

# **National Residential Fire Sprinkler Initiative**

**United States Fire Administration**

**Summary of Meeting, April 9-10, 2003**

Submitted by

James A. Milke, Ph.D., P.E.  
Meeting Facilitator

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# **FEMA**



**U.S. Fire Administration**

## 1. Introduction

The following policy statement was developed at the meeting to reflect the motivation for a renewed National Residential Fire Sprinkler Initiative:

**The United States Fire Administration advocates the use of automatic fire sprinklers to save lives, reduce injuries, and protect property. Based on an identified history of success, this technology should be employed in all residential occupancies.**

R. David Paulison, USFA Administrator, indicated that the annual number of residential fire deaths, totaling over 3,000 people, is unacceptable. Even in this time where terrorism receives much of the national attention, deaths and injuries of residents and firefighters in residential fire incidents continue to occur in appreciable numbers and thus is a principal area of concern to the United States Fire Administration (USFA).

Paulison expressed his strong commitment to recognizing residential sprinkler systems as the principal means by which a major reduction in this annual death rate could be achieved. However, currently no more than 2% of all new residences are being protected with residential sprinkler systems. This very low proportion of sprinkler-protected new residences is very disappointing. Most of the modest number of installations of residential sprinklers is the result of local mandates, with few systems being installed voluntarily.

Given the unacceptable number of residential fire deaths and low acceptance rate of residential sprinkler systems, this meeting of representatives from the fire protection community was convened at Paulison's encouragement to assist in the development of a national strategy. The principal intent of this strategy is to increase the interest in residential sprinkler systems among builders, developers, cities and especially homeowners. So far, these groups appear to see little benefit being derived from residential sprinkler systems.

The U.S. Fire Administration has a long history of meetings held to address the acceptance of residential sprinklers by the American homeowners. Even though several past meetings have been convened with some of the same individuals as in this meeting, the response of the invited individuals to this meeting was very positive. Many of the individuals expressed significant disappointment at the level of use of sprinklers, though progress in some communities was recognized. Currently, support for proposals to install residential sprinkler systems is available through educator kits developed by consortia such as the USFA, the Home Fire Sprinkler Coalition (HFSC) and the Residential Fire Safety Institute (RFSI). While expressing enthusiasm and interest in helping to develop a

national strategy, there was also concern that the result of this meeting would be like some others, i.e. some discussion is held on old topics, a report is generated, and no change is effected. Both Paulison and Charlie Dickinson, Deputy Administrator of the USFA, indicated that near-term strategies developed at the meeting need to involve a significantly different tact than what has been previously attempted.

As described in this report, several strategies were proposed at this meeting for the National Residential Fire Sprinkler Initiative. Some of these strategies were significant in their difference from previous thrusts, including the concept of localized sprinkler protection in the kitchen area of existing homes. Other strategies consisted of an expansion of existing ideas, such as developing broader-based coalitions composed of a wide range of organizations and Federal agencies to develop educational and policy-related plans to promote residential sprinkler systems.

Topics for the meeting included:

- Identification of the impediments to greater acceptance of residential sprinkler systems
- Identification of solutions to overcome the impediments
- Development of national strategies to implement the solutions

Meeting attendees are identified below. A wide range of fire protection organizations and individual backgrounds were represented at the meeting.

#### Fire protection representatives

Jim Milke, University of Maryland, meeting facilitator

Garry Briese, International Association of Fire Chiefs (IAFC)

Ed Budnick, Hughes Associates, Inc.

Ron Coleman, former CA State Fire Marshal

Jim Dalton, National Fire Sprinkler Association (NFSA)

Chris Dubay, National Fire Protection Association (NFPA)

Jim Ford, Assistant Fire Chief in Scottsdale, AZ

Dan Madrzykowski, National Institute of Standards and Technology (NIST), chair NFPA  
13-D Committee

Roy Marshall, Residential Fire Safety Institute (RFSI)

Harry Shaw, staff member of USFA from 1975-1982

Steve Muncy, American Fire Sprinkler Association (AFSA)

#### USFA Staff

R. David Paulison, Administrator, USFA

Charlie Dickinson, Deputy Administrator, USFA

Alex Furr, National Fire Data Center (NFDC), USFA  
Cortez Lawrence, National Fire Programs (NFP), USFA  
Larry Maruskin, Research Team, NFDC, USFA  
Rob Neale, Mitigation Branch, NFP, USFA  
Woody Stratton, Research Team, NFDC, USFA

As a further backdrop for the need to develop a national residential fire sprinkler initiative, meeting participants made the following observations:

- Data is needed to demonstrate the significant progress in reducing the number of residential fire deaths and injuries being realized through the installation of residential sprinkler systems. An analysis of fire incident data from communities with widespread sprinkler programs is needed to identify the impact of such protection on their fire departments.
- Case studies were related where fire service personnel have testified against mandating the installation of residential sprinkler systems in new residences.
- In Scottsdale, AZ, the community has recognized the importance of sprinklers and has implemented a highly successful residential sprinkler program, with over 40,000 homes with sprinklers.
- The technology exists today for the installation of cost-effective residential sprinkler systems.
- The public seems to be apathetic concerning the installation of residential sprinkler systems. This may be due to a lack of information on the availability and benefit of this technology, or may be due to casual attitudes of safety in the home.

## **2. Proposed Goal and National Strategies**

### Goal Statement:

Develop and implement policies that have an immediate National impact, identify and strive to remove barriers inhibiting the acceptance and use of residential fire sprinklers to reduce life loss and injuries.

### National Strategies:

The proposed national strategies developed at the meeting include the four initiatives included in Table 1. Each of these strategies is described in more detail in this section, including the rationale for each strategy as well as the associated tasks.

Strategy	Lead	Start	Deadline
Develop aggressive strategy for advocating residential sprinkler systems in occupancies the Federal government influences or supports financially, especially manufactured housing or health care facilities.	USFA	Immediate	April 2004
Based on research, data and proof of concept, advocate localized fire suppression in high fire risk areas (e.g., kitchens) for retrofit applications.	USFA with NIST support	Immediate	April 2004
Provide advocacy and informational support among partners, State and local decision makers, finding a common agenda on behalf of the protected public.	Partners and USFA	Immediate start (already started)	On-going
US Fire Administrator continue to support research and development and associated programs aimed at advances in residential fire sprinkler technology for the increased acceptance of residential fire sprinkler systems.	USFA	Immediate	On-going

**Strategy #1.**

*Develop aggressive strategy for advocating residential sprinkler systems in occupancies the Federal government influences or supports financially, especially manufactured housing or health care facilities.*

This strategy is directed toward advocating residential sprinkler systems in occupancies the Federal government influences or supports financially. The Federal government has influence in some residential units as a result of adoption of design standards, through the provision of loans or subsidies or because the Federal government owns or leases the residences. Federal funding for residential occupancies is provided by the following Federal agencies:

- Department of Housing and Urban Development (HUD)
- Federal Housing Authority (HUD\FHA)
- Department of Agriculture (USDA)

- Department of Interior/Bureau of Indian Affairs (DOI\BIA)
- Department of Defense (DoD)
- DOI/Bureau of Land Management (DOI\BLM)
- Fannie Mae/Freddie Mac

There are five tasks associated with this strategy:

- Require all new manufactured homes to be protected by residential sprinkler systems.
- Require all new Federally owned, leased or subsidized residential units to be protected by residential sprinkler systems.
- Require all new assisted living facilities for senior citizens, small nursing homes, and board and care facilities that are receiving Federal support to be protected by residential sprinkler systems.
- Require all new dormitory and Greek housing at college campuses and boarding schools to be protected by residential sprinkler systems.
- Educate state and local jurisdictions that Federal preemption in the above five target areas is appropriate.

### **Manufactured Homes**

The Federal government's role relative to manufactured housing is recognized via HUD's regulatory authority over design and construction standards for such housing. There are two principal reasons for identifying manufactured housing in this strategy. First, manufactured housing is distributed throughout the U.S., so that being able to affect a change with this type of housing will have visibility nationwide. Second, because many low-income families select this style of housing, senior citizens and citizens in rural communities, this suggests that these homes may be occupied by high-risk segments of the U.S. population. However, the only fire protection typically provided in such homes is smoke detection. Thus, if successful, this task has the potential to make a significant impact at the national level.

In recent years, HUD has adopted NFPA 501, which applies to all new manufactured housing. Changing NFPA 501 to mandate residential sprinklers in all new manufactured homes should be pursued following the NFPA code revision process. This means that a proposal will need to be developed, including wording for new code section(s) as well as the technical justification supporting the proposal. Further, continued support for the proposal will need to be provided in the code revision steps, including defending the proposal against criticism in the public comment period, at the Technical Session of the NFPA meeting at which the new version of NFPA 501 is presented, and potentially at

appeals to the NFPA Standards Council. Once adopted by NFPA, the adoption of the new standard by HUD needs to be advocated and monitored.

### **Federally subsidized, owned or leased housing**

Other housing, which receives financial support from the Federal government, includes DOD housing on military bases, other HUD housing units, homes that have FHA- or Veterans Affairs (VA) -backed mortgages and Federally subsidized disaster replacement housing. In addition, residential sprinkler protection for temporary post-disaster housing should be strongly considered (the potential impact of an injury or death occurring to a temporarily displaced family member from a fire in Federally-provided temporary housing could be very damaging to the USFA and FEMA).

This strategy would mandate that any new residential construction receiving Federal support be protected with residential sprinkler systems. The increased number of homes being protected by residential sprinklers via this mandate in Federally supported housing units would have a benefit to residents of such homes. In addition, a secondary benefit as a result of the increased number of homes being protected by residential sprinklers will be the expanded experience base as a result of additional fire incidents with operating residential sprinklers. These experiences need to be documented and carefully tracked to help build the package of case studies that can be used to help encourage new homeowners in non-Federally supported housing units to consider the installation of residential sprinklers.

In order to develop a proposal that will require all new Federally supported housing units to have residential sprinkler systems, the USFA needs to take a lead position to promote the concept of residential sprinklers in such housing units. However, USFA should not attempt to pursue this strategy alone. Rather, the USFA should attempt to encourage the previously identified Federal agencies with jurisdiction over residential units to become partners in this venture. Technical support for such a proposal needs to be generated. In particular, such technical support will likely need to include an analysis of the performance of residential sprinklers in the limited number of homes with such protection (compared to those without) and may also need to include a cost-benefit analysis of such a mandate. An essential part of any valid cost-benefit analysis is the development of meaningful performance metrics in order to properly assess the benefits accrued. The potential benefits are expected to be significant in high-risk areas (e.g. low income or rural areas). In addition, costs included in previous cost-benefit analyses have concentrated primarily on those associated with property damage and casualties to residents. However, costs also include firefighter casualties (41% of firefighter fatalities occur in residential fires) and community resources expended. Indirect losses associated

with displaced families, loss of personal artifacts and family records are also likely to be significant.

### **Housing for Senior Citizens and Board and Care Facilities**

Another high-risk focus group involves housing for senior citizens, e.g. in retirement communities, assisted living facilities, and small nursing homes. Federal support for such housing is provided from Department of Health and Human Services\Health Care Financing Administration (HHS\HCFA) in many cases. These residential units are identified given this age group is the fastest growing segment of the U.S. population and also are part of the high-risk segment of the population. A coalition with this group needs to be formed with the Federal agencies with responsibility for these residential units and could also seek participation from the private sector, such as through American Association of Retired Persons (AARP). AARP in particular could be helpful in providing information through their publications on the benefits of sprinkler protection in residential units and also to solicit their support of the initiative.

In addition, small board and care facilities also provide housing for a high-risk segment of the U.S. population. These facilities may also receive HHS support and would also benefit from residential sprinkler protection.

### **Campus and Greek Housing**

The final group of housing that received attention at the meeting was college campus housing and especially Greek housing. USFA has already had involvement in addressing the fire protection provided in such homes. The results of this involvement include the USFA video, *Get Out and Stay Alive* and related publications geared toward Greek organizations and campus administrators. These products could be the foundation for this initiative. In addition, there may be an opportunity to leverage the successes in multi-family housing that have been accomplished in some communities. The Greek organizations could be approached either through the 104 national Greek organizations, campus administrators or campus safety organizations (such as the Campus Safety Health and Environmental Management Association or the Campus Safety Journal). Given the limited resources available within Greek organizations and declining State budgets (at least in the short term) that could be used for the improvement of Greek and campus housing, the economic impact of retroactively adding residential sprinklers would appear to be a significant challenge.

## **Communication with State and Local Jurisdictions**

The final task in this strategy involves an effort in communication with the states and local jurisdictions concerning any proposed Federal initiatives in the types of housing noted in the previous sections. In this task, representatives of state and local regulatory agencies need to be aware of the Federal initiatives, as well as to receive information pertaining to the justification for this approach. In addition, the state and local authorities need to be informed that these initiatives are done with the principal intent of improving the level of safety provided in residence for a broad segment of the population, and are not intended to undermine the authority of the state and local regulators. In fact, these same state and local regulators need to be included in the coalition.

### **Strategy #2**

*Based on research, data and proof of concept, advocate localized fire suppression in high fire risk areas (e.g., kitchens) for retrofit applications.*

This strategy involves an analysis of the performance and feasibility of localized automatic fire suppression in high-risk areas of the home. The number of deaths per manufactured housing fires is higher than other residential structures. As such, increased fire protection in these homes in retrofit applications could have a significant impact on fire fatalities in the U.S. Further, because 14% (1989-1998) of all fatal residential fires are initiated in the kitchen, having automatic suppression capability in the kitchen of manufactured homes would have the potential to provide a significant impact on reducing the number of residential fire deaths and injuries. Such a program could serve as a pilot to explore the efficacy of such protection in all existing residential units.

There are three tasks associated with this strategy:

- Conduct research to identify high-risk areas of the home, in terms of location of fire initiation, which lead to serious fires resulting in fatal or non-fatal injuries to building occupants or fire fighters.
- Conduct research to analyze the performance of localized, automatic fire suppression units in kitchens (as one high-risk area).
- Purpose design standard for localized, automatic fire suppression units in kitchens of existing Federally owned, leased or subsidized residential units.

Widespread support for the retrofit application was expressed at the meeting, considering that very few existing homes can be expected to be retrofitted with NFPA 13D residential sprinkler systems. One principal advantage of the localized fire protection recognized at the meeting was the potential development of case studies with successful outcomes. Thus, this database could be used as leverage to demonstrate the effectiveness of

residential sprinklers in general that could help to support the adoption of NFPA 13D residential sprinkler systems. Support for residential sprinkler protection for the kitchen was based on the technology already being available, the simplicity of the design (with the strong possibility of a pre-engineered set of components) and the minimal water supply needed. Small stand-alone kitchen fire suppression units could be developed with a dedicated water supply, bypass valve and pump and could also use a battery backup.

### **Identify High-risk Areas in Residences**

The principal purpose of this task is to confirm from fire incident data that the high-risk area of a residence is the kitchen. This analysis should include fire incidents from a variety of housing types and tabulate each group separately as well as collectively. Such an analysis might identify a particular high-risk area in one type of housing, e.g. manufactured housing, and another high-risk area in another type of housing, e.g. campus Greek housing.

### **Research Performance of Localized Fire Suppression Units**

The notion of localized fire protection is not new, being provided in numerous industrial applications where the hazard is localized and reasonably separated from other hazards. Such protection may already be provided in some garages, washrooms, and shops (certainly, local application suppression has been used in industrial and commercial applications for many years). Concerning residential applications, the principal issue involves whether a particular room or area is sufficiently separated from other areas of the home or whether a residential sprinkler can operate quickly enough to limit fire spread to areas beyond the coverage area of the sprinkler.

The localized fire protection units were described as being a logical extension of the philosophy that is associated with the initial development of NFPA 13D. The early philosophy associated with NFPA 13D was to provide a cost effective residential sprinkler system design by having sprinkler protection in the highest risk areas and eliminating protection in low risk areas such as closets and some bathrooms. Meeting attendees indicated that the design of a localized fire suppression unit should be recognized by NFPA 13D or perhaps a new NFPA standard. Alternative designs (besides locating a residential sprinkler in the kitchen) are also available and should be considered, e.g. a dry chemical system. However, the Consumer Product Safety Commission (CPSC) has previously noted in other meetings that they will support such a design with alternative agents only if interlocks between the suppression unit and the stove are provided that shuts off the power to the stove upon operation of the suppression unit.

Of all of the topics addressed at the meeting the concept of localized fire suppression units for the kitchen received the greatest amount of discussion. Concerns were expressed about a national strategy that would advocate that concept. One of these concerns related to the potential for homeowners to develop a false sense of security as a result of having this type of unit with limited capabilities. Other concerns were raised about the potential liability and negative attitudes that could develop if a death occurs in an area of the home from a fire other than in the kitchen.

Many of the concerns expressed indicated that marketing of the localized fire protection unit for kitchens was essential. Reference to this approach as a “partial system” would have a connotation of the approach being substandard or inadequate. One particular concern was the current lack of data to identify the “value added” by protecting only the kitchen with a residential sprinkler. All attendees agreed that the adequacy of the sprinkler design for this application needed to be confirmed via testing. Such research is currently underway at NIST with HUD and USFA support.

Meeting attendees also suggested that because of the potential simplicity of the design of these units, in the future these localized units could be developed so that individual homeowners could purchase parts at local hardware stores and install these units themselves, similar to other home improvement projects. While this proposition was intriguing, concerns were raised about the capability of homeowners to complete such an installation successfully (though not all homeowners attempt home improvement projects) and also on obtaining third party confirmation of the acceptability of any installation.

### **Propose Design Standard for Localized Fire Suppression Units**

The final product of this strategy involves the documentation and standardization of acceptable designs of a localized fire suppression unit. The design would be confirmed by the results of the task described this section. Once such a design (or set of designs) is accomplished, the recognized design(s) can be proposed to be incorporated into NFPA 13D, or included in a new NFPA standard. The proposal would need widespread support from a coalition of industry, regulators, researchers and consensus standards makers. The USFA, HUD and NIST are already engaged in the required research component. Assuming that positive results are obtained, the formulation of the coalition is the next significant step.

### **Strategy #3**

*Provide advocacy and informational support among partners, State and local decision makers, finding a common agenda on behalf of the protected public.*

This strategy is directed toward “team-building” and the development of a persuasive, technically sound information package to assist fellow advocates of residential sprinkler systems. The need for this strategy relates to the high proportion of currently installed residential sprinkler systems that are the result of mandates in state and local codes. Because it is difficult for each code official to develop their own technical justification for proposed residential sprinkler mandates, a technical support package should be developed for use by all code officials. In addition, code officials who can promote legislation at the state or local levels need to be considered as partners and members of the coalition being formed in support of the policy statement indicated in the opening section of this report.

There are seven tasks associated with this strategy:

- Establish high visibility initiative with an overarching strategic view on a National level
- Seek endorsement and support from fire professionals on behalf of residential fire sprinklers.
- Establish an on-going coalition of fire and allied professionals and customers to pursue initiatives that seek to increase the use of residential fire sprinklers.
- Accelerate paradigm shift toward more pro-active fire service activities for prevention and built-in fire protection solutions.
- Distribute support resources and promote local adoption of model residential fire sprinkler ordinance(s) for fire service and local jurisdictions.
- Have a better means of collecting and disseminating data and case studies, including economic analysis.
- Emphasize residential sprinkler systems in USFA curricula, providing technical, management and “political” emphasis.

#### **Establish High Visibility Initiative**

The first task involves developing an area of activity that has a high visibility profile in support of the national initiative. In particular, this task involves developing a position paper on residential sprinklers from a “disinterested” third party, the USFA. The principal intent of this paper is to dispel myths about residential sprinklers and build the case for them. This activity should place the USFA in the forefront as the premier advocate of residential sprinklers within the Federal Government. The paper could include a range of case studies, including people who suffered losses from fires and

others who experienced sprinkler successes. A myth to dispel is that the fire service can protect homeowners and their families “regardless” of the fire scenario. The paper should also encourage homeowners to think seriously of the expectations they should have for fire safety within their own homes, and perhaps should be encouraged to have a similar level of expectation to that in public buildings.

### **Seek Endorsement And Support From Fire Professionals**

Seeking endorsement and support from fire professionals on behalf of residential fire sprinklers would seem to be unnecessary. However, the support of fire professionals is not guaranteed, as related by meeting attendees in some cases (see next section of this report). In some cases, fire service labor issues are principal concerns when opposing proposals for residential sprinklers, because of concerns that legislation mandating residential sprinklers will lead to staff reductions in fire service personnel (such concerns are unfounded). Instead, residential sprinklers can become part of the community’s overall fire protection planning, providing increased safety for first responders, reduced fire flow requirements (possibly resulting in smaller mains in residential areas) and the provision of an alternative means of protection.

An organizational alliance with the National Association of State Fire Marshals (NASFM) and the International Fire Marshals Association (IFMA) should be sought, along with the IAFC and International Association of Fire Fighters (IAFF). In addition to fire service organizations, other organizations within the fire protection field should be asked to join the alliance. These other fire protection organizations include associations such as:

- American Fire Sprinkler Association (AFSA)
- Home Fire Sprinkler Coalition (HFSC)
- National Fire Protection Association (NFPA)
- National Fire Sprinkler Association (NFSA)
- Residential Fire Safety Institute (RFSI)
- Society of Fire Protection Engineers (SFPE)

This alliance should be formed promptly after the policy statement indicated in the beginning of this report is disseminated. As an initial action for this alliance, all members of the alliance should be asked to endorse and support the statement via their own press releases, literature or websites. In addition, the alliance should be asked to develop materials that provide professional, factual and emotional support to others advocating residential sprinklers. The factual support could involve developing information packages that include:

- Distribute case studies of the performance of residential sprinklers in actual fire incidents
- Distribute case studies of successful adoption of legislation mandating residential sprinklers (for example legislation in Maryland for multi-family housing).
- Reward or recognition to those who propose legislation that is passed mandating residential sprinklers
- Reward or recognition to those who propose legislation mandating residential sprinklers, but are unsuccessful in getting such passed.
- Distribute and promote model fire sprinkler ordinance to fire service and local jurisdictions
- Distribute a resource list that includes a directory of residential sprinkler information sources

In general, this coalition, led by the USFA, needs to facilitate the attempts by local and state fire service representatives in their attempts to seek legislation to mandate residential sprinklers. In addition, this coalition could also serve as a principal resource for information on residential sprinklers for city /county councils and state legislators rather than having the local and state fire service representatives bear the brunt of that responsibility.

In general, this task involves many fire protection associations working in a unified manner through this coalition to develop a consistent, supportive agenda for sprinklers in residential occupancies (any interested association should be welcomed into the consortium). The National Fire Plan for Forestry, an alliance of Federal, state and local organizations, was proposed as a model for the alliance sought for the residential sprinkler initiative.

### **Establish An On-Going Coalition of Fire and Allied Professionals and Customers**

The next task, to establish an on-going coalition of fire and allied professionals and customers to pursue initiatives that seek to increase the use of residential fire sprinklers, is suggested to assist in the development of a strong technical support package for code officials proposing legislation to mandate residential sprinkler. One of the initial efforts of this coalition should be to identify barriers to the increased acceptance of residential sprinklers.

One of the noted barriers consists of a perceived resistance and/or ignorance of allied professionals about the value of residential sprinklers. As such, a new coalition should be formed to include representation from at least these interest groups:

- Architects
- Insurance companies
- Water purveyors: American Water Works Association (AWWA)
- Consumers – including such groups as AARP
- Home builders - including building designers and contractors: NAHB or major national builders (e.g. Kohl Bros. Ryan Homes, and Beazer Homes)

Homebuilders need to be included to encourage them to make residential sprinklers available, at least as an option (case studies were noted where individuals, including some of the attendees of the meeting, asked homebuilders to install a residential sprinkler system as part of the construction of a new home and were refused). However, the presence of HFSC at home shows has been better received in recent years, so some homebuilders appear to be supportive of residential sprinklers. A list of homebuilders who are willing to install residential sprinklers could be developed. Also disturbing was the mention of cases where homebuilders were known to mark-up the price of a residential sprinkler system appreciably above that charged by the sprinkler contractor or plumber.

On a related matter, meetings need to be arranged between those organizations taking adversarial positions on residential sprinklers in order to present the policy statement along with supporting documentation on the value of residential sprinklers. This supporting information could include a study of fire losses in sprinkler-protected versus unprotected residences, case studies of “saves” by residential sprinklers, etc. These organizations should be queried about the basis for what appear to be excessive requirements related to large water meters, backflow prevention devices, water tap fees and standby fire protection fees, given more realistic fire flows.

These latter meetings need to be held to understand the adversarial arguments and to better counter them. In some cases, the coalition may be informed of significant issues seen by these other organizations and agree to work together to alleviate the problems identified. One such issue might involve labor concerns and certification of installers of residential sprinkler systems. In addition, by reaching out to these adversarial organizations, perhaps they can be encouraged eventually to join the coalition.

In general, the coalition would address impediments to sprinkler ordinances, such as:

- Insurance issues, including a lack of substantial economic incentives and insurance surcharges for increased meter sizes and backflow prevention devices
- Tax increases because of an increased assessment due to sprinkler protection

- Cost-effectiveness of requirements, such as the efficacy of large water meters, backflow prevention devices, water tap fees and standby fire protection fees.

Instead, insurance and taxes should be used as incentives, especially to encourage homeowners to accept residential sprinkler systems as an option. Such incentives could include a reduction in insurance premiums, tax credits, permitting deductions of income for interest on loans for the installation of sprinkler systems, and a reduction in property taxes.

### **Accelerate Paradigm Shift**

The fourth task seeks to accelerate the paradigm shift toward more pro-active fire service activities for prevention and built-in fire protection solutions. This topic has long been discussed and relates to the fire service traditionally giving much more attention and resources to fire suppression activities rather than “fire prevention programs” (which includes encouraging built-in protection). In this manner, resources of the fire service could be devoted to developing proposals for residential sprinkler legislation, education packages for homeowners, home inspection programs, etc.

### **Distribute Resources And Promote Adoption Of Model Sprinkler Ordinance(s)**

Technical support resources need to be distributed to promote the local adoption of model residential fire sprinkler ordinance(s) promoted for fire service and local jurisdictions. This includes two possible areas of activity. One involves energizing fire service personnel to participate in the code development and revision process in model codes, such as the International Building Code and NFPA 5000, 501 and 13D or other standards developed to address localized fire suppression in residences. In each case, proposals to mandate residential sprinklers in residential occupancies need to be supported vigorously.

In addition, concerns were expressed that the NFPA 13D technical committee was perhaps losing sight of the initial philosophy for residential sprinkler systems with the strong life safety focus and interest in requiring a cost-effective system. Support for innovations that can reduce costs, effectiveness of reliability, such as multi-purpose piping systems, should be provided to the technical committee for possible mention in the standard or one of its annexes.

Another area of activity within this task includes encouraging local or state adoption of model codes, which mandate residential sprinkler systems. Alternatively, local jurisdictions can be encouraged to adopt local amendments. A draft section can be

developed which can be readily included in the respective model codes for local adoption.

Perhaps a list or U.S. map could be developed which identifies those jurisdictions that have adopted residential sprinkler legislation. These jurisdictions could serve as a resource for other jurisdictions contemplating the development of proposals to mandate residential sprinklers.

### **Improve Means Of Collecting And Disseminating Data And Case Studies**

Another task consists of having a better means of collecting and disseminating data and case studies, including economic analysis. In particular, no “real good” published data exists to support statements that refer to the effectiveness of residential sprinklers. This is in part due to the need for measurement techniques of sprinkler impact. The database should seek to demonstrate issues such as:

- Identifying a nexus between low fire death rates and residential fire sprinkler systems.
- Assess the number of people that have been “saved” in residential fires by fire suppression forces versus residential sprinklers (this may serve as one of the performance measures for the data base?)
- Assess the impact of residential sprinklers on the need for related services, such as burn prevention and treatment, medical care (both acute and long-term).
- Compare the protection level provided by smoke detection with that by residential sprinklers. Review recent research suggesting problems related to the inaudibility of smoke alarms by children and the elderly.

As part of this task, an effort to identify and build on past successes should be pursued. This may be best done by institutionalizing successful programs by developing case studies of the successes, such as from Maryland for multi-family residences, including apartment and townhouses or the Scottsdale, AZ community.

The mission to collect and disseminate information suggests that a resource list, i.e. directory of residential sprinkler information sources, should be developed. This could also involve the pursuit of new “marketing” methods and initiatives via web sites or pop-up ads. Such a directory of resources needs to be readily found through search engines and by extensive links between sites (much of this exists now and may only need to be expanded).

In addition, literature should be developed which focuses on protecting the homeowner after installation. Developing information brochures on warranties, sources for customer service, maintenance requirements by the homeowner and commercial resources for maintenance would all be beneficial as a support service to homeowners.

### **Emphasize Residential Sprinkler Systems In USFA Curricula**

Finally, residential sprinkler systems need to be emphasized in USFA curricula, providing technical, management and “political” emphasis to help develop the widespread support for residential sprinkler systems among the fire service. Including the topic in National Fire Academy (NFA) courses is essential to educating the fire service about the merits of residential sprinklers to improve the base of support within the fire service (which should help commit fire service organizations to the coalition noted previously). In courses where residential sprinklers are discussed, it would be beneficial if such could be reflected in course descriptions.

### **Strategy #4**

*US Fire Administrator continue to support research and development and associated programs aimed at advances in residential fire sprinkler technology for the increased acceptance of residential fire sprinkler systems.*

This strategy is directed toward the continued development of residential sprinkler technology, being principally focused on identifying and analyzing the performance and reliability of design alternatives that may improve the cost-effectiveness of the systems. The USFA has been involved in the role of supporting research to advance the technology so that barriers to the adoption of residential sprinklers become eroded. For example, the USFA has supported research on the efficacy of backflow prevention devices, performance of residential sprinklers in manufactured housing, localized kitchen fire suppression, low-flow systems, water mist piping systems, and others. In addition to the research directed at technological issues, research on socio-economic issues may also be valuable, especially to understand the factors affecting the acceptance of residential sprinkler systems by homeowners.

There are three research tasks associated with this strategy:

- Reduce sprinkler installation costs to minimum
- Reestablish UL testing protocols toward life safety goals
- Analyze fire protection system reliability

### **Minimize sprinkler installation costs**

Research should be conducted to explore design options for residential sprinkler systems that would reduce the installation cost of the system. Examples of possible areas of investigation include multi-purpose piping systems, necessity of backflow prevention devices, evaluation of pre-engineered systems and improvements in sprinkler technology.

A study of the need for backflow prevention devices was conducted in one area of the country in the early 1980's. This should be repeated in several areas of the country to assess the impact of any differences caused by differences in the intrinsic water quality in the area and also to assess the impact in changes in water quality standards since 1980. Pre-engineered systems could be studied to develop a set of "standard designs", thereby eliminating the need to perform hydraulic analyses to support designs, thereby decreasing the engineering time required. Also, continued improvements in sprinklers could be sought that would have improved performance characteristics.

### **Reestablish UL testing protocols toward life safety goals**

While the UL 1626 test for the approval of residential sprinklers includes thermal tenability criteria, consideration should be given to re-evaluating these criteria to assess whether alternate or additional tenability criteria need to be included in UL 1626 in order to enhance the level of life safety provided (note: this may be contrary to the provision of a cost-effective system, and may be an essential aspect of the analysis conducted to propose alternative tenability criteria). Tenability criteria involving gas concentrations and temperatures have recently been included in a research program on residential smoke detectors. In that program, the temperature and gas concentration criteria were suggested based on ISO standards and tenability research.

### **Analyze fire protection system reliability**

The reliability of residential sprinklers (either 13D systems or those installed following the local protection unit concept) needs to be addressed. The results of this could be used as part of the documentation needed to help establish "confidence" in the system designs.

## **3. Impediments to greater acceptance**

Identifying impediments inhibiting an increased rate of acceptance and installation of residential sprinkler systems is one of the first activities for the coalitions to address. Nonetheless, the attendees of this meeting identified several impediments at the

beginning and throughout this meeting (several of these impediments are reflected in the description of strategies provided in the previous section). These impediments are presented as a group in this section as a “starting point” for the deliberations of the coalitions. The order of the impediments is random and should not be construed to represent any attempt to rank or establish priorities.

- The public’s expectation of in-home safety: the public feels “safe”, given the widespread acceptance of smoke detectors and presence of the fire service (the homeowner expects the fire service to provide complete protection, regardless of the situation or fire scenario).
- There is a lack of published data to document definitively the benefit of residential sprinklers. In a related area, there are no agreed upon performance measures or measurement techniques to describe the impact of residential sprinklers.
- Costs were recognized to be a continuing and significant impediment. Frustrations with costs were discussed (see list below). Costs were recognized to vary appreciably in different regions of the country. On the positive side, in Scottsdale costs decreased after the residential sprinkler systems were mandated. However, to indicate that costs aren’t the sole barrier, a rhetorical question was raised, asking for opinions as to what the hypothetical acceptance rate of residential sprinkler systems would be if they could be installed for free. Cost-related topics included:
  - Cost-benefit parameters need to be established.
  - Sprinkler installation costs need to be reduced to the minimum. A goal needs to be established to reduce system installation costs by \$‘X’ in ‘Y’ years.
  - Does current edition of NFPA 13D seek to minimize costs? Does current edition of NFPA 13D seek to optimize cost-effectiveness?
  - Do UL 1626 test criteria adequately reflect life safety goals of system?
  - Should anyone license installers? If so who and to what level?
  - Federal funding leverage has not been exercised.
  - There is a lack of substantial economic incentives.
    - Insurance
    - Taxation

- Propose a program where people could get a large tax incentive for sprinkler installations?
    - Property
    - Income
  - Builder mark-ups
  - Insurance surcharges
  - Water tap fees
  - Standby fire protection fees
  - Increased meter sizes
  - Backflow prevention devices
  
- Resistance and/or lack of knowledge by allied professionals may lead these organizations and entities to obstruct the installation of a sprinkler system. The water dept, the architect, and the homebuilder, among others, may discourage someone who wants a sprinkler system. Again, if the systems could be installed for free, would some of these groups still provide obstructions to inhibit the installation of these systems? In some areas, people may still not be able to install a system due to other impediments. Impediments are believed to be presented by:
  - Home builders/Architects/Building Designers/Contractors/Water purveyors
    - National Association of Home Builders (NAHB)
    - AWWA is now voting to disband the fire protection committee
  - Fire service professionals
    - Labor force issues: fears that residential sprinkler system mandates will lead to staff reductions
    - Effectiveness of residential sprinkler system isn't presented as part of community's overall fire protection planning, providing
      - Increased first responder personnel safety
      - Reduced fire flow
      - Alternates to other means of protection
  - Sprinkler organizations may have labor issues concerns of who installs the systems (sprinkler fitters or plumbers)
  
- Fire chiefs that propose residential sprinkler systems are "all alone". Their promotion and job security is not affected by testifying for a mandate for residential sprinklers (in fact, the converse may be true). Is there a bias against the local chief in favor of homebuilders/developers in an area? In some cases, professional lobbyists may oppose the fire chief.

- Successful programs and initiatives are not well documented. Thus, every new proposal to mandate sprinklers requires the proponent to “start over” in building the case.
- A conservative trend in code and standards development appears to be emerging after 9-11-01. Comments were made that NFPA 13D may have forgotten its original emphasis on life safety for residential sprinkler systems.
- Reliability of residential sprinkler systems is undocumented.

#### **4. Future Directions**

The formation of two coalitions was proposed in the list of tasks associated with the four strategies. While these two coalitions may best begin as two separate entities, they could be merged at some point in the future. The coalition meeting involving an expanded group of fire professionals should be held within the next six months. This group includes representation similar to that provided for this meeting and would also include fire service organizations and other fire professionals. The principal purpose of this coalition is to expand the base of support for a national residential sprinkler initiative.

The second coalition should meet by April 2004 and include allied professionals. The initial intent of this coalition is to broaden the education base and narrow (preferably eliminate) the gap between advocates and adversaries. The long-term intent is to include this group among the advocates of residential sprinklers.

Finally, development of a group of Federal partners is essential in order to effect the proposed changes in Federally subsidized, leased and owned residential units. Success with the strategy is strongly contingent on the support of the other Federal agencies. As such, meetings with individual potential partners need to be conducted immediately. Once a list of partners is confirmed, a group meeting of all of the Federal partners should be held.