

NAHB Talking Points to Sprinkler Proponent Reports

Ahrens, Marty. 2007. ***“Trends and Patterns of U. S. Fire Losses.”*** Quincy: National Fire Protection Association.

NAHB Summary-

- Our population grew 36 percent between 1977 to 2006, according to the U.S. Census, while at the same time the rate of fires per 1,000 population fell 63 percent: from 14.9 in 1977 to 5.5 in 2006.
- Structure fires accounted for 32% of the total reported fire incidents in the US in 2006, a decrease in over 52% when compared to the 1,098,000 reported in 1977.
- In 2006 the number of U.S. fire deaths were the lowest it has ever been since NFPA started recording the data in 1977, both total fire deaths and residential fire deaths fell by more than 56%.
- Key trends fire incidents, fire deaths, firefighter deaths, civilian injuries and direct property damage (when adjusted for inflation) continue to decline all without the assistance of sprinklers.

Hall, John R., Jr. 2007. ***“U. S. Experience with Sprinklers and other Automatic Fire Extinguishing Equipment.”*** Quincy: National Fire Protection Association.

NAHB Summary-

- Dr. Hall explains that sprinklered buildings tend to be better built and maintained better in terms of all the other fire safety features and fire protection measures, this point alone would indicate that fire sprinklers will receive some credit for life savings that should be accredited to the entire integrated system.
- Table 13 compares the characteristics of victims reported in non-confined fire from 2002 and 2004. The table shows that when sprinklers operated there were a higher percentage of victims who were unable to act, clothing on fire, in the area of origin or were older than 65 years of age compared to all fires and all conditions.
- Even Dr. Hall admits that cost is a legitimate concern as they are not inexpensive.
- Overall performance of automatic sprinkler in all reported fires is much lower than claims made by proponents when the sprinkler operates. In all the reported fires from 2002 to 2004 where sprinklers were present in residential occupancies, 50% of the systems never operated due to the fire being too small, in 47% of the fires the sprinklers were effective, in 2% of the fires the sprinkler failed to operate and in 1% of the reported fires they were ineffective.

- It is estimated that less than 2% of the new residences built in 2003 were equipped with an automatic fire suppression system and less than 1% of the reported fires occurred in homes equipped with residential sprinklers. Many of these systems were installed because of an ordinance and not at the request of the homeowner.

Dewar, Buddy. 2001. ***“Residential Fire Sprinklers for Life Safety: An Economic and Insurance Perspective.”*** Patterson: National Fire Sprinkler Association.

NAHB Summary-

- Cost savings from construction tradeoffs do not hold true for the one- and two-family dwelling. There simply are not enough construction tradeoffs available in the national building codes to offset the cost of installing fire sprinklers in the one- and two-family dwelling.
- The authors claim “Assuming that there are no impact fees or other governmentally imposed taxes, fees, or other cost drivers that will escalate the cost of the fire sprinkler system, a 1% increase in the cost of construction appears to be an appropriate measure of the impact of installing residential fire sprinklers in new homes.” The reality is that these associated costs are required and are directly tied to the overall installation cost for the system which will exceed the estimated 1% cost of construction.
- The academic argument presented that a 1% increase in the cost of a new home would not prohibit potential buyers is contradicted by the real world situations that realtors and financial lending institutions deal with on a daily basis when they must steer buyers away from homes that are out of their price range.

Siarnicki, Ronald Jon, 2001. ***“Residential Sprinklers: One Community’s Experience Twelve Years after Mandatory Implementation: Executive Leadership.”*** Prince Georges County.

NAHB Summary-

- The studies conducted in Scottsdale, Arizona and Prince Georges County Maryland both make the claim that the fire suppression system is responsible for saving over 170 people. In the reports there is no mention to the importance that smoke alarms played in these fires scenarios and the contributions made in saving those lives.
- In January of 2007, NIST issued a report that documented the performance of residential smoke alarms in residential fire settings. Test that were simulated and recorded by the NIST technicians and scientist included some scenarios where residential type sprinklers were present. In several of the tests it was recorded that the sprinklers activated well

after the alarms activated, which would provide the early warning needed to escape before untenable conditions were achieved.

*The Report states "It is now a proven fact, through the Prince George's County experience, that in all 117 fire related cases, as part of this research, the buildup and accumulation of toxic fire gases and heat was prevented by the activation of either one or two residential sprinkler heads. This is supported by the fact that no one individual, out of the 154 that were present at the time of these reported fire occurrences or seven that were injured in these 117 fire cases, was overcome by smoke or, more tragically, succumbed to the devastating effects of the fire. Compared to the obvious number of injuries, both smoke inhalation and burns that resulted to the group of citizens that resided in non-sprinklered structures, 22 reported deaths and 46 significant burns and smoke related injuries that occurred in just four short years."*²

- While the report provides some information on the fire incident, it does not go into any great detail describing the criteria used to determine if the sprinkler system was the primary factor responsible for the safe evacuation of the people in the dwelling unit.

*The Report also states "The criteria utilized by the Department, at the time of completing this activation report, was based upon the numbers of people that were in close proximity of the fire's origin or were in the immediate areas of the living unit where the fire occurred."*²

- No clear definition was provided for what was considered "close proximity" or "in the immediate areas of the living unit". What alerted the occupant that there was a fire? Was a smoke alarm present? Was it working? And what about those one- and two-family dwellings where there was a fire fatality, did they have working smoke detectors? Were the occupants capable of self preservation? Were they sleeping or awake?
- For those who have read the documentation available about smoke alarms performance, fire suppression systems and the victims of fire fatalities it is clear that there are several factors that will affect the outcome of a structural fire, none of which is provide in great detail in the Prince George report to give an accurate appraisal of the fire sprinkler system.

United States Fire Administration. 2008. ***“Residential Fire Sprinklers.”***
Emmitsburg: FEMA.

https://www.usfa.dhs.gov/downloads/pdf/sprinkler_position_paper.pdf

NAHB Summary-

- In the position paper for the USFA administration acknowledges that there is a decreasing trend in the number of fires and fire fatalities since 1977.
- While the decrease has shown a slight plateau over the past ten years, there is no evidence that supports the USFA assumption that there is a link between the reduction in the available escape time based on new furnishing as discussed in the NIST technical note 1455.
- Furthermore the USFA administration failed to also explain that the NIST TN also reported that today’s smoke alarms provided more than enough time to provide safe egress based on the required egress time for occupants and the time that untenable conditions were reached.
- The report also concluded that in those test where sprinklers were present, they responded long after the smoke alarms had detected and alerted the occupants of a fire.
- One of the goals of the USFA administration is to reduce life and economic losses due to fire, however mandating sprinklers in new construction will not meet either of these two goals. The only effective way to reach these goals is to provide more fire prevention education to US citizens and to promote the use of hard-wired interconnected smoke alarms in existing homes.

Technical Issues

Brown, Heyden. 2005. ***“Economic Analysis of Residential Fire Sprinkler Systems.”*** Gaithersburg: U.S. Department of Commerce Technology Administration, National Institute of Standards and Technology.

<http://fire.nist.gov/bfrlpubs/fire05/PDF/fo5085.pdf>

NAHB Summary-

- The only associated costs for the automatic fire suppression systems analyzed in this report consisted of the design, labor and bare material. There were several additional costs that are associated with a residential fire sprinkler system that were excluded. (IE increased service line, additional meters, final connections to water service, permitting fees, mark-ups from distributors, contractors, tanks and pumps).
- This academic approach to qualify residential sprinklers on an economic basis fails to include future replacement and maintenance cost that will be incurred over the lifetime of the home without assessing the fact that many of these homes will never suffer the effects of a fire that will activate the system.

Butry, D. T.; Brown, M. H.; Fuller, S. K. 2007. ***Benefit-Cost Analysis of Residential Fire Sprinklers.*** Gaithersburg: U.S. Department of Commerce Technology Administration, National Institute of Standards and Technology. <http://fire.nist.gov/bfrlpubs/build07/PDF/bo7025.pdf>

NAHB Summary-

- *The NIST report has stripped the cost of the sprinklers down to the bare material cost (prior to mark-up), labor and design to achieve the lowest value possible for a sprinkler system.*
- The system that was chosen for the study was a multipurpose system, which according to a previous report by Brown, was the least expensive of all the systems that can be installed in a one- and two-family dwelling. The multi-purpose system is limited in applicability and is only cost effective when the existing infrastructure can provide the required water supply. The other systems were excluded from this study because of the expenses associated with backflow prevention devices and other costly items such as booster pumps, additional storage tanks, yearly maintenance of anti-freeze system, inspection of dry-systems which could not be proven to be cost-beneficial.
- *The NIST report only estimates the costs for a multipurpose network fire sprinkler system into an existing cold-water plumbing system, the minimum standard required by NFPA 13D.*
- A multi-purpose system is not the most widely used and is not accepted by local water purveyor that require a mechanical separation between the fire suppression system and the domestic water system. A backflow preventer cost about \$200 to purchase and about \$100 per year to inspect. This alone would be sufficient to push the cost of fire sprinklers above the estimated benefits.

Ford, Jim. 1997. ***Saving Lives, Saving Money: Automatic Sprinklers: a 10 Year Study: A Detailed History of the Effects of the Automatic Sprinkler Code in Scottsdale, Arizona.*** Frankfort: Home Fire Sprinkler Coalition.

NAHB Summary-

- Over the ten year period 19,649 (35%) of the total of 57,301 available one and two family dwellings were equipped with sprinklers. During that time a fire was reported to have occurred in 18 (0.0009%) of those single family dwelling units. Of the reported 598 fires in residences, 18 of which occurred in sprinklered single family homes.
- Through circular logic, it is suggested that in the ten years that sprinklers were required in Scottsdale there were 13 lives that were lost in non-sprinklered homes and no lives were lost in the sprinklered homes,

therefore proponents suggest that sprinklers saved the lives of 13 people. One must look carefully at the circumstances surrounding those 13 fatalities. Were there smoke alarms present and if so did they operate? As stated before, often proponents fail to mention smoke alarms and the roles they play in alerting occupants that there is a fire.

- If you look carefully at the Scottsdale Report, at the end of the first ten years there were 19,649 homes that were required to be sprinklered. Over the ten year period the cost to install a sprinkler system in a 2,000 square foot house started at \$1.14/psf and dropped to \$0.59/psf. That means for a 2,000 square foot home it cost \$2,280 in 1986 and in 1996 it cost \$1,180 to install a sprinkler system, which averages \$1,713.
- Using the average cost over the ten years would put the total cost of installing the sprinkler systems in all 19,649 homes around \$33,658,000 (not including any profit or mark-up figured in of course). The study states that there was a potential loss \$5,393,000 that could have occurred had the sprinklers not been installed, \$28,265,000 less than what was spent on average to install.

Dwelling units equipped with Sprinklers	19,649	Number of fires in protected dwelling units	18	Percentage of fires in protected	.0009%
Total cost to install sprinklers	\$33,658,000	Total potential loss	\$5,393,000	Total spent in excess of potential damages	\$28,265,000

Impact

Butry, D. T.; Brown, M. H.; Fuller, S. K. 2007. **“Benefit-cost Analysis of Residential Fire Sprinklers.”** Gaithersburg: U.S. Department of Commerce Technology Administration, National Institute of Standards and Technology. <http://fire.nist.gov/bfrlpubs/build07/PDF/bo7025.pdf>

NAHB Summary-

The credibility of any cost-benefit analysis depends ultimately on the accuracy of the basic assumptions that determine the value of cost and benefit estimated values. The conclusions in the NIST report are based on a large number of questionable or unjustified assumptions. In each case, the effect of one of these assumptions has been to reduce the estimated cost of fire sprinklers’ installation and maintenance, or to increase their estimated benefits. It would appear that each of these assumptions were predestined to lead to the necessary to the report’s conclusion. In fact, only slight changes to these assumptions demonstrate that sprinklers are uneconomical.

- The system that was chosen for the study was a multipurpose system, which according to a previous report by Brown, was the least expensive of all the systems that can be installed in a one- and two-family dwelling.
- The multi-purpose system is limited in applicability and is only cost effective when the existing infrastructure can provide the required water supply.
- The other systems were excluded from this study because of the expenses associated with backflow prevention devices and other costly items such as booster pumps, additional storage tanks, yearly maintenance of anti-freeze system, inspection of dry-systems which could not be proven to be cost-beneficial.
- A multi-purpose system is not the most widely used and is not accepted by local water purveyor that require a mechanical separation between the fire suppression system and the domestic water system.
- A backflow preventer cost about \$200 to purchase and about \$100 per year to inspect. This alone would be sufficient to push the cost of fire sprinklers above the estimated benefits.
- Throughout the analysis, the NIST report assumes that the value of a statistical life is \$7.94 million (p.14). Although assigning a value to a statistical life is difficult, a value of almost \$8 million seems quite high. It translates into more than 160 years of income for a person earning Census Bureau's latest estimate of median household income: \$48,451 per year.
- According to Building and Fire Research Laboratory (BFRL website), if sprinklers were mandated in 100% of the homes in the US the cost per life saved would be close to \$35 million.
- The cost per life saved is a crucial value of the overall cost to society, much as the cost values given to injuries averted in the analysis. Where is the justification for the spending of \$35 million per life saved when the assumed statistical value of a life is \$8 million?

Home Fire Sprinkler Coalition. ***“New National Survey Shows a Majority of Homeowners Believe that Fire Sprinklers Increase a Home’s Value.”***
Frankfort.

NAHB Summary-

- Only 45% of the respondents agreed that homes with sprinklers were more desirable, which last time we checked was still a minority.
- Only 38% said that they would most likely purchase a new home with sprinklers rather than a home without sprinklers, which reiterates NAHB claim that homeowners are not requesting sprinklers in their homes.

National Fire Protection Research Foundation. **“Home Fire Sprinkler Cost Assessment”**

NAHB Summary-

- According to the report, only one out of the ten communities offered any type of incentive or trade off for the sprinkler system in the construction of the development or the structure. One of the most discouraging findings in this report, was that many of these communities have added additional requirements that went above and beyond the minimum requirements of NFPA 13D. IE requiring water flow switches and alarms that must be monitored, backflow preventers when the system is connected to the potable water source, and sprinklers in the garage area even when separated by a layer of fire resistive drywall.
- Another disappointing finding deals with the so called “Insurance Premium Reductions”. According to the report, insurance companies that offer a reduction will base the reduction offered depending on whether the dwelling is “partially” protected or “fully” protected. A “fully” protected dwelling will have sprinklers in all areas of the house including crawlspaces/basements whether they contain fuel fired appliances or not, all bathrooms and closets regardless of size, and several companies required that the system be monitored by an alarm.
- According to the insurance industries definition protection, a system installed in compliance with NFPA 13D would be quantified as a “partially” protected dwelling and would not qualify for the larger reductions. Furthermore, according to this report, homeowners can also receive these same reductions for having a security system, deadbolts, fire extinguishers or a monitored fire alarm system.
- The report also probed into the concerns of what would happen in the event of an accidental discharge of the system. According to ISO, while insurance some companies routinely treat sprinkler piping the same as plumbing, if the system leaks and is determined to be due a failure to maintain the system, the claim can be denied. Furthermore, there are several insurance companies that offer additional policies to cover the accidental sprinkler discharge when there is no fire present.