

BENEFITS of RESIDENTIAL FIRE SPRINKLERS:

Prince George's County
15-Year History with its
Single-Family Residential Dwelling
Fire Sprinkler Ordinance



Prepared by Steve Weatherby
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Produced in cooperation with the Home Fire Sprinkler Coalition, University of Maryland University College, Prince George's County Fire Department and the Maryland State Fire Marshal's Office.



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Executive Summary

In 1992, Prince George's County in Maryland enacted an ordinance mandating the installation of automatic fire sprinkler systems in new one- and two-family structures. Through a partnership with the Home Fire Sprinkler Coalition (HFSC), the Maryland State Fire Marshal's Office, the Prince George's County Fire Department, and the University of Maryland University College, a study was conducted to review Prince George's County's experience with this ordinance over the 15-year period of 1992-2007.

The most obvious benefit of the ordinance is the direct impact that home fire sprinkler systems have made in saving lives and reducing fire-related injuries.

From 1992-2007, there were 101 fire deaths and 328 civilian injuries in single-family or townhouse fires that were not protected with fire sprinkler systems. No fire deaths occurred in sprinklered-structure fires during the period studied, and there were only six civilian injuries.

Property protection is another important benefit. Looking at the average loss per event in a structure that did not have a residential sprinkler system installed, the damages averaged \$9,983 per incident, and \$49,503 per incident when there was a fatality. The average loss for a single-family/ townhouse structure protected by fire sprinklers was \$4,883 per event. Having sprinklers cut the property loss by almost one-half.

Prince George's County experienced 13,494 single-family or townhouse fires during the period,

with an average of 900 fires per year. The County's total fire loss for single-family/townhouse structures topped \$134 million, averaging almost \$9 million per year. Prince George's County's data indicates that more than 45,000 permits were issued for single-family/townhouse structures from 1992 through 2007, with an average issuance of 3,019 permits per year.

During the period studied, Prince George's County Fire Department (PGFD) recorded 245 sprinkler activations in single-family and townhouse structure fires. In the 245 activation incidents, PGFD recorded no lives lost and only six civilian injuries. PGFD reports 446 residents were present in the structures during the time of sprinkler activation. More than 80 of those residents were present when sprinklers activated during the hours of 10:00 p.m. to 5:59 a.m., which is the most common time for fire deaths to occur, according to NFPA fire data. In the 245 activation incidents, the PGFD estimated the fire loss at \$1,352,820, compared to a total potential loss of \$42,578,420.

The cost impact to developers/builders was determined by interviewing several Prince George's County sprinkler contractors, who indicated that the per-square-foot cost to install a fire protection system in a single-family home in the County has decreased over the years to under \$2.00 per square foot. This is consistent with a recent NFPA study that found the average cost of installation nationally to be \$1.61 per sprinklered square foot. ❖

Demographics

Prince George's County, Maryland, is roughly 500 square miles and is situated in close proximity to Washington, DC. Prince George's County has a mixture of light industrial, retail, residential and institutional structures that are protected by the county's fire department. Prince George's County is known for providing affordable



living for many people who commute to work in the Washington, DC area(1).

Most of Prince George's County's population is concentrated in the northern two-thirds of the County(1). The southern part of the County is predominantly rural(1) but urban sprawl has pushed development into these areas, which are affected by Prince George's County's residential sprinkler code. According to Census figures(6), the average population in the County from 1992-2006 was 846,000 residents. In 2007, it was 828,770. The overall population of Price George's County has grown 11 percent on average since the enactment of the residential sprinkler ordinance(6).

The average median income in Prince George's County in 2004 was \$55,129.00(6). The percentage of home ownership in Prince George's County is 61.8 percent, which is almost 6 percent less than the average for the State of Maryland and in 2008 the median value of a single-family dwelling in Prince George's County is \$145,600(6).

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YEAR	POPULATION	% CHANGE	No. of Permits
1992	740,390	N/A	3680
1993	743,156	1.00%	3858
1994	751,282	1.01%	2418
1995	757,795	1.00%	4344
1996	764,644	1.00%	3635
1997	769,840	1.00%	2920
1998	776,907	1.00%	2664
1999	781,781	1.00%	2927
2000	803,291	1.02%	2506
2001	815,203	1.01%	2467
2002	824,365	1.01%	3068
2003	830,513	1.00%	2088
2004	835,021	1.00%	2233
2005	838,156	1.00%	2782
2006	834,660	-1.00%	2233
2007	828,770	-1.00%	1462
		11.05%	45,285

Source: US Census Bureau Estimates

Source: Prince George's County Planning Department Estimates

Since 1992, Prince George's County has issued more than 45,285 building permits for one- and two-family dwellings. The average yearly issuance of one- and two-family dwelling building permits is 3,019.

The Prince George's County Fire Department has 44 stations with a career staff of more than 800 individuals and a volunteer force of 2,000 members. There are 1,200 active emergency responders. In 2007, Prince George's County Fire Department responded to nearly 127,000 calls for service(7). ❖

Prince George's County Residential Sprinkler Ordinance

In 1987, Prince George's County signed a mandatory fire sprinkler law for all residential structures. This law covered every type of residential dwelling from multi-structures to townhomes to one- and two-family structures.



This law was to be phased in over the next five years with the final phase requiring all newly constructed single-family structures to be protected by an NFPA 13D fire sprinkler system(1).

The ordinance was phased as follows: one- and two-family model homes were to feature residential fire sprinklers by February 1, 1988. All newly constructed multi-family structures were to have residential fire sprinklers installed by January 1, 1989. In the final phase, January 1, 1992, all newly constructed single-family homes were to be fully protected by an NFPA 13D residential sprinkler system (1). ❖



Statistical Comparisons

This report consolidates the data collected from Prince George's County Fire Department. The fire department tracked each sprinkler activation by dispatching an on-duty Fire Marshal to the scene. The Fire Marshal was required to complete a Sprinkler Activation Report, which included the type of structure, documentation of the number of sprinklers activated, the potential cause, the type of sprinkler system, the room(s) involved, total dollar value of the property, the estimated dollar loss, and the number of residents present in the structure during activation.

From the years 1992 to 2007, Prince George's County recorded a total of 13,494 single family/townhouse fires and 245 of those were protected by fire sprinkler systems. In those 245 incidents, no deaths were recorded and only six injuries were reported. In the 13,249 fires that occurred in homes that were not protected by sprinklers, 101 residents were killed and 328 were injured. Fire deaths in residential dwellings made up 89% of the fire deaths in Prince George's County during the years.

Four hundred forty-six persons were present in the structures at the time of sprinkler activation. According to the NFPA, the most vulnerable time of day for home fire deaths is between the hours of 10:00 p.m. and 6:00 a.m. Eighty-one occupants were present in their homes during this time period. Another 294 residents were home at the time of sprinkler activation between the hours 6:00 a.m. and 9:59 p.m. Seventy-one residents were home during activation at unrecorded times.

During the study period, there were 45 recorded residential fire deaths between the hours of 6:00 a.m. and 9:59 p.m., 38 recorded residential fire deaths between 10:00 p.m. and 5:59 a.m. and 18 recorded residential fire deaths where the timeframe was not known in residences without sprinklers.

Fire Deaths and Fire-Related Injuries



These findings clearly show the benefits of an automatic sprinkler system. The most compelling data is that no deaths occurred in any fire where a fire sprinkler system was present. In a tragic contrast, 101 people lost their lives to fires in nonsprinklered home fires during the same period. When one looks at the large number of residents present during fires in sprinklered homes, the protective value of home fire sprinklers is underestimated even more. These residents would have been at a much higher risk of death due to flame and smoke spread had their residences not been sprinklered.

In some of the cases analyzed, residents were impaired or asleep at the time of the fires and were awakened by fire crews. In these instances, the sprinkler system's ability to keep the fire controlled with just one or two sprinklers allowed responding fire crews to rescue the residents in a

Statistical Comparisons *(continued)*

less hazardous environment. In 96 percent of the 245 reported fire-related sprinkler activations only one or two sprinklers operated.

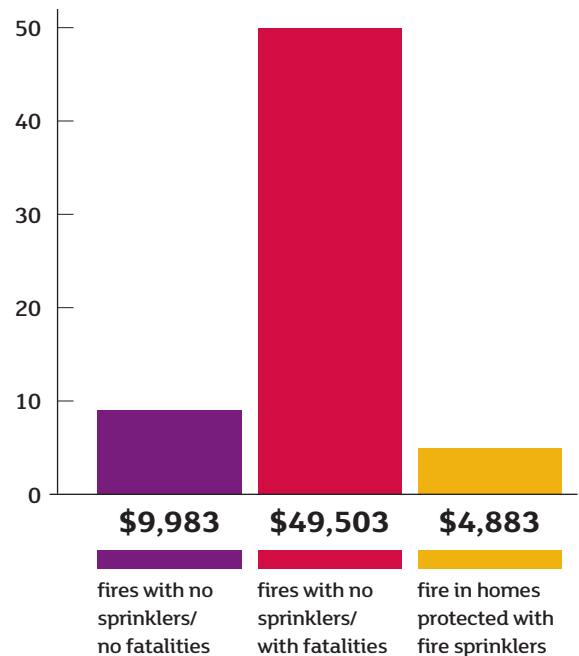
Another important advantage of home fire sprinklers is property protection. From the years 1992 to 2007, Prince George's County Fire Department recorded fire loss for single-family homes and townhouses at \$134,711,199. Property loss from the 245 activated sprinkler events was \$1,352,820. The average loss per event in a structure that did not have a sprinkler system installed averaged \$9,983 per incident. The average fire loss in a structure that was not protected by a sprinkler system and resulted in a fatality came to \$49,503. The average loss for a sprinklered single-family/townhouse structure was \$4,883 per event. (See chart.) This cut the property loss by almost one-half in single-family and townhouse residences and is at least 10 times less than a fatal non-sprinklered residential fire.

The average water output of a residential fire sprinkler is between 13-15 gallons per minute. The average flow from a fire hose is 95 to 200 gallons per minute, under high pressure. Obviously, the activation of a fire sprinkler will create far less water damage.

Another benefit to the residents of Prince George's County is lower insurance costs for homeowners. Having a home fire sprinkler system helps protect the structure and its contents, lowering the replacement risk of the dwelling. When the sprinklered housing stock increases, the overall fire loss will decrease, which potentially decreases the insurance premiums for everyone.

The cost of installing a residential fire sprinkler system has long been debated. A 2008 study by the Fire Protection Research Foundation showed

Average Property Loss Per Incident



that the national average cost for fire sprinkler installation is \$1.61 per sprinklered square foot. In the report, the average median sprinkler-protected area of a new construction single-family home is 4,124 square foot, which makes the cost of a full NFPA 13D system \$6,640 for an average sprinklered structure(4). The Research Foundation study used Prince George's County as one of Its models and showed that within five years of the ordinance being enacted, the average installation cost dipped below \$1.00 per square foot. At this price point, sprinkler installation should be less than a 5 percent increase over the entire cost of construction for the single-family structure. ❖

Conclusion

This study shows numerous benefits that residential fire sprinklers provide to the public. Prince George's County's residential sprinkler ordinance has had a significant impact on life safety and reduction of property damage. Prince George's County's experience of suffering no loss of life in a sprinklered home should provide ample justification for other jurisdictions throughout the country to pass similar ordinances. ❖

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