Management of the City of Milwaukee to Institute Residential Fire Sprinkler Requirements
(Title)

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At the present time, the City of Milwaukee, Wisconsin does not have a residential fire sprinkler ordinance. The purpose of this study is to convince the City of Milwaukee to require installation of fire sprinklers in construction of new homes. This can be accomplished by enacting fire code changes in city fire safety ordinances.

The review of literature presents the history of fire sprinklers, case studies and excerpts of present day fire sprinkler ordinances that are currently in use in cities of approximate age and size of Milwaukee.

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CHAPTER 1

Research Problem and Objectives

Introduction

Saving lives should be a goal for everyone. For individuals involved with fire fighting, saving lives is of paramount importance. A proposed method to help save lives is fire sprinkler systems. A campaign in Milwaukee metropolitan area is anticipated to convince city lawmakers and residents that support of sprinkler ordinances and education will render this city a safer place to live.

In 1874, Henry S. Parmelee of Rochester, New York, placed the first automatic fire sprinkler systems in forging shops and boiler rooms. The first original sprinkler head was perforated, globe-shaped and suited with a piece of metal that dissolved at 155 degrees Fahrenheit (Wormald, 2003, April)

Later in the century, Parmelee installed the first commercially successful closed sprinkler head in his Mathusek Piano Works Company. His goal was to reduce insurance rates and property loss through automatic sprinkler installations (Wormald, 2003, April).

Since 1874, this lifesaving discovery has developed into the most effective weapon against fire destruction ever devised, other than the fire service itself (National Fire Sprinkler Association, 1989).

Residential fire sprinklers, which arrived on the scene in the 1970s, are likened to invisible firefighter-silent sentinels. The purpose of this study was to determine the ability of fire sprinklers to save lives and property.

Information was gathered through the use of research and surveys of cities throughout the United States similar in size to Milwaukee. For this report, the issue was

centered on new construction fire sprinkler requirements and training. Retrofitting of existing structures could be addressed at a later time.

Statement of the Problem

No ordinance currently exists that calls for residential fire sprinklers in the City of Milwaukee. Besides no current requirements, the lack of awareness and misunderstanding concerning residential sprinklers (plus the previous inadequate fire education programs) has caused the city to experience an annual death rate of 11 people due to fire. Of these 11 people, 58% of the fire dead were children under the age of 18 years old. The national average for children deaths due to fire is only 14.4% (City of Milwaukee, 2000, March).

Objectives of the Study

The purpose of this study is to have the management of the City of Milwaukee adopt a residential fire sprinklers requirement as a potential life saving ordinance. As managers for the city, it is their responsibility to provide the best and safest environment possible for Milwaukee's families.

Significance of the Study

The text located in Chapter 3 contains reasons why fire sprinklers are needed in residential structures in Milwaukee. Some economic reasons are also provided why fire sprinklers are a valid fire safety device not only for the individual resident, but for cost saving advantages on a community wide basis.

Chapter 3 contains feedback from other municipalities both in the form of verbal and written surveys. The possible implementation of sprinkler requirements and a plan of

action for achieving this are covered in the Conclusion and Recommendation section in Chapter 5.

This project focused on implementing residential fire sprinkler requirements for new construction only. Although the concept of retrofitting existing structures with sprinkler systems is an acknowledged practice, the researcher chose to concentrate on new construction only.

Limitations of the Study

The timeframe to implement these sprinkler requirements and training cannot be set. The gathering of research materials, survey results and the necessary documents has taken approximately six months; however as will be outlined in the Recommendation section, the public education and ultimately the city management legislation adoption could take years.

Assumptions of the Study

The City of Milwaukee Fire Department, being a progressive department, continues to move forward with new concepts and protocols. The change in fire protection requirements for its city structures will eventually be welcomed as another way to provide fire and life safety for its residents. This study will be presented to the City of Milwaukee and the Milwaukee Fire Department.

Definitions

Fire Safety Officer – Fire Department member/civilian employee that provides fire safety education to fire department and community (International Fire Service Training Association, 1996, May).

Main Riser – Vertical pipe that carries water to sprinkler system (International Fire Service Training Association, 1996, May).

Ordinance – A law or code created by a community to identify a safety issue (International Fire Service Training Association, 1996, May).

Residential – Single family, duplex and apartment houses (International Fire Service Training Association, 1996, May).

CHAPTER 2

Review of Related Literature

Introduction

At present no ordinance exists that calls for residential fire sprinklers in the City of Milwaukee. Besides no current requirements, the lack of awareness and misunderstanding concerning residential sprinklers, plus the previous inadequate fire education programs, has caused the city to experience an annual death rate of 11 people due to fire. Of these 11 people, 58% of the fire dead were children under the age of 18 years old. The national average for children deaths due to fire is only 14.4% (City of Milwaukee, 2000, March).

The purpose of this project was to request the management of the City of Milwaukee pass legislation to require residential fire sprinklers as a potential life saving ordinance. As managers for the city, it is their responsibility to provide the best and safest environment possible for Milwaukee residents.

Review of Literature

Primary sources of information for this report will come from the sprinkler industry:

1. National Fire Sprinkler Association (NFSA) - An organization that promotes education and implementation of fire sprinklers in communities.
2. The Fire Rattle – The newsletter published by the NFSA.
3. Star Sprinkler Company – A national fire sprinkler manufacturer, installer and contractor.

4. Also utilized, as secondary sources, will be the City of Milwaukee Annual Report, the Milwaukee Fire Department Annual Report, case studies from surveyed cities, and personal conversations with fire safety training officers from fire departments throughout the United States.
5. California State Fire Marshal. (1987, February). Residential Sprinkler Subcommittee on Insurance Report, Sacramento, CA: Author

The Fire Problem

The United States has led the industrialized world in fire deaths and fire losses for decades. The United States Fire Administration studied the fire death rates of fourteen industrialized nations for the period of 1979 to 1992. The United States fire death rate fell 46.3 percent, from 36.3 fire deaths per million populations in 1979 to 19.5 fire deaths per million populations in 1992 and averaged 26.5 fire deaths per deaths per million populations during this thirteen year period. The U.S. fire death rate is over five times that of Switzerland, the nation with the lowest rate of all the countries considered (City of Scottsdale, 2000, April).

The U.S. fire death rate reduction has largely been attributed to the use of smoke detection devices in residential occupancies. Technology has made smoke detection devices affordable and reliable when properly maintained. Disturbing is the report that in 14.8 percent of residential fires resulting in death the smoke detector failed to operate largely because of poor battery maintenance (National Fire Sprinkler Association, 1998).

If new technology residential fire sprinklers were installed along with the smoke detectors, fire deaths could be reduced by an estimated 82 percent (Ruegg and Fuller, 1984). Using the 10-year average of U.S. fire deaths from 1985-1994 of 5,770 fire deaths

per year, an 82 percent reduction means that over 4,700 people a year during this period would have survived the fire (United States Fire Administration, 1997).

Fire Sprinkler System Factual Review

Fire sprinklers have been an amazing and beneficial invention. They have saved countless lives and billions of dollars in property. There has never been a multiple death situation in a fully operating sprinklered building.

The first automatic fire sprinkler system was said to be created in England in the early 1800s. It was made up of a pipe with several valves held closed by counterweights attached by string. When flames burned through the string the counterweight dropped to the floor, which opened the valve that released the water and extinguished the fire (National Fire Sprinkler Association, 1989).

Manually operated systems were developed around the turn of the nineteenth century as well. Manual systems consisted of a number of perforated pipes fed by a main riser that was activated from an adjacent area. The manual systems were effective at dousing fires; however, water damage to the building and the contents not affected by the flames were often more costly than the fire damage (National Fire Sprinkler Association, 1989).

In 1864 Major Stewart Harrison of the 1st Engineer Volunteers of London invented the first Automatic Sprinkler Head. But the first practical application of automatic sprinkler heads did not happen until 1874 by Henry Parmelee of Connecticut who wanted to protect his piano factory. He produced the first widely used automatic sprinkler with a heat sensitive device (National Fire Sprinkler Association, 1989).

Parmelee quickly realized the financial benefit of sprinkler protected factories and warehouses and decided to try to show insurance companies how they could help them. He set up demonstrations and quickly impressed the insurance industry. Within a short time the insurance companies began to insist on the installation of sprinkler systems in areas of high risk. Through their practical application, sprinklers have consistently increased in use, beginning in warehouses and factories to places of public assembly, schools and now some residences (National Fire Sprinkler Association, 1989).

Overseas Use

The advantages of fire sprinklers were soon recognized by the Insurance Industry, who within a short time began to insist on the installation of sprinkler systems in areas of high risk. Thus began a long association between insurers and the Sprinkler Industry, which resulted in fire sprinklers being developed primarily to protect property. It was for this reason that their life saving properties were largely ignored until comparatively recently (National Fire Sprinkler Association, 1989).

The record of fire sprinklers is unsurpassed in the safety field. For instance, in New Zealand where all fires have had to be reported for over 100 years, records show that sprinklers have been effective in 99.7% of cases (National Fire Sprinkler Association, 1989).

Fire sprinklers have been continuously developed throughout their history and the modern residential fire sprinkler is a highly sophisticated piece of equipment. Its development started as a result of a report prepared in the United States by the Presidential Commission on Fire Prevention and Control entitled *America Burning*. This report published in 1973 highlighted the scale of the fire problem in the United States and

drew particular attention to the fact that over 75% of all fire deaths and injuries occurred in the home. They recommended the development of a residential fire sprinkler system as a possible solution and this prompted the National Fire Protection Association (NFPA) to set about developing a modification of its standard (NFPA 13, Standard for the Installation of Sprinkler Systems) to produce a reliable but inexpensive residential system.

At its first meeting the NFPA established a philosophy based on the following guiding principles:

a. Cost is of major importance. The NFPA reasoned that a system that was slightly less sophisticated, but that could be installed at a substantially lower cost than a full NFPA 13 system, was necessary if widespread acceptance of residential systems was to be achieved.
b. Life safety is the primary goal of a residential fire sprinkler system, with property protection a secondary goal.
c. System design should be such that a fire could be controlled for sufficient time to enable people to escape, i.e., it should operate for at least 10 minutes whilst sounding an adequate, local alarm.
d. Piping arrangements, components, and hangers must be compatible with residential construction techniques.
e. The omission of sprinklers in areas of low historical incidence of fire deaths (such as roof and the like) should be allowed, thus saving considerable cost (Dewar, 2001 February).

Recent Use

Until the 1940s, sprinklers were installed almost exclusively for the protection of commercial buildings, whose owners were generally able to recoup their expenses with savings in insurance costs. Over the years, fire sprinklers have become mandatory safety equipment and are required by building codes to be placed in hospitals, schools, hotels and public buildings. The next generation will require full residential protection (Southern Building Code Congress International, 1997).

Montgomery County, Maryland Law Mandates Residential Fire Sprinklers

On October 15, 2003, Montgomery County, Maryland, the largest jurisdiction in the nation, mandated fire sprinkler systems in new single-family homes. Fire sprinklers along with smoke detectors offer a package of protection that is far broader than what can be achieved by other interventions. With fire sprinklers, the homeowners are protecting not only lives, but also property, the furnishings, and all the intangibles of residential security and peace of mind (Montgomery County, Maryland-Fire Rescue Service, 2003).

The law identifies the fact that advances in technology have improved the reliability of fire sprinklers, lowered their costs and allowed broader application. The cost of installing fire sprinklers in a new home today amounts to about one percent of the home's total cost or about the cost of installing carpeting. Supporters of the law estimate that the presence of fire sprinklers can reduce a homeowner's insurance bill by ten to fifteen percent. Estimates of implementing the measure in Montgomery County are expected to be in the $1.6 million range. This cost will carry the program until permit fees are expected to balance the costs of the requirement. More officials would be

required to issue permits and conduct inspections (Montgomery County, Maryland-Fire Rescue Service, 2003).

Cost savings can be realized by the city in other tangible ways. Fire sprinklers offer opportunities for more effective use of fire and emergency service resources. While fire sprinkler systems do not necessarily reduce the number of emergency calls for firefighters, they do reduce the severity of the fire; thereby reducing the danger to firefighters and the lost time due to firefighter injuries. Because fire sprinklers could diminish the requirements of fire suppression, they also make it possible for the fire service to allocate more resources to important emergency medical service demands, search and rescue needs, etc. (Montgomery County, Maryland-Fire Rescue Service, 2003).

As a service to the public, the law requires property tax notices to provide information about local tax credits available for installing fire sprinkler systems, both in mandated and non-mandated residences, such as in existing single family, multi-family apartments, townhouses, and commercial structures. County residents who install fire sprinkler systems in their homes or retrofit them are eligible for up to a fifty percent one-time property tax credit (Montgomery County, Maryland-Fire Rescue Service, 2003).

Presently over two hundred U.S. communities have residential fire sprinklers laws. Roughly one hundred of these communities are in California. In downtown Fresno, for example, there has been fire damage of only $42,000 during a ten year period in which fire sprinkler laws have been in effect (Montgomery County, Maryland-Fire Rescue Service, 2003).

But the bottom line with this law is that it represents an important step forward in protecting this community from the dangers of fire. Fire sprinklers save lives, and they are relatively inexpensive when installed in the construction phase of a home (Montgomery County, Maryland Fire Rescue Service, 2003, October).

Property tax credit information and example:

- County tax on 2500 sq. ft. dwelling is approximately $1,600.
- Fire sprinkler installation cost: $1.25 to $1.75 per square foot.
- Fire sprinkler installation tax credit total: 50% x $1,600 = $800.
- Fire sprinkler installation insurance savings: 10% savings a year, approximately $400 over 10 year period.
- Installation cost: 2500 sq. ft. x $1.50 = $3,750.
- Fire sprinkler cost: $3,750 - $1,200 (tax credit & insurance saving) = $2,550 final cost of installation. (Montgomery County, Maryland-Fire Rescue Service, 2003).

Who is eligible for the tax credit? If the dwelling unit is not otherwise required to have a fire protection sprinkler system, then the owner who has installed the sprinkler system is eligible for the property tax credit (Montgomery County, Maryland Fire Rescue Service, 2003).

Dallas Adopts Residential Fire Sprinkler Ordinance

With an effective date of July 1, 2003, the City of Dallas has adopted an ordinance that requires fire sprinklers in certain single-family dwellings. The ordinance requires that all n*ew single-family dwellings (SFD) exceeding 7500-sq. ft. floor area must be sprinklered per National Fire Protection Association (NFPA)-13D design criteria.* All areas under roof, including garages and all covered porches, patios or balconies,

determine the floor area. NFPA-13D allows for sprinklers to be omitted from garages, small closets less than 24 sq. ft., small bathrooms less than 55 sq. ft., porches or patios which are open to the outside, and attic spaces. *Draft stops will be required in all attics where the space exceeds 9000 sq. ft.* The draft stops may be omitted if fire sprinklers are installed throughout the attic per NFPA-13 design criteria (commercial building design) that may require a dry pipe or antifreeze system if heat is not provided in the attic (National Fire Protection Association, 1998).

Dallas Fire Code distance requirements for fire hydrant and fire department access to unsprinklered SFD will remain the same. If fire sprinklers are not required based on floor area, then Dallas Fire Code minimum distance requirements for hydrants and access must be satisfied. Additional hydrants and fire access lanes may be installed or sprinklers may be installed as an option to increase the hydrant distance or eliminate access per present fire code interpretation (National Fire Sprinkler Association, November 2003).

Insurance Industry

There are insurance savings for fire sprinklered properties over those not sprinklered. The insurance savings can be substantial. There are a number of individual considerations that are visited when analyzing property insurance rating for a specific property. Insurance grading of the fire protection system within a property is not automatic. In fact, over sixty percent of those who have fire sprinkler systems are not receiving insurance credit for fire sprinkler systems. Many fully sprinklered properties remain on the insurance roles as a non-sprinklered property simply because somebody did not request that the property be graded. There are various procedures that must be

followed before a property is graded with many insurance carriers requesting field inspection fees to recover its costs (California State Fire Marshal, 1987, February).

CHAPTER 3

Research Methods

Introduction

At present no ordinance exists that calls for residential fire sprinklers in the City of Milwaukee. Besides no current requirements, the lack of awareness and misunderstanding concerning residential sprinklers, plus the previous inadequate fire education programs, has caused the city to experience an annual death rate of 11 people due to fire. Of these 11 people, 58% of the fire dead were children under the age of 18 years old. The national annual average for children deaths due to fire is 14.4% (Telephone Interview, June 3, 2003, Resource Center Attendant (name not available), National Fire Academy Resource Center, Emmetsburg, Maryland). The purpose of this study was to appeal to the management of the City of Milwaukee to pass legislation requiring residential fire sprinklers as a potential life saving ordinance. It is their responsibility, as managers for the city, to provide the best and safest environment possible for Milwaukee residents.

The organization and contents of the chapter include:

- design of the qualitative survey used,
- how it was created (focus groups),
- sample focus group discussion data for the survey,
- population surveyed,
- justification of recipients,
- survey cover letter, and
- survey questions.

Research Design

The researcher employed a qualitative survey process. The use of a focus group to develop a hypothesis included a total of eight fire safety officers, fire sprinkler industry personnel and City of Milwaukee – Department of City Development staff.

In a qualitative survey for this project, the information gathered centered on what is being done in other cities, the question being "Why reinvent the wheel?" If there is something out there that is being used that can be of use to Milwaukee, why not use or build upon it?

Do ordinances exist that mandate fire sprinkler installation in residences in other cities now? How were they enacted? What is the fire department involvement with these codes? Have they seen any improvement in lives saved? What were the cost factors both for installation and tax savings? Has there been any change in fire department response?

Population

The justification for the use of the cities surveyed is based upon several factors:

1. The cities are approximately of the same population size.
2. The age of the structures in each of the cities is comparable.
3. A range of concerns for water sources was also addressed.
4. All cities have Fire Safety Officers on staff that can respond to a survey.

Procedures

In July/August 2003, contact was made with several fire safety officers, fire sprinkler industry personnel and City of Milwaukee Development staff. Discussions centered on the need for residential fire sprinkler requirements, life safety issues, possible loss of fire service personnel and cost of implementation. Agreement was made to send

out a survey to the fifteen identified city fire departments (Appendix C), all with fire education officers. These cities all have like qualities and populations. The focus group unanimously agreed upon the five questions. On September 22, 2003, Residential Fire Sprinkler Implementation survey forms were sent out to the fifteen city fire departments.

Data Collection

Upon receiving completed surveys from city fire education officers, a structured evaluation and sort of all materials took place. The first step was to separate fire departments with existing residential fire sprinkler requirements. Additional information received from participants of the survey concerning proposed implementation was then separated out. After that, all case studies were consolidated. Graphs or charts were not used in this analysis of the survey data due to the varied responses from the city fire departments. Various completed studies on residential fire sprinkler implementation needs/history were included in some of the returned packets.

Instrumentation

The data considered necessary for the study centered on residential fire sprinkler implementation. Collection of data from cities that presently have residential fire sprinkler requirements, cost analysis, property/life saving statistics, and insurance rate reduction percentages will be used to promote the ultimate goal of this study. The ultimate goal of this study is to convince the managers of the City of Milwaukee to require residential fire sprinklers in Milwaukee area homes.

Collection of some data came from surveys (Appendix B) sent to the fifteen identified city fire departments (Appendix C). A cover letter (Appendix A) explaining that the information gathered from the surveys would be used to solicit the City of

Milwaukee to enact legislation to require residential fire sprinkler installation in new construction was included with each survey. The information source would only be acknowledged if agreed upon with suppliers. The validity and reliability of the data collected is taken as fact due to the integrity of the Fire Education Officers in the identified city fire departments interviewed and the information supplied by these individuals.

The data received helped formulate the conclusions in Chapter 5. The limitations found in this research showed a need for surveying states and counties around the United States as well as the selected cities. This would help in receiving a larger and more diverse response – thus more data to work with.

CHAPTER 4

Results

Introduction

At present no ordinance exists that calls for residential fire sprinklers in the City of Milwaukee. Besides no current requirements, the lack of awareness and misunderstanding concerning residential sprinklers, plus the previous inadequate fire education programs have caused the city to experience an annual death rate of 11 people due to fire. Of these 11 people, 58% of those fire dead were children under the age of 18 years old. The national average for children deaths due to fire is only 14.4% (City of Milwaukee, 2000, March). The purpose of this study was to have the management of the City of Milwaukee pass legislation to require residential fire sprinklers as a potential life saving ordinance. As managers for the city, it is their responsibility to provide the best and safest environment possible for Milwaukee families.

The organization and contents of the chapter include presenting the findings from the surveys sent out, follow-up sample telephone conversations with fire education officers, and evidence to support fire sprinkler requirements in the City of Milwaukee.

Presenting the Findings

The information to implement residential fire sprinkler requirements in the City of Milwaukee may already exist. The appropriate way of gathering that information is through inquiries. In this case, the use of a mailed survey was one of the data gathering techniques. These cities were chosen as preliminary introduction telephone conversations with the fire education officers ascertained to have similarities between Milwaukee and

their communities. These similarities included general population size and building construction age.

The results of the surveys indicated widespread knowledge of residential fire sprinkler systems. This information could potentially be used to help establish a foundation for legislation implementation.

The recipients of the surveys were dedicated professionals and quite responsive. Of the fifteen surveys sent out, twelve were returned.

Survey Answer Summaries

1. Does your community presently have residential fire sprinkler requirements?

   A. Yes. If yes, please enclose copy of present ordinance requirements.

   B. No

   C. Not at present time, but are in process of implementing residential fire sprinkler ordinance. If so, please forward any data on implementation process.

   Of the twelve responding communities surveyed:

   - Seven communities have no residential fire sprinkler ordinances.
   - Two are in the process of drafting said ordinances.
   - Three have existing ordinances in place at this time.

Although only three have existing ordinances, with two more in the works, all seven were very interested in implementing fire sprinkler requirements. Most asked for copies of findings to be sent to them upon completion of report.

2. If ordinance exists, has it cut down your fire losses, both property and fire victims?

   If yes, please elaborate, i.e.: yearly comparison statistics, etc.

   Three answered this question:

- One stated a residential fire sprinkler ordinance was recently implemented. No data as yet exists.
- Two stated a reduction of fire losses to residential properties protected by fire sprinklers. This reduction was shown in dollar amount losses in residential fires. Compared were structures with fire sprinkler systems in place and structures without fire sprinklers. The average cost to repair fire damage to a non-sprinklered residence was averaged at $38,000 in both communities; while the averaged cost of fire damage repair to sprinklered residences was approximately $2,500.

Adding to these dollar amounts both communities showed an overall average life loss reduction of 30 percent.

3. If ordinance exists, have the insurance companies in your area granted home insurance rate reductions?

If yes, please give estimate of percentage reductions.

Three fire education officers answered this question:

- One community responded saying one insurance company granted a 5 percent across the board rate reduction.
- Two communities stated that the insurance companies responded favorably, but with a sliding rate reduction scale.
- All three stated that they expected further reductions as the ordinance is in place for a while.

4. If ordinance exists, has your fire department experienced any lost positions because of success of residential fire sprinklers?

If yes, please indicate percentage of lost fire suppression forces.

All three communities stated that they had not experienced any cut backs in personnel due to new fire sprinkler requirements.

5. If ordinance exists, are there any suggestions you might have for expediting implementation of residential fire sprinkler ordinance in the City of Milwaukee?

Several excellent suggestions were included with return of the surveys. Some suggestions even came from communities who at present do not have residential fire sprinkler ordinances. These suggestions are included in the form of positive data.

Survey Telephone Supplement

The following information was received in part from a telephone conversation as a follow-up to the return of survey by Orlando, Florida Fire Department. The fire education officer for the Orlando Fire Department explained that his city has a proposed code that would require developers of newly constructed buildings to offer a residential fire sprinkler system to every buyer. The cost of the system ranges from $1,500 to $2,000 per unit. A key factor in the acceptance of these systems will be fire insurance reductions. However, many insurance companies are waiting for more evidence of success before they pledge their support for the sprinkler program.

The fire education officer believed sprinklers would change the nature of firefighting. Firefighters hired in the future will be of a different caliber. The macho hero attitude will be a concept of the past. Fire departments will return to their roots as community service organizations, providing more education as a fire protection method. He also stated that the National Fire Protection Association estimates that the fire service responds to only about 10 percent of all fires. With residential fire sprinkler systems

reporting directly to the fire department through water flow alarms, there may be an increased response to alarms, but the fires would be less intense and less hazardous to the occupant as well as the firefighter. He also stated that he expects the implementation of new fire sprinkler ordinances in the City of Orlando, Florida would not cause a reduction of current fire department staff levels.

Survey Data Returns

The fire education officer in Nashville, Tennessee states that manufacturers of fire sprinkler products have spent many dollars on new innovative technology in an effort to make the installation of residential fire sprinkler systems in small dwellings affordable. The advent of residential quick response fire sprinklers has resulted in a significant reduction in the water volume and pressure needed to successfully control a fire meaning less water, smaller pipes, thus, lower costs (National Fire Sprinkler Association, 1996). In Germantown, Tennessee one fire sprinkler contractor is installing residential fire sprinklers in single-family homes at a cost of $0.84 per square foot (National Fire Sprinkler Association, 1998). This amounts to an average slightly over a one percent increase in construction costs (Appendix D). In Florida, the Orlando fire education officer states that in Altamonte Springs, Florida a new technology fire sprinkler system was installed at a cost of $0.38 per square foot or well under one percent of the construction costs (National Fire Sprinkler Association, 1998).

The National Institute of Science Technology in San Antonio, Texas reports that there will be an 82 percent reduction in fire deaths in our nation should fire sprinkler systems be placed in residential occupancies (Ruegg and Fuller, 1984). The flaw with this statistic is the remaining 18 percent of fire deaths not reduced are in fact those occurring

outside of the residential setting. Thus, the new homebuilder could easily report that the residential fire sprinkler system installed in its new home will provide almost certain life safety, a very sellable or "glitter" item particularly for those homebuyers with young children. One cannot argue that hot tubs, upgraded countertops in kitchens and bathrooms, unique architectural designs, and many other creative features add glitter to the home and make it more sellable; however, the desire of adding more glitter should not lead to eliminating proven life safety residential fire sprinkler systems. The simple solution is that the residential fire sprinkler system should be considered and promoted as not only an essential life safety system, but also the glitter that they are by the homebuilder.

Data received from the fire education officer in San Francisco, California was from a fifteen-year study conducted in Scottsdale, Arizona. This data coincided with implementation of a residential fire sprinkler ordinance on January 1, 1986. There were 49 fires in single-family homes with fire sprinkler systems:

- No deaths occurred in sprinklered homes. (While thirteen people died in homes during that period, not protected by sprinklers.)
- Sprinklers prevented over $20 million potential loss.
- $106,110 actual structural damage loss
- Average fire loss per sprinklered incident: $2,166.
- Average fire loss per unsprinklered incident: $45,019.
- Ninety percent of fires are contained by the operation of just one sprinkler.
- There was less water damage in homes with sprinklers.

- Sprinkler systems discharged an average of 341 gallons of water per fire.
- Firefighter hoses released 2,935 gallons of water per fire.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

Saving lives should be a goal for everybody. For individuals involved with fire fighting, saving lives is of paramount importance. A proposed method to help save lives is fire sprinkler systems. A campaign is anticipated to convince all parties involved that support of sprinkler ordinances and education will make the City of Milwaukee a safer place to live.

In 1874, Henry S. Parmelee of Rochester, New York placed the first automatic fire sprinkler systems in forging shops and boiler rooms. The first original sprinkler head was perforated, globe-shaped and suited with a piece of metal that dissolved at 155 degrees Fahrenheit (Wormald, 2003, April).

Later in the century, Parmelee installed the first commercially successful closed sprinkler head in his Mathusek Piano Works Company. His goal was to reduce insurance rates and property loss through automatic sprinkler installations (Wormald, 2003, April).

Since 1874, this lifesaving discovery has developed into the most effective weapon against fire destruction ever devised, other than the fire service itself (Dewar, 2001, February).

Residential fire sprinklers, which arrived on the scene in the 1970s, are likened to invisible firefighter-silent sentinels. The purpose of this paper will be to determine the ability of fire sprinklers to save lives and property.

Information was gathered through the use of research and surveys of cities similar to Milwaukee throughout the United States. For this report, the issue will center on new

construction fire sprinkler requirements and training. Retrofitting of existing structures could be addressed at a later time.

The purpose of this project was to have the management of the City of Milwaukee institute legislation to require residential fire sprinklers as a potential life saving ordinance. As managers for the city, it is their responsibility to provide the best and safest environment possible for Milwaukee's families.

No ordinance currently exists that calls for residential fire sprinklers in the City of Milwaukee. Besides no current requirements, the lack of awareness and misunderstanding concerning residential sprinklers, plus the previous inadequate fire education programs has caused the city to experience an annual death rate of 11 people due to fire. Of these 11 people, 58% of the fire dead were children under the age of 18 years. The national average for children deaths due to fire is only 14.4% (City of Milwaukee, 2000, March).

Summary of Study Procedures

The population used in this study included Fire Prevention Officers from the 15 cities identified in Appendix C. Their backgrounds and expertise in fire safety have made them a leader in their own community. Each one of them is a library-like source for residential fire sprinkler data. Prior to sending out the written surveys, telephone contact was made with their selected fire departments.

The instrumentation used to conduct the study, in part, was a qualitative survey that was sent out to 15 fire departments. Included in the survey were questions asking for:

- feedback on their city's present fire sprinkler requirements;

- data in their possession that could help pass implementation of residential fire sprinklers in Milwaukee;
- personnel loss in their fire department due to implementation; and
- financial gains/losses from fire sprinkler code requirements.

Data collection started with a focus group made up of eight fire safety officers, fire sprinkler industry personnel and City of Milwaukee – Department of City Development staff. This group brainstormed the needed information to be included in the survey. This survey was then sent to carefully selected Fire Education Officers in cities comparable to Milwaukee in size, age and construction.

The survey response rate was very good. Fire Education Officers responded from 12 out of 15 cities. Three cities presently have residential fire sprinkler requirements and another two are in the process of implementation. Further data was accumulated from telephone calls to select fire departments.

Conclusions and Implications

Those responsible must do better in finding solutions to minimize the United States fire problem. A residential fire sprinkler system is the answer. Homebuilders must recognize community needs and encourage the installation of fire sprinkler systems in new housing stock. Over one million families each year could move into fire safe environments. While recognizing the uncertainty of housing markets and the risk homebuilders take when building homes during market demand swings, homebuilders must do the right thing for the community and the homebuyer by revisiting its resistance to residential fire sprinklers.

This research supports the conclusion that automatic fire sprinkler systems save lives and conserve property. Data shows that there could be a probable reduction in lives lost and costly property damage if the city council would pass an automatic fire sprinkler system ordinance.

The need for city management to pass ordinances to require their use is an important issue. Action is needed before one more person is needlessly lost to a fire's death grip. Milwaukee needs to become proactive in fire safety and protection, not re-active.

Recommendations

The Fire Sprinkler Industry should launch a marketing campaign to sell automatic fire sprinklers, which might ultimately institute a city ordinance. There are two terms to remember in marketing: desire and demand. Desire is when we want something, but are not willing to sacrifice the money to buy it. Demand is wanting and being willing to purchase that item.

If one asks the average homeowner if he or she desires to live in a house that has a built-in residential fire protection system, he or she would probably say yes. However, if you ask if he or she would be willing to pay for it or demand it, the answer would probably be negative.

How can demand for automatic sprinklers be created? Primarily, a marketing strategy is needed that targets both the homeowner and the city's decision makers. Following is a sampling of promotional ideas that could be implemented toward this end:

- Newspapers: Go to the local newspaper and look for a reporter who is not only interested in residential fires, but also is interested in how they could be prevented.

Provide him or her with daily stories of fire department actions; some that are reader appealing (like saving a kitten), and others like life and death struggles. The story must be newsworthy and interesting to be published. Photographs give a better pictorial of what is taking place.

- Television and Radio: At the same time, contact the local television and radio stations and again look for the same type of interested reporter.
- Signs: Once fire sprinklers are installed in a few residential units, produce 4x8 foot signs that read "For the safety of your family, these homes are protected by residential fire sprinklers." These signs could have the Milwaukee Fire Department's logo right in the middle of them and could be paid for by the local sprinkler contractors. People buying these homes are looking for positive purchasing features. If it could be shown that these homes are safer for families than homes without fire sprinklers, a demand for them would be created.
- Sparky the Fire Dog: Also make available the National Fire Protection Association's (NFPA) Sparky the Fire Dog signs with public safety messages at each of the fire stations. These signs catch people's eyes as they drive past and are a very effective public education and public relations tool.
- Service clubs: Another marketing medium is community service clubs. They are always looking for speakers. Anyone with a copy of NFPA's "Firepower" video (fire sprinkler activation video) and a video of a local house fire can sell the need for fire sprinklers to the most influential people in the community. This presentation also works well at the many ethnic festivals in the City of Milwaukee.

- Successful sprinkler operation: Another strategic angle is the successful operation of a fire sprinkler. The media could be provided with a successful save by fire sprinklers. This would create believers, as well as product acceptance.
- Other marketing possibilities are signs on the fire engines, bumper stickers and public safety posters in store windows. Any vacant space is public safety advertising space.
- Endorsements: Possibly have developers/contractors who are supportive of the proposal testify from the home safety standpoint.
- Dispelling myths: Provide factual information to dispel myths regarding accidental discharges, excessive water damage, leaking and the impact on affordable housing.
- Target market: The old saying that a *man's home is his castle* is important to remember. If the goal is to get fire sprinklers in as many homes as possible, avoid the retrofit-remodel traps and concentrate on new construction. Many an ordinance has been stifled due to homeowner resistance.
- Pre-selling: Do not go into hearings without pre-selling to legislation officials. Spend as much time with the city council members as with the media contacts. Show them "Firepower" and have them review the stories of the fire losses and the sprinkler system saves.
- Staff support: Not to be overlooked is the need to educate and pre-sell the Milwaukee Fire Department's own support staff, including planners, public works personnel and above all – the firefighters. There is nothing more embarrassing than to have firefighters appearing at public hearings lined up with developers opposing fire and life safety ordinances.

Following these guidelines and marketing fire sprinklers is not the end of the task. Ordinances are passed and they can be repealed. The Fire Department will need to continue to foster customer satisfaction through media presentations. Also, the Milwaukee Fire Department should educate new legislators as they take office. During and after ordinance passage, the Milwaukee Fire Department Fire Prevention Bureau should follow whatever legal noticing, filing or recording that is required to protect the sprinkler ordinances from legal challenges.

Recommendations for Future Studies

The primary information used in this study was provided by surveys completed by city fire departments, research publications, and Internet research. The wealth of collaborating studies available from communities, fire safety experts, and industry professionals far exceeds the resources available to this author. Future studies could center on internationally proactive fire sprinkler legislated countries, fire sprinkler installation companies, state government fire sprinkler codes, and community economic impacts. Although these areas could be addressed as a total package, taking them as individual studies would better influence city fire sprinkler legislation.

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APPENDIX A

Cover Letter

Fire Education Officer
City of ---

Dear Sir/Madam,

My name is Niles Ottesen. I am a former Fire Safety Officer for the City of Milwaukee and presently a full time Fire Service Instructor for Milwaukee Area Technical College. The City of Milwaukee contains approximately 615,000 people. We have a full time staffed fire department of approximately 1050 firefighters. Every year the city experiences fire deaths averaging 11 people. At present, we have a limited fire sprinkler ordinance for multiple family and high rise structures only. There are no single or two family residential sprinkler requirements at this time.

I am seeking information about your community's residential fire sprinkler laws. If you presently have sprinkler ordinances in your city, please take the time to fill out the enclosed survey and return in stamped envelope provided. If at present no legislation exists or legislation is pending, please indicate and return survey.

This information will be used to fulfill the requirements for my Graduate Degree in Training and Development at University of Wisconsin–Stout and eventually be submitted as part of a report to the City of Milwaukee Legislative Committee.

Your cooperation in returning this survey will be greatly appreciated. A copy of the final results will be mailed to you after compiling of data. All source information returned will be kept confidential.

Thank you.

Niles Ottesen

If you have any questions, please contact me or my research advisor at UW Stout.

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APPENDIX B

Residential Fire Sprinkler Implementation Survey

1. Does your community presently have residential fire sprinkler requirements?

   A. Yes. If yes please enclose copy of present ordinance requirements.
   B. No
   C. Not at present time, but are in process of implementing residential fire sprinkler ordinance. If so please forward any data on implementation process.

2. If ordinance exists, has it cut down your fire losses, both property and fire victims?

   If yes, please elaborate. i.e.: yearly comparison statistics, etc.

3. If ordinance exists, have the insurance companies in your area granted home fire insurance rate reductions?

   If yes, please give estimate of percentage reductions.

4. If ordinance exists, has your fire department experienced any loss of positions because of success of residential fire sprinklers?

   If yes, please indicate percentage of lost fire suppression forces.

5. If ordinance exists, are there any suggestions you might have for expediting implementation of residential fire sprinkler ordinance in the city of Milwaukee?

APPENDIX C

List of Cities Surveyed

1. Albany, New York
2. Albuquerque, New Mexico
3. Birmingham, Alabama
4. Boston, Massachusetts
5. Cleveland, Ohio
6. Lincoln, Nebraska
7. Nashville, Tennessee
8. Orlando, Florida
9. Pittsburgh, Pennsylvania
10. Portland, Oregon
11. Richmond, Virginia
12. San Antonio, Texas
13. San Francisco, California
14. Seattle, Washington
15. Wichita, Kansas

APPENDIX D

New Home Sprinkler Costs

New Home Sprinkler Cost

This analysis pertains to the relationship between the cost of residential fire sprinkler protection and the cost of affordable housing.

LUXURY HOME

3,064 Sq. Ft.

Item		Cost	Percent
Construction ($63.00 sq. ft.)		$193,032	48
Developer Profit		$60,011	15
Lot		$80,000	20
Realtor Fee		$24,000	6
Financial		$20,000	5
Permit Fees		$19,343	5
Muni	$8,578		
School	$5,270		
Sanitation	$5,495		
Fire Protection		$3,614	1
Residential Fire Sprinklers	$3,524		
Smoke Detectors	$ 90		
Sales Price		$400,000	

New Home Sprinkler Cost

This analysis pertains to the relationship between the cost of residential fire sprinkler protection and the cost of affordable housing.

MODULAR/MANUFACTURED HOME
1,152 Sq. Ft.

Item		Cost	Percent
Construction ($37.00 sq. ft.)		$42,600	28
Developer Profit		$39,798	27
Lot		$35,000	23
Realtor Fee		$9,000	6
Financial		$7,000	5
Permit Fees		$14,912	10
Muni	$7,436		
School	$1,981		
Sanitation	$5,495		
Fire Protection		$1,690	1
Residential Fire Sprinklers	$1,600		
Smoke Detectors	$ 90		
Sales Price		$150,000	