

COMMUNITIES with HOME FIRE SPRINKLERS:

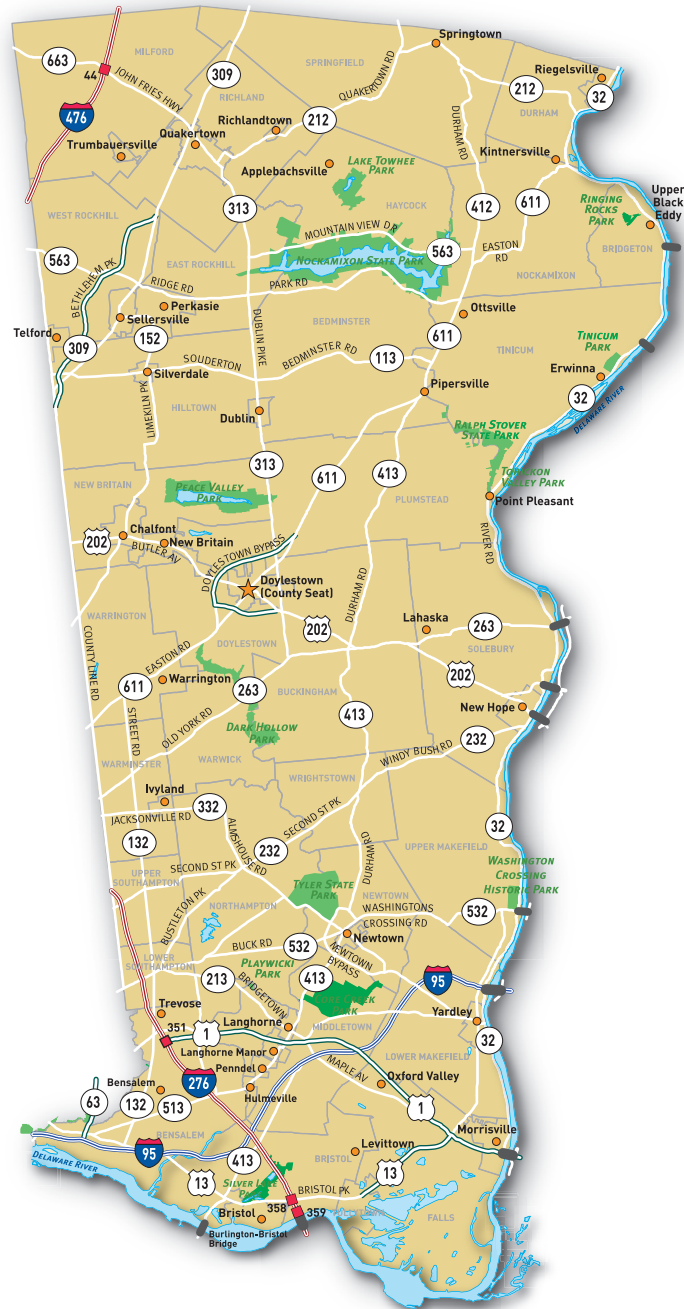
The Experience in
Bucks County,
Pennsylvania

BUCKS COUNTY PENNSYLVANIA



Produced in collaboration with
the Bucks County Fire Marshals
Association for the Home Fire
Sprinkler Coalition (HFSC)

Fire Planning Associates, Inc.
Washington Crossing, PA
November 2011



Bucks County, Pennsylvania



Home Fire Sprinkler
COALITION
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This review could not have been completed without the significant cooperation of the members of the Bucks County Fire Marshals Association, particularly those in the communities listed in this report, who provided great assistance with data collection and historical perspective of residential sprinkler requirements and installations in the County.

Executive Summary

Fire sprinkler systems have been saving lives, preventing injuries and limiting property loss since the mid 1800s. Initially used in manufacturing and commercial structures, over time the technology's unique protective qualities were extended to other occupancies, including residential structures. This is fortunate; homes have for decades been where the vast majority of structural fire deaths occur and that fact remains

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true today. In 2011, the National Fire Protection

Association's (NFPA) 2010 fire loss survey showed that home fires accounted for 85% of all civilian fire deaths.

Fire sprinklers are uniquely suited to protecting occupants of homes. Most fatal home fires occur at night, when people are typically sleeping. Working smoke alarms provide an early warning that can alert or awaken occupants so they can deploy their escape plan. However, smoke alarms can only detect and signal a fire; they do nothing to control it. Survival is dependant upon the occupants' willingness and ability to quickly and appropriately respond (normally, to escape).

When a fire occurs in a home with a fire sprinkler system, the heat from that fire quickly activates the sprinkler closest to the fire (not the entire system). That action controls the fire while it is still small, and in many cases extinguishes it. Controlling a fire in this incipient stage limits the spread of deadly heat and smoke, and prevents flashover (the point at which everything in the room ignites). Sprinklers give occupants a safe window of opportunity to escape the fire. This added time is especially valuable for the most vulnerable populations – young children,

older adults, and people with disabilities that limit their mobility.

This report looks at home fire sprinkler installation in six municipalities in Bucks County, Pennsylvania. These municipalities were selected because sprinkler installation was required in those jurisdictions at varying times over several decades. That widespread use provided our researchers with a unique picture of home fire sprinkler installation and the opportunity to compare that experience with homes in the same municipalities that do not have sprinklers installed.

The six municipalities include Buckingham Township, Ivyland Borough, New Britain Township, Warrington Township, Warwick Township and Wrightstown Township. Each is located in the central portion of the County, and has undergone significant growth since the 1980s. The jurisdictions range from rural to suburban, with and without public water service.

This report focuses on the life safety advantages of installing home fire sprinkler systems, primarily the prevention of civilian fire deaths. Some attention is also given to the additional benefits of the technology, including injury prevention (civilian and firefighter), reduced tax rates and lower capital expenditures for community fire protection. Because most discussions about installing fire sprinkler systems in new homes include a debate about added costs, our report also investigated this aspect and reviewed the impact the systems have had on development in the six communities.

Our study illustrates many ways in which home fire sprinkler system installations have become an important part of the community fire protection plan for these jurisdictions. Most importantly, we recount the documented "life saves" that resulted when fires occurred in sprinklered homes.

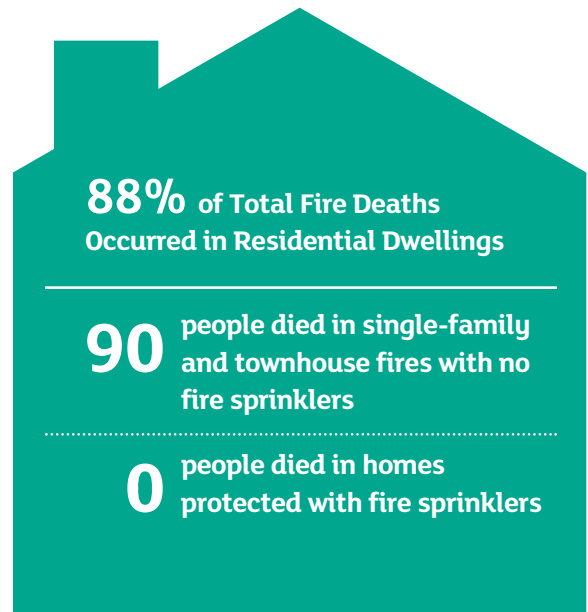
Executive Summary *(continued)*

Overall, there were 90 fire deaths in unsprinklered one- and two-family dwellings in Bucks County from 1988-2010 (88% of all County fire deaths during that time frame), with no fire deaths occurring in sprinklered dwellings. Five fire incidents in sprinklered homes have been documented as saving at least five lives.

The average property loss in the sprinklered-home fire incidents was \$14,000, with an average of 340 gallons of water used to extinguish the fires. These incidents can be compared to 51 fires in un-sprinklered homes in the six studied municipalities from 2005-2010, in which the average fire loss per incident was \$179,896 and for those fires where water usage data was available, an average of 5,974 gallons (nearly 25 tons) of water was needed to extinguish the fires. ❖

This report was prepared by Fire Planning Associates, Inc., for the Home Fire Sprinkler Coalition (HFSC), an independent 501(c)(3) educational organization.

Bucks County Fire Death*



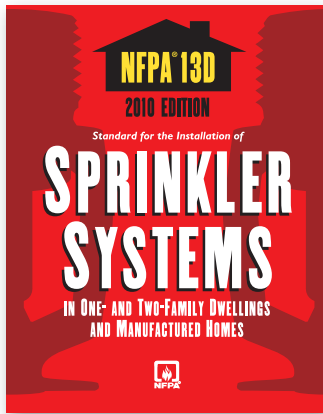
**1988–2010 data*

Bucks County Costs of Fires Sprinklered vs. Unsprinklered

Fires in Homes with Sprinklers	Fires in Homes Without Sprinklers
\$14,000 average total loss	\$179,896 average total loss
340 gallons of water used per fire	5,974 gallons of water used per fire

Report Scope

The scope of this report covers homes that are sprinklered in compliance with the National Fire Protection Association's NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*. In this report, the following definitions apply from the 2010 Edition of NFPA 13D:



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Dwelling – “Any detached building, or any part of a townhouse structure that is separated from the remainder of the townhouse structure with fire resistance rated assemblies in accordance with local building code, that contains no more than two dwelling units intended to be used, rented, leased, let, or hired out to be occupied or that are occupied for habitation purposes.”

Dwelling Unit – “One or more rooms, arranged for the use of one or more individuals living together, as in a single housekeeping unit, that normally have cooking, living, sanitary, and sleeping facilities.”

Manufactured Home – “A structure, transportable in one or more sections, which, in the traveling mode, is 8 body-ft (2.4 m) or more in width or 40 body-ft (12.2 m) or more in length or, when erected on site, is 320 ft² (29.7 m²) or more and which is built on a permanent chassis and designed to be used as a dwelling, with or without a permanent foundation, when connected to the required utilities, and includes plumbing, heating, air-conditioning, and electrical systems contained therein; except that such terms include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the regulatory agency. Calculations used to determine the number of square feet in a structure are based on the structure's exterior dimensions, measured at the largest horizontal projections when erected on site. These dimensions include all expandable rooms, cabinets, and other projections containing interior space, but do not include bay windows.”

Demographics – About Bucks County

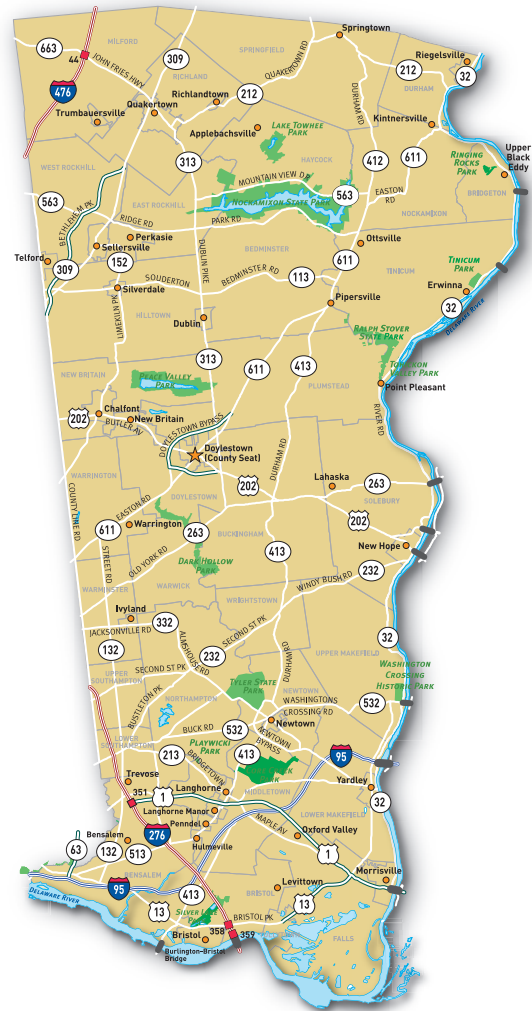
Founded in 1682 by William Penn, Bucks County has had a long and distinguished history. Penn named the county after Buckinghamshire, the Penn family home in England. The County was the launching ground at Washington Crossing for the turning point in the American Revolution, and the location of Levittown, a sprawling development of more than 17,000 homes in the lower (eastern) end of the County in the 1950s.

Bucks County is famous nationally for its historic sites, including the Mercer Museum, Washington Crossing Historic Park, Pennsbury Manor, and Pearl S. Buck House. It is also a very diverse county – ranging from rural farmlands and small towns, to moderately size townships, to some areas that can be considered urbanized. Bucks County comprises roughly 608 square miles of land and 15.8 square miles of water. There are approximately 626,000 residents within 23 boroughs and 31 townships.

Bucks County is protected by a primarily volunteer fire service – generally fire companies that are independent of municipalities – that operate out of 85 stations. There are several career fire companies that operate during weekday hours. ❖

INFORMATION SOURCE/CREDIT:

<http://www.buckscounty.org/about/index.aspx>



Similar Bucks County Fires – Dissimilar Outcomes

Case Study 1: Fire In Unsprinklered Home Kills One, Fire In Sprinklered Home Saves One Life

In January 2008, a 53-year-old Doylestown Borough resident called 9-1-1 to report that the bed she was in was on fire and she could not get out of it. This incident was widely publicized, receiving national attention because the resident

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was placed “on hold.” However, police did arrive at the residence within two minutes of receipt of the 9-1-1 call, and initial arriving firefighters began rescue attempts two to three minutes after that. Unfortunately, firefighters were initially driven back by fire conditions and the woman perished. The fire caused thousands of dollars in damages. Firefighters spent hours on the scene, and the investigation and related media relations lasted for weeks.

Ironically, a very similar incident occurred prior to the Doylestown fire, just a few miles away. The fire occurred in a sprinklered Warwick Township home, where a 74-year-old woman with limited mobility was asleep in bed. Her bedding and the padded headboard began to burn. The fire produced enough heat to activate the residential fire sprinkler system. One sprinkler activated and controlled the fire. The water spray woke her up. She was scared and wet, but unhurt. The fire was extinguished within an estimated 30 seconds after the sprinkler activated. There was minor cosmetic damage to the home, but with some new drywall, carpet and paint, the woman was back in her home in two weeks. There were no structural damage or lingering odors in the

home. Firefighters cleared the scene in well under one hour.

This incident was covered in a single paragraph on page three of the second section of the local newspaper. The emergency lasted just a few seconds, and was controlled by a residential sprinkler system that was required by Warwick Township ordinance.

These incidents occurred a few miles apart and shared many similar pre-fire conditions. In both cases:

- the fires occurred during daytime hours
- the occupants lived alone
- the occupants had medical conditions that impaired their movement ability
- age of the home had no impact on the origin or spread of the fires

While the pre-fire conditions were very similar, the presence of a home fire sprinkler system in the Warwick Township home drastically altered the results of that incident. There is no question that the residential sprinkler system saved the life of the occupant. ❖

Source: Research paper authored by Kelli Scarlett, Doylestown Borough, and Ed Pfeiffer, Warwick Township

Similar Bucks County Fires – Dissimilar Outcomes *(continued)*

Case Study 2: Fire In Unsprinklered Home Results In Devastating Loss, Fire In Sprinklered Home Saves Christmas

On Christmas Day, 2009, in the Rushland section of Wrightstown Township, a residential fire sprinkler successfully extinguished a fire using less than 300 gallons of water in under seven minutes. The home was built in 2005. The

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homeowners, who were preparing for their holiday

celebration in the early afternoon, were alerted to the fire by the activation of the sprinkler alarm in the house which signaled to indicate water flow. They discovered an active fire spreading up the walls from the initial point of origin and evacuated the home safely. Upon the arrival of the fire department, the fire was already extinguished. Fire damages were estimated at a total of \$12,000. The nearest fire hydrant was more than a mile from the house, and the fire department estimates that damages would have been at least 15 times greater if the home had not been equipped with residential fire sprinklers. Firefighters cleared the scene, and the home's occupants returned to their holiday celebration within 33 minutes from the time the 9-1-1 call was received.

In August 2010, a late afternoon fire occurred in a Buckingham Township home that was built six years prior to the township's adoption of a residential sprinkler ordinance. Heavy smoke could be seen within the neighborhood at the time firefighters were initially dispatched, and heavy fire was showing on arrival of the first fire officers approximately six minutes later. The

Buckingham fire required more than 65,000 gallons of water to extinguish the fire, which caused an estimated \$1.5 million in damages. Fire spread quickly throughout the unsprinklered house and firefighters were on the scene for well over six hours.

These incidents occurred a few miles apart and shared many similar pre-fire conditions. In both cases:

- the fires occurred in the daytime while residents were home
- the fires occurred in areas not provided with fire hydrants, requiring the fire department to tank water to the scene
- the fires occurred in homes of a similar size, built 12 years apart

In just this one Rushland incident, residential fire sprinklers saved hundreds of personnel hours by the fire department (firefighters were on the scene of the Buckingham fire for over six hours, and had to return later to extinguish smoldering hot spots), at least \$168,000 in damages, and as much as 64,000 gallons of water along with the equipment/fuel needed to apply that water. Ironically, the Buckingham Township home that burned is being replaced by the same model, which will now be sprinklered in accordance with NFPA 13D. ❖

Buckingham Township

Home fire sprinkler ordinance implemented June 1999

Buckingham Township was opened to settlement at the beginning of the 1700s. Physically, Buckingham is the largest township in Bucks County, covering 33 square miles. Its geography is dominated by Buckingham Mountain, which rises to a height of 520 feet, but its landscape is characterized by gently rolling countryside.

Agriculture has been Buckingham’s principal industry since its founding, and the Township still retains a strong farm community. However, since the mid-1970s, there has been a substantial shift in the landscape from rural to suburban. New needs have accompanied the change in character, and the growth has placed additional demands on emergency services. The Township has a 2009-estimated population of 19,674 – significant growth from 16,442 in 2000 and almost 9,000 in 1980. There are 6,945 homes (Bucks County Board of Assessment Real Estate Land Use Classification Report 1/5/11), with an estimated real estate market value in 2009 of more than \$3 billion.

For about 100 years, Buckingham Township was protected by three fire stations – one located inside of the Township, and two others located just outside of it. Due to growth, in 1982, an additional fire station was added in a garage in the central portion of Buckingham Township, ultimately moving to a new purpose-built fire station in the fast-developing northern end of the Township in 1997. Also in 1997, another small fire substation was added in the southern end of the Township, where rapid development was experienced beginning in 2000.

Home fire sprinkler systems in Buckingham Township are supplied either by the public water system (where available) or by on-site pump and tanks or other similar stand-alone systems.

Buckingham Township enacted its sprinkler ordinance on June 25, 1999. The ordinance requires sprinklers in all buildings, including residential occupancies (known as Use Group R-3). The ordinance also requires the installation of residential sprinklers in certain home expansions of 50% or 2000 square feet or more over the life of the building since the date of the ordinance.

RECENT BUILDING HISTORY IN BUCKINGHAM TOWNSHIP:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1996	401	38,200,000
1997	331	40,600,000
1998	271	37,100,000
1999*	198	29,500,000
2000	127	20,900,000
2001	144	25,600,000
2002	202	30,600,000
2003	203	45,000,000
2004	173	24,300,000
2005	208	28,900,000
2006	148	22,900,000
2007	165	21,900,000
2008	59	11,000,000
2009	58	8,700,000

**Home fire sprinkler ordinance adopted June 25, 1999*

Note: Data is mix of estimate and reported from the US Census

Of the 6,945 homes in the Township, 800, or 11.5%, have installed residential sprinkler systems as of December 31, 2010. U.S. Census statistics show that 763 homes in the Township were built in 1939 or earlier. These same statistics indicate 330 homes were built in the Township in the 20 years from 1940-1959, 1,216 homes were

Buckingham Township *(continued)*

built in the 20 years from 1960-1979, 698 homes were built in the 10 years from 1980-1989, and a building boom occurred in the 1990s, with the Township growing by 2,716 homes – 64% residential growth in a single decade. This growth presented a significant strain on the Township’s infrastructure – two fire stations had already been added. The fire sprinkler requirement was implemented as a method to control the community’s fire risk, which was increasing as a result of this growth. Since the residential sprinkler ordinance was enacted, \$250 million in new residential construction (cost of construction) has been invested in Buckingham Township, with new homes exceeding 10% growth through the ensuing decade. This statistic indicates that the residential sprinkler requirement has not affected new development in Buckingham. More than 700 of the homes built since 1999 are in the Furlong section of the Township – a section farthest (more than three miles) from a fire station that is able to provide reliable service around-the-clock. More than 450 of those homes are sprinklered, which has reduced the risk and demand on the fire service in that part of the Township.

It should be noted that about the time the residential sprinkler ordinance was implemented, one large developer had filed a lawsuit against Buckingham Township related to the development process in general, and perceived delays in the approval process. The lawsuit was settled with a number of concessions, including that this developer was exempted from the requirement to install sprinklers in several of its developments in the Township.

This developer built a major townhouse development (“Townhouse Development 1” – 386 units) in the Southwest portion of the Township,

and the sprinkler exemption applied to this development. However, as these townhouses were developed, 109 of them had “tuck under” garages/finished basements or lofts. This created additional levels that made these homes essentially four stories in height, thus requiring sprinklers under the International Building Code requirements. Ultimately because of the additional story, these 109 townhouses (28% of the development) were sprinklered.

The same main street that runs through Townhouse Development 1 also runs through a directly adjoining development of 199 townhouses being built by a different developer (“Townhouse Development 2”). Townhouse Development 2 had all homes built in accordance with the residential sprinkler ordinance.

Townhouse Development 1 (386 townhouses, advertised as unsprinklered):

- Advertised square footage: 1,979 – 2,413
- Advertised pricing: \$384,995 – \$445,995
- Advertised price per square foot, unsprinklered: \$194.54 – \$184.83

Townhouse Development 2 (199 townhouses, sprinklered):

- Overall Price Range: \$359,990 – \$415,990
- All Models (Interior Units) square footage: 1,763 – 2,205
- All Models (Interior Units) pricing: \$359,990 – \$390,990
- All Models price per square foot: \$204.19 – \$177.32

Buckingham Township *(continued)*

- Model B (similar in size to Development 1):
\$366,990
 - Interior Unit at 1,873 sq. ft.
 - Advertised price per square foot, sprinklered:
\$195.94
- Model B (similar in size to Development 1):
\$381,990
 - Interior Unit with Walk-out Package
at 2,338 sq. ft.
 - Advertised price per square foot, sprinklered:
\$163.38

Pricing was obtained on the same day in 2010, and actual pricing on literature for specific homes in Development 1 included: \$359,665 ("Spotlight price – only 1 available, valued at \$411,665, still time to customize"); \$394,451; and \$454,882. Actual pricing on literature for specific homes in Development 2 included: \$366,990; \$371,900; \$390,990; \$391,900; and \$416,990. These townhouse developments, built at the same time in the same municipality with the same public water and sewer system and other infrastructure, have one difference – Development 2 included home fire sprinkler systems, as required. In actuality, there is little or no pricing difference in comparable townhouses in these two developments, despite the fact that Development 2 was required to install sprinklers in every home.

There have been no civilian or firefighter fatalities at residential fires in Buckingham Township since 1988, although one civilian died at a fire scene due to causes not attributable to the fire. During the same period, there were 90 fire deaths in Bucks County homes. In the period from 2005-2010, there have been 18 dwelling fires in Buckingham Township requiring the fire department to go into service to extinguish. The total loss at these fires was over \$5 million, with the average loss \$283,983 (fire loss data did not fully account for contents losses, which were likely significant, at several of the fires), and the average amount of water required to extinguish these fires was 7,493 gallons – or more than 31 tons of water per fire. It should be noted that two of the three fire departments protecting Buckingham Township use compressed air foam (CAFS) to fight fires, which has been found to reduce the amount of water needed for extinguishment.

Buckingham has not yet experienced any reported fires in homes protected by a sprinkler system, although a fire that occurred in the Township in 2009 was in a home that was being expanded and a residential sprinkler system was in the process of being installed. The fire resulted in \$175,000 in damage, and the residential sprinkler that was installed in the area of origin fused, but it was not yet connected to a water supply. The sprinkler likely would have extinguished the fire very early on had the water supply been connected.

The fire tax rate in Buckingham Township is \$0.75 per \$1,000 assessed value. The average home in Buckingham Township of types covered in this report is assessed at \$50,190 (2011 Bucks County Board of Assessment report), with \$38 in annual fire tax. ❖

Buckingham Township *(continued)*

INFORMATION SOURCES/CREDITS:

www.buckinghampa.org

http://factfinder.census.gov/servlet/STTable?_bm=y&-geo_id=06000US4201709816&-qr_name=ACS_2009_5YR_G00_S2501&-ds_name=ACS_2009_5YR_G00_

<http://www.auditorgen.state.pa.us/Department/Info/Fire/2009StateAidMunicipalities.pdf>

<http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl>

<http://www.buckscounty.org/government/departments/finance/boardofassessment/LandUseClassificationReport2011.pdf>

Ivyland Borough

Home fire sprinkler ordinance implemented May 2000

Ivyland is a uniquely historic area, described as “perhaps the finest collection of Victorian buildings in the State.” Much of the Borough is listed on the National Register of Historic Places, with residential building in the Borough beginning in the 1870s. Ivyland Borough is also an interesting mix of the old and new. There may be nowhere that this is better exemplified than the Ivyland Borough Hall building, which is believed to be built in the 1890s. Ivyland Borough Hall is a beautifully renovated building that is typical of the Victorian-style legacy residences in much of the Borough. Walking into the Borough building gives a feel for what life must have been like 100 years ago, and the building has been meticulously renovated to appear much like it must have when built. Ironically, the previous Borough Hall was gutted by fire in 1998, resulting in the loss of many of the Borough’s records. When the current building was renovated into Borough Hall, it was protected by a sprinkler system.

Ivyland Borough covers 0.35 square miles in the South central portion of Bucks County, with an estimated current population of 805 (2009), and an estimated real estate market value of \$118 million (2009). The 2000 Census shows 199 total homes in Ivyland Borough. Borough statistics indicate that 141 homes have been built since the residential sprinkler ordinance was adopted in May of 2000 for a total number of 340 homes in the Borough. Ivyland is among the smallest boroughs in the Commonwealth of Pennsylvania.

In 1996, the closure of the 750-acre Johnsville Naval Air Development Center, portions of which were in both Warminster Township and Ivyland Borough, resulted in an opportunity to develop a significant percentage of the Borough that was

previously government land. At the same time, this development presented an opportunity to protect a significant percentage of Ivyland Borough homes with home fire sprinklers.

Ivyland Borough adopted Ordinance No. 2000-6 on May 24, 2000, that states, “...the adoption of the BOCA National Building Code, 12th edition, 1993, adopted as the Building Code of Ivyland Borough, is amended as follows:”

The following section is added:

“An automatic fire suppression system shall be provided throughout all new or substantially reconstructed buildings with an occupancy in Use Group R-3... For purposes of this section, ‘substantially reconstructed’ shall mean that the total reconstruction or repair cost shall be greater than one-half of the value of the building before reconstruction.”

Borough records indicate that from 2000-2010, 141 new homes were built in Ivyland (with three more currently planned) and sprinklered, resulting in 41.5% of the Borough’s housing stock, as of December 31, 2010, being protected by residential sprinklers. Ivyland Borough is provided with public water, and the home fire sprinkler systems are supplied by the public water system.

(see chart on next page)

Ivyland Borough *(continued)*

RECENT BUILDING HISTORY IN IVYLAND BOROUGH:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1996	3	240,000
1997	0	0
1998	0	0
1999	0	0
2000*	1	124,000
2001	3	284,000
2002	51	4,850,000
2003	35	3,780,000
2004	37	3,970,000
2005	8	815,000
2006	0	0
2007	0	0
2008	0	0
2009	0	0

**Home fire sprinkler ordinance adopted May 24, 2000*

Note: Data is estimate from information from Ivyland Borough employees, review of number of homes built, and general estimate based upon US Census.

According to an interview with Ivyland Fire Chief Jeff McAllister on September 28, 2010, there have been no residential dollar loss fires, nor civilian or firefighter injuries or deaths in sprinklered or unsprinklered homes in Ivyland Borough since 1998. During the same period, there were 90 fire deaths in Bucks County homes.

Census statistics show that 83 homes in the Borough were built in 1939 or earlier. These same statistics indicate that no decade since then has seen more than 20 homes built, except in the decade immediately following the adoption of the residential sprinkler ordinance through December 31, 2010, during which 141 homes were built. Based on this information, there has been no negative impact on development in Ivyland Borough since the residential sprinkler ordinance was adopted. ❖

INFORMATION SOURCES/CREDITS:

<http://www.ivylandborough.org/>

<http://www.auditorgen.state.pa.us/Department/Info/Fire/2009StateAidMunicipalities.pdf>

http://factfinder.census.gov/servlet/ACSSAFFacts?_event=&geo_id=16000US4237304&_geoContext=01000US%7C04000US42%7C16000US4237304&_street=&_county=ivyland%2C+pa&_cityTown=ivyland%2C+pa&_state=&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=160&submenuId=factsheet_1&ds_name=null&_ci_nbr=null&q_r_name=null®=null%3Anull&_keyword=&_industry=

<http://censtats.census.gov/cgi-bin/bldgprmt/bldgdisp.pl>

New Britain Township

Home fire sprinkler ordinance implemented June 1999

New Britain Township was founded in 1723 and celebrated its 275th birthday in 1998. The Township comprises more than 15,000 acres and includes land that is now occupied by Chalfont and New Britain boroughs as well as Doylestown Township. The Township currently encompasses 14.7 square miles. According to historical research conducted by Township volunteers, it is estimated that the Lenni Lenape Indians arrived in New Britain Township as early as 1397. The current U.S. Route 202 corridor was a main route for travelers as early as 1730. In 1778, George Washington's troops are said to have marched through the Township on their way to Monmouth, New Jersey from their camp at Valley Forge.

The Township has a 2010 population of 11,070, and 3,862 homes (Bucks County Board of Assessment Real Estate Land Use Classification Report 1/5/11), with an estimated 2009 real estate market value of \$1.32 billion. New Britain Township is generally provided with a public water system where new homes have been constructed. Homes in approximately 10% of the Township have water supplied from individual residential wells. Residential sprinkler systems in the Township are supplied either by the public water system (where available) or by on-site pump and tanks or other similar stand-alone systems.

New Britain Township adopted Ordinance No. 99-06-01 on June 28, 1999, which required a NFPA 13D sprinkler system in all R-3 and R-4 one- and two-family dwellings.

As of December 31, 2010, there are 303 properties in New Britain Township with residential sprinkler systems installed out of 3,862 (per Bucks County Tax Records) or 7.8%. The breakdown of the sprinklered homes is: 24 manufactured homes per HUD requirements

resting on pier foundations; 187 single-family dwellings; two twin-family dwellings; 58 privately-owned townhouses; and 32 executive rental townhouses.

RECENT BUILDING HISTORY IN NEW BRITAIN TOWNSHIP:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1996	27	3,754,000
1997	16	2,003,000
1998	5	1,155,000
1999*	61	5,736,000
2000	15	2,696,000
2001	9	2,765,000
2002	25	6,679,000
2003	10	4,785,000
2004	36	12,852,000
2005	42	15,607,000
2006	96	22,049,000
2007	30	12,175,000
2008	15	5,920,000
2009	1	350,000

**Home fire sprinkler ordinance adopted June 28, 1999*

Note: Data is estimate based on local information and US Census.

Since 1988, three civilian fatalities have occurred in residential fires in New Britain Township, while 90 have occurred in Bucks County homes during the same time period. All of the fatalities were at unsprinklered homes. No firefighters have been injured over that time period while responding to residential fires, and New Britain Township has yet to experience its first reported home sprinkler activation, although they have had a successful sprinkler activation in a condo unit that is not directly included in the

New Britain Township (*continued*)

one- and two-family dwelling scope of this report. Since 2000, there have been three dwelling fires in New Britain Township requiring the fire department to go into service to extinguish. The average loss in these fires was \$251,000, although the average amount of water that was required to extinguish these fires is not available.

The first fatality occurred in 1999. The fire started in the first-floor family room in the early morning hours. The smoke alarm sounded, and the children got out onto a second-floor porch. The children attempted to pull their father out onto the same roof, when he fell back into the room as flashover occurred. The origin of fire was determined to be an electrically operated recliner. When renovations were made to the property post-fire, fire sprinklers were installed.

The other two fatalities occurred on January 30, 2003, at 19:12 hours. The property was being operated as a small bed and breakfast by a couple who perished as a result of the fire. The cause of the fire was determined to be electrical wiring in the family room, with the couple living on the second floor above. It was unknown if the smoke alarms sounded to alert the occupants, due to the piece-meal system installed by the property owner. The female victim was found on the second floor, with the male victim found on the first floor near the exit door.

Census statistics show that 4.8% of the homes in the Township were built in 1939 or earlier. From 1940-1959, 12.4% of the homes were built, with 34.6% built in 1960-1979. Just over 21% were built in 1980-1989, just over 19% were built in 1990 to 1999, and 8% have been built since. The homes built in New Britain Township since its residential sprinkler ordinance was implemented represent construction costs (not selling cost) of

almost \$86 million. Although home construction slowed somewhat in the two years immediately following implementation of New Britain's residential sprinkler ordinance, the number of homes built in the years afterward were back to levels generally equal to or greater than the number of homes built in the three years prior to the sprinkler ordinance. The reduction in the number of homes built during the years immediately following the implementation of the sprinkler ordinance was directly related to a construction moratorium that was implemented in much of the Township due to the lack of available sanitary sewer capacity in the Township at that time. Investment in construction increased significantly in the years following the sprinkler ordinance and the subsequent lifting of the construction moratorium versus the years immediately prior to the sprinkler ordinance.

The fire tax rate in New Britain Township is \$1.25 per \$1,000 assessed value. The average home in New Britain Township of types covered in this report is assessed at \$34,286 (2011 Bucks County Board of Assessment report), and pays \$43 in annual fire tax. ❖

New Britain Township *(continued)*

INFORMATION SOURCES/CREDITS:

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Warrington Township

Home fire sprinkler ordinance implemented June 1989

Warrington Township covers 13.8 square miles, and was founded in 1734 with an estimated 2009 population of 22,491. It has been designated as “The Gateway to Historic Bucks County,” and is not only a dynamic residential area, but a bustling commercial center as well. The Warrington community is nestled amidst both agricultural and preserved lands, including 300 acres dedicated to parks and active recreation and nearly 700 acres of open space.

There are 6,291 homes (Bucks County Board of Assessment Real Estate Land Use Classification Report 1/5/11) in the Township with an estimated 2009 real estate market value of \$2.59 billion.

Warrington Township has both a public water system and some individual residential wells. Residential sprinkler systems in the Township are supplied either by the public water system (where available) or by on-site pump and tanks or other similar stand-alone systems.

Warrington Township Ordinance 89-3 was adopted on June 20, 1989, requiring residential sprinklers only in new homes built in areas provided with public water. On August 11, 1998, the Township adopted Ordinance 98-0-17 adding that residential sprinklers should also be provided in residential garages. On November 26, 2002, Ordinance 2002-0-12 was adopted by the Township requiring home fire sprinklers regardless of the type of water supply for the dwelling.

RECENT BUILDING HISTORY IN WARRINGTON TOWNSHIP:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1986	308	N/A
1987	232	N/A
1988	99	N/A
1989*	57	N/A
1990	50	N/A
1991	217	N/A
1992	164	N/A
1993	199	N/A
1994	173	N/A
1995	85	N/A
1996	52	3,943,000
1997	123	17,423,000
1998*	351	20,723,000
1999	519	47,153,000
2000	513	57,674,000
2001	243	22,679,000
2002*	265	21,396,000
2003	332	20,176,000
2004	340	32,616,000
2005	212	27,090,000
2006	110	25,167,000
2007	62	8,426,000
2008	64	10,662,000
2009	36	8,400,000

**Home fire sprinkler ordinance originally adopted 1989 and modified in 1998 and 2002*

Note: Data is mix of information provided from Warrington Township (number of new homes) and costs estimated and reported from the US Census.

Warrington Township *(continued)*

Census statistics show that 2.6% of the homes in Warrington Township were built in 1939 or earlier. From 1940-1959, 9.8% of the homes were built, with 23.4% built in 1960-1979. From 1980-1989, 14.5% of the Township homes were built, with 24.7% built in 1990 to 1999, and 25% have been built since. Out of the 6,291 homes in the Township, there are 3,161 one- and two-family dwellings and townhouses, or just over 50% of the total number of homes in the Township, equipped with fire sprinkler systems. Of the sprinklered dwellings, 2,083 are one- and two-family dwellings and 1,078 are townhouses. Since 1996 (the earliest for which data is available), there has been \$323,528,000 invested in new residential construction (at construction cost) in Warrington Township. Based on this information, for approximately two years following the adoption of the residential sprinkler ordinance, new home starts were down compared to previous years. Since that time, there has been no negative impact on residential construction, with home construction accelerating in Warrington Township since the residential sprinkler ordinance was adopted.

Since 1988 there have been two fire fatalities in Warrington Township, both at unsprinklered homes. During the same time period, there have been 90 fire fatalities in Bucks County. The first Warrington fatality occurred in 1993 involving a 29-year-old woman at a single-family dwelling. The second occurred in 1999, involving a 66-year-old male who was found unconscious on the second floor of a burning single-family home shortly after 3 pm. He was rescued by firefighters, but was pronounced dead on arrival at a local hospital after being transported there by paramedics. An unidentified passerby, who saw

the fire and tried to enter the house before firefighters arrived, was also transported to the hospital for smoke inhalation. Firefighters found smoke alarms in the home, but they were missing batteries.

Four firefighters have been injured in dwelling fires in Warrington from 1988-2010 and at least one (perhaps more) of these would have been avoided had the dwellings been equipped with residential sprinklers.

Warrington has experienced fires in three residences covered in the scope of this report where sprinklers controlled or extinguished the fire prior to the arrival of the fire department. In January 2006, firefighters were dispatched for a fire in a bedroom on the second floor of a residence. The cause was an unattended soldering iron. Firefighters were on the scene in seven minutes from the time of the call, and the fire was out upon their arrival. Less than 300 gallons of water were needed to extinguish the fire, with no fire suppression needed from the fire department, and total damages of \$20,000. Firefighters cleared the scene in 34 minutes from dispatch.

A second fire occurred in October of the same year in a dishwasher that had been recalled due to potential fire hazard, but the dishwasher in this home had not been removed from service. The home and dishwasher were approximately two years old. Firefighters did need to stretch a one-and-a-half-inch hoseline to complete extinguishment, although total water used was under 500 gallons and damage was estimated at \$10,000.

The third save occurred in February 2009 with a fire on the second floor of the dwelling. A mother and her two children were able to escape the fire while the sprinkler system activated. The fire was

Warrington Township *(continued)*

extinguished by the sprinkler system upon the arrival of the fire department, using under 200 gallons of water. Damage to the dwelling was estimated at \$8,000. The average loss at these three fires was \$12,700, while the average amount of water needed to extinguish these fires was less than 333 gallons.

Since 2005, there have been 20 dwelling fires in Warrington Township requiring the fire department to go into service to extinguish. The average loss in these fires was \$91,250. The average amount of water required to extinguish these fires is not available. In at least one of these fires, firefighters had to make a rescue of an occupant through a second-floor window, using a ladder. In another of these fires, the dwelling was destroyed. The remains still stood two years later, causing a nuisance in the neighborhood. The property is in foreclosure. These are some of the indirect impacts of fire that are often not considered when looking at damage statistics.

The Warrington Township Fire Marshal was able to obtain bid prices from the sprinkler contractor for the new home at 2543 County Line Road. The home is 4,510 square feet, was built in 2010, with the tank and pump sprinkler system bid price of \$12,000 or \$2.66 per square foot. The sprinkler contractor for the David Cutler Group's Warrington Ridge development also provided data to the Warrington Township Fire Marshal's Office on the sprinkler bids for these homes. Warrington Ridge is a development of single-family homes located off of Turk Road between Bristol Road and Almshouse Road in the northern section of Warrington Township, and it is serviced by public water. Warrington Ridge has three basic models, with the development completed near the end of 2010. The Sterling model totals 5,042 square feet,

the Chadbourne model at 4,795 square feet and the Devon model at 4,832 square feet. The subcontractor's bid price to the developer to install sprinklers varied from \$4,600 for the largest floor plan to \$4,100 for the smallest. According to the developer's website, pricing of these homes started from the "upper \$400's," making the cost of sprinklers to the builder approximately 1% of the selling cost of the house, likely even less when all of the options are added on to the starting price. Real estate information indicated that the homes in this development start at 3,744 square feet, making the cost to install sprinkler systems (for the smallest floor plan) for this development approximately \$1.10 per square foot.

The fire tax rate in Warrington Township is \$1.50 per \$1,000 assessed value. The average home in Warrington Township of types covered in this report is assessed at \$37,456 (2011 Bucks County Board of Assessment report), and with just over \$56 in annual fire tax. ❖

Warrington Township *(continued)*

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<http://www.buckscounty.org/government/departments/finance/boardofassessment/LandUseClassificationReport2011.pdf>

Intelligencer News Archives

Warwick Township

Home fire sprinkler ordinance implemented March 1999

Warwick Township was founded in 1733, and provided an encampment and headquarters for George Washington and his troops in 1777. The Township covers 11.1 square miles, with an estimated 2009 population of 14,726 – which due to rapid growth more than doubled from the 1990 population of just less than 6,000. Warwick Township has 5,073 homes (Bucks County Board of Assessment Real Estate Land Use Classification Report 1/5/11), and a 2009 real estate market value of \$1.74 billion.

Residential sprinkler systems in Warwick are supplied by mostly public water, but some are supplied by on-site pump and tanks or even directly from well pumps or other similar stand-alone water supply systems.

Warwick Township enacted its ordinance requiring residential sprinklers on March 1, 1999. The Warwick ordinance adopted the 1996 BOCA National Building Code, and requires sprinklers in all Use Group R-3 and R-4 buildings, except detached accessory structures. The ordinance also requires that pre-engineered wood floor trusses be protected by half-inch gypsum board minimum in all Use Groups. The ordinance was prompted by a fire in a home on Peony Court in the autumn of 1996, that was constructed just a few years prior by a major national builder. The fire started in the garage from a cause completely unrelated to the construction of the home, and very quickly burned through much of the lightweight construction of the home. The garage had already collapsed upon the arrival of the fire department, and a video taken by a neighbor clearly showed the rather shocking rapid progression of the fire through the lightweight structure.

Out of 5,073 homes in the Township, 2,282 or 45% are sprinklered. Census statistics show that

RECENT BUILDING HISTORY IN WARWICK TOWNSHIP:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1996	195	14,585,000
1997	248	19,918,000
1998	271	21,471,000
1999*	135	14,338,000
2000	185	21,114,000
2001	149	17,948,000
2002	305	29,585,000
2003	48	6,219,000
2004	87	15,149,000
2005	76	12,938,000
2006	28	4,361,000
2007	35	7,251,000
2008	16	3,442,000
2009	24	5,407,000

**Home fire sprinkler ordinance adopted March 1, 1999*

Note: Data is based on estimate from local fire marshal and US Census.

150 homes in the Township were built in 1939 or earlier. These same statistics indicate that 357 homes were built in the next 30 years, 195 homes were constructed in the 1970s, 932 homes were constructed in the 1980s, and 1,652 homes were built in the 1990s (with 780 of these being voluntarily sprinklered as a trade-off). Since Warwick adopted its sprinkler ordinance, Township records indicate that 1,502 more homes have been built (the Census numbers appear to be low estimates) at a construction cost exceeding \$137 million. These statistics indicate that there has been little impact on development in Warwick Township since the fire sprinkler ordinance was adopted.

Warwick Township *(continued)*

In the three years preceding the residential sprinkler ordinance, Warwick Township was experiencing a housing boom, with almost 200 or more homes valued at almost \$15,000,000 or more built in each of those years. The year that the home fire sprinkler ordinance was adopted, construction dipped slightly to 135 homes and just over \$14,000,000. However, investment in residential home construction picked up in 2000 with 185 homes with construction cost of over \$21,000,000, in 2001 almost \$18,000,000 in construction investment, and 2002 the highest number of homes from 1996-2009 were built – 305 at well over \$29,000,000 in construction costs. In the years following, the number of new homes dropped significantly, but this was primarily due to the fact that much of Warwick Township had been built out.

There have been no civilian or firefighter fatalities in Warwick Township since before 1988. During the same period, there were 90 fire deaths in Bucks County homes. Since 2005, there have been six dwelling fires in Warwick Township requiring the fire department to go into service to extinguish. The average loss in these fires was \$120,000, and the average amount of water that was required to extinguish these fires was 4,017 gallons.

It is important to note that some of these homes that required the fire department to go into service to extinguish initially appeared to have room and contents damage, but wound up having significant smoke and water damage throughout the house, resulting in weeks and months of repair work and damage much more extensive than originally estimated.

Warwick Township has had one home where residential sprinklers have activated in a fire,

saving one and perhaps two lives. On a beautiful day in August 2007, a neighbor noticed water coming out of the garage of a sprinklered townhouse. A fire had started in a bedroom of the home that was occupied by a woman who had limited mobility and was in the bed at the time of the fire. Despite heavy damage to the bed, the occupant did not receive any injuries. There was a second bedridden victim on the first floor who was unable to escape. A neighbor pulled him out, wet from the sprinkler. The residential sprinkler system successfully extinguished the fire using less than 400 gallons of water and the fire was out upon arrival of the fire department. There was a total of \$20,000 in damages to the room of origin and surrounding areas of the home due to heat, smoke and water. If this home had not been equipped with residential sprinklers, it is extremely likely that the occupant of the room of origin would not have survived the fire, and also likely that the second occupant of the home who was immobile and on the floor below the area of origin may have been seriously injured, if not killed. Fire would have likely spread throughout the home, resulting in hundreds of thousands of dollars of damage. Firefighters cleared the scene in one hour and four minutes from the time the 9-1-1 call was received.

There are three communities in Warwick Township where the builder chose to install sprinklers before the Township's residential sprinkler ordinance was put into place. Windrush Townhouses (Katz-Swerdloff), Deer Run Townhouses (Orleans Homes) and all of Country Crossings (DeLuca Homes with 430 dwelling units – approximately half are townhouses and some buildings are eight-plexes) are sprinklered because the builders chose to install sprinklers

Warwick Township *(continued)*

and a double one-inch sheetrock firewall instead of the cinder block firewall that was required by code. By not using the cinder block wall, the developers were able to continue building through the winter months and meet their delivery schedule. Construction using block would have required mixing mortar in freezing conditions that builders reported would have interrupted the schedule. These developments in total represent about 780 homes. In all three cases, the builders made the sprinkler choice based on the economics of the entire project. The sprinkler save in Warwick Township was in one of the townhouses where the builder choose to install sprinklers prior to the adoption of the Township's residential sprinkler ordinance.

After years of experience working with builders in the Township, the fire marshal for Warwick indicated that there are many different considerations that go into the cost of building a

home, including timing, schedule, property costs, the number of homes that can be constructed on a given property parcel, and others. Including residential sprinklers in the construction can have a positive impact on many of these, actually saving money for the builder in the long run.

The fire tax rate in Warwick Township is \$0.75 per \$1,000 assessed value. The average home in Warwick Township of types covered in this report is assessed at \$36,900 (2011 Bucks County Board of Assessment report), and with \$28 in annual fire tax. ❖

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Wrightstown Township

Home fire sprinkler ordinance implemented March 1995

Wrightstown Township covers 10.16 square miles, with an estimated 2009 population of 2,934, 1,030 homes (Bucks County Board of Assessment Real Estate Land Use Classification Report 1/5/11), and an estimated 2009 real estate market value of \$583 million. There are at least 141 houses in the Township that are 100 years old or older. The population of Wrightstown Township in 1990 was 2,426. Villages that are partially or fully in Wrightstown Township include Pineville, Penns Park, Rushland, Wrightstown and Wycombe.

Wrightstown Township has a mixture of residences of all shapes and sizes, up to approximately 20,000 square feet. Many families have lived in the Township for generations. The Township is within commuting distance to both Philadelphia and New York City. There are currently one elementary school and two gas stations in the Township, with a number of farms and three major working quarries.

Wrightstown Township is not provided with a public water system; all homes are supplied by wells. Residential sprinkler systems in Wrightstown are supplied by on-site pump and tanks or other, similar stand-alone water supply systems.

Wrightstown Township enacted its ordinance providing for residential sprinklers on March 6, 1995. The Wrightstown ordinance requires residential sprinklers in all multifamily (Use Group R-2) occupancies, and all one- and two-family (Use Group R-3) occupancies where the aggregate fire area is equal to or greater than 4,000 square feet, or greater than 1,000 square feet where the occupancies are serviced by public or community water systems. The ordinance also requires certain home expansions to require the installation of fire sprinklers.

RECENT BUILDING HISTORY IN WRIGHTSTOWN TOWNSHIP:

YEAR	NUMBER OF NEW HOME PERMITS	CONSTRUCTION COSTS (\$)
1992-1994	N/A	N/A
1995*	At Least 2	N/A
1996	20	3,960,000
1997	23	4,310,000
1998	21	3,700,000
1999	18	3,410,000
2000	7	1,460,000
2001	9	2,200,000
2002	0	0
2003	1	244,000
2004	13	2,130,000
2005	10	1,640,000
2006	11	1,800,000
2007	25	5,090,000
2008	16	2,990,000
2009	9	2,180,000

**Home fire sprinkler ordinance adopted March 6, 1995*

Note: Data is based on estimate from local fire marshal and US Census.

Out of 1,030 homes in the Township, 244 or 23.7% have been built in the 15 years through December 31, 2010, since the sprinkler ordinance was enacted. Census statistics show that 201 homes in the Township were built in 1939 or earlier. These same statistics indicate that no decade since then has seen more than 151 homes built, except during the 1990s when 301 homes were built. Approximately one-third of these homes were built in the second half of the 1990s – when fire sprinklers were required. Over 100 homes were built in the 2000s, with construction continuing even in the years 2008 and 2009, which are considered to be recession

Wrightstown Township *(continued)*

years. The homes built in Wrightstown Township since the residential sprinkler ordinance was implemented represent construction costs (not selling cost) of over \$35 million. Based upon sample construction cost information that has been provided for the Township, this is a real estate value of over \$70 million. These statistics indicate that there has been minimal impact on development in Wrightstown Township since the residential sprinkler ordinance was adopted.

There have been no civilian or firefighter fatalities in Wrightstown Township since 1988. During the same period, there were 90 fire deaths in Bucks County homes. Since 2004, there have been four dwelling fires in Wrightstown Township requiring the fire department to go into service to extinguish. The average loss in these fires was \$191,250, and the average amount of water that was required to extinguish these fires was 2,075 gallons. It should be noted that the fire department protecting Wrightstown Township used compressed air foam (CAFS) to fight fires to reduce the amount of water needed for extinguishment.

Wrightstown Township has had one reported sprinkler save – a fire that started on Christmas afternoon, 2009, in a home built in 2005. The homeowners, who were preparing for their holiday celebration, were only alerted to the fire by the activation of the sprinkler alarm in the house. They discovered an active fire spreading up the walls from the initial point of origin and evacuated the home safely. The fire sprinkler system successfully extinguished the fire using less than 300 gallons of water in under seven minutes. Damage to the house was estimated at \$12,000 total. The nearest fire hydrants were more than a mile from the house, and the fire department estimates that damages would have been at least

15 times greater if the home were not equipped with home fire sprinklers. Firefighters cleared the scene, and the home's occupants returned to their holiday celebration within 33 minutes from the time the 9-1-1 call was received.

Wrightstown Township has reported representative costs to sprinkler several dwellings (all include on-site water supply system) in the Township since 2005:

- **Rushland Road**

Total Protected Square Footage: 6,415

Home Sprinkler Contract Cost: \$9,950

Construction Cost Reported to Township:

(not available)

Home Sprinkler Cost per square foot: \$1.55

Sprinkler Cost as Percentage of Construction Cost: (not available)

- **Penns Park Road**

Total Protected Square Footage: 4,792

Home Sprinkler Contract Cost: \$13,000

Construction Cost Reported to Township:

\$300,000

Home Sprinkler Cost per square foot: \$2.71

Sprinkler Cost as Percentage of Construction Cost: 4.33%

- **Pheasant Lane**

Total Protected Square Footage: 7,300

Home Sprinkler Contract Cost: \$9,000

Construction Cost Reported to Township:

\$775,000

Home Sprinkler Cost per square foot: \$1.23

Sprinkler Cost as Percentage of Construction Cost: 1.2%

Wrightstown Township *(continued)*

- **Wrightstown Road**

Total Protected Square Footage: 10,000

Home Sprinkler Contract Cost: \$14,000

Construction Cost Reported to Township:

\$800,000

Home Sprinkler Cost per square foot: \$1.40

Sprinkler Cost as Percentage of Construction

Cost: 1.8%

The fire tax rate in Wrightstown Township is \$0.75 per \$1,000 assessed value. The average home in Wrightstown Township of types covered in this report is assessed at \$60,511 (2011 Bucks County Board of Assessment report), and pays \$45 in annual fire tax. ❖

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<http://www.buckscounty.org/government/departments/finance/boardofassessment/LandUseClassificationReport2011.pdf>

Summary

The six municipalities in central Bucks County that adopted residential fire sprinkler ordinances during 1989, 1995, 1999, and 2000 have already realized benefits from implementation of this life-saving technology. Several lives have been directly saved, and perhaps other deaths and injuries to occupants and firefighters have been averted as fires in sprinklered homes have been kept small. In contrast, numerous fire deaths have occurred in unsprinklered homes throughout the County. Damage to structures and contents from fires in unsprinklered homes in these six municipalities is more than 12 times the damage that was experienced in the fires that occurred in the sprinklered homes, and almost 18 times as much water was needed to extinguish fires in unsprinklered homes as in sprinklered homes. The cost to install sprinklers in new homes where public water was not provided ranged from \$1.23 to \$2.71 per square foot, with costs in one development where public water was provided being \$1.10 or less per square foot. Two similar townhouse developments constructed adjacent to each other during the same period in the same municipality by two different builders showed little market price difference between the sprinklered and unsprinklered homes.

The residential fires being experienced in Bucks County demonstrate little or no relationship to the age of the home. Most all of the new construction throughout the County is lightweight wood truss. Advocates of the use of engineered wood trusses have indicated this type of construction is less expensive and overall, uses less wood than legacy lumber systems – saving construction labor costs as well as forests. Despite this, engineered wood trusses have been shown to fail much more quickly under fire conditions due to their methods

of connection, using glue and gusset plates with short connecting lugs. These methods of construction may work satisfactorily, until they are exposed to a fire when they can be subject to rapid collapse without warning. Wood truss members are also thinner than legacy lumber systems, which results in faster burn-through time when exposed to fire.

Each of the communities in central Bucks County that have adopted residential sprinkler ordinances is protected by volunteer fire companies. In some cases, the growth seen in these and nearby communities has necessitated adding new fire stations with associated costs, to provide for fire protection in these growing areas. The developments associated with this growth have also resulted in portions of at least some of these communities to move from a “rural” classification, to a “suburban” classification by NFPA 1720 (2010 Edition), *“Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments,”* which then requires a more robust fire suppression response to dwelling fires. The fire departments in at least some of these communities have not had difficulty meeting or exceeding the NFPA 1720 response objectives for the rural classification, but can struggle at times to meet or exceed the response objectives for the suburban classification. In addition, several of these communities have experienced considerable fire losses in recent years in residential occupancies. The use of residential sprinklers has been an integral part of the ongoing fire risk management plan in these communities, which has resulted in them continuing to enjoy fire tax rates that average less

Summary *(continued)*

than \$50 per household per year, while still providing modern fire protection equipment and infrastructure sized to fit the fire risk of the community.

Central Bucks County has seen growth over a period that exceeds 100 years, with development spurts during specific periods, particularly in the past two decades. There has been little or no impact to ongoing residential development in the communities that have adopted fire sprinkler ordinances, and in fact, in some of these communities, home building has accelerated since the sprinkler ordinances have been enacted. Builders and homeowners had a choice in which of the county's 54 municipalities to construct new homes, and clearly, the residential sprinkler requirements in these six communities did not deter homebuilders from investing almost \$815 million in these communities, and buyers from purchasing almost 7,000 sprinklered homes.

Residential sprinklers in these communities are tools that significantly reduce fire losses, as

well as reduce the impact on these communities' fire protection infrastructures. These communities have yet to fully realize all the savings that sprinkler protection provides, in lives, property and infrastructure, as these systems provide benefits over the life of the home. The requirement to install residential fire sprinklers in these communities is part of a community risk reduction strategy that not only protects residents and firefighters, but also supports the long-term sustainability of volunteer fire services which can have a significant impact on municipal taxes. Building construction data in these communities indicates that despite the implementation of residential sprinkler ordinances, development in each of them has continued at a strong pace. Residential sprinklers do work in small- and medium-sized communities. ❖

Acknowledgements

This study would not have been possible without the help of the following:

Bucks County Fire Marshals Association

Michael Bean, Chief, Warrington Township Fire Company

**Jim Kettler, Director of Building and Codes/Fire Marshal,
Buckingham Township**

Phil Leiggi, Fire Marshal (ret.), Wrightstown Township

**Rick Lesniak, Director of Fire, Inspections and Emergency Services,
Warrington Township**

Jeff McAllister, Chief, Ivyland Fire Company

Ted Middleman, Fire Marshal, Wrightstown Township

**Frank Orfe, Building Inspector, Ivyland Borough (Keystone
Municipal Services)**

Edward A. Pfeiffer, Fire Marshal, Warwick Township

Rayna Polsky, Archivist and Librarian, Intelligencer Newspaper

Nick Rafferty, Fire Marshal, Bucks County

Jay Scanlon, Fire Marshal (ret.), Bensalem Township

Kelli Scarlett, Asst. Fire Marshal, Doylestown Borough

Randy Teschner, Fire Marshal, New Britain Township

All Data Used is as of December 31, 2010 unless otherwise noted.

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