STAKEHOLDER VIEWS IN RELATION TO THE INTRODUCTION OF RESIDENTIAL SPRINKLER LEGISLATION IN NEW SOUTH WALES, AUSTRALIA

LEADING COMMUNITY RISK REDUCTION

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ABSTRACT

The problem was that the introduction of legislation requiring the installation of residential sprinkler systems was not being seriously considered within the fire protection community in New South Wales (NSW), Australia. This meant that an effective, proven engineering solution was not being provided for members of the community who are more at risk from fires in the home, including young children, older adults, and people with disabilities.

The purpose of this paper was to investigate the potential barriers that existed in relation to the introduction of residential sprinkler legislation in NSW, by describing the viewpoints of key stakeholders within the fire protection community. This was a descriptive research project and the research questions were:

1. What automatic fire protection measures currently must be installed in residential structures in NSW, including the specific requirements in relation to sprinklers?

2. Who are the key stakeholders within the fire protection community in relation to the introduction of residential sprinkler legislation in NSW?

3. What are the views of these key stakeholders in relation to the introduction of residential sprinkler legislation in NSW?

The procedures involved examining the relevant legislation and codes in NSW to identify what requirements existed for automatic fire protection measures in homes. Semi-structured telephone interviews were then conducted with 15 representatives of organizations or groups identified as key stakeholders. Their responses were summarized to show the following attributes in relation to the introduction of residential sprinkler legislation in NSW: (a) benefits to stakeholders, (b) disadvantages or risks to stakeholders, (c) resources that stakeholders have available, (d) power of stakeholders, and (e) interest of stakeholders.

The results were that, while there are appropriate standards for residential sprinklers in Australia, the deemed-to-comply provisions of the *Building Code of Australia* do not require them to be installed in homes. The responses of the 15 stakeholders representatives who participated in this study indicated that there was a lack of understanding of residential sprinklers within the fire protection community, and that future support is contingent on demonstrating their cost-effectiveness for residential property in NSW.

The major recommendation of this study was for the NSW Fire Brigades to develop strategies to improve the level of knowledge regarding residential sprinklers, especially among the key stakeholders. This includes forming a coalition of supportive stakeholders to combine their resources to promote residential sprinklers, as well as undertake further research into the cost-effectiveness of residential sprinklers for both new and existing dwellings in NSW.

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INTRODUCTION

The problem is that the introduction of legislation requiring the installation of residential sprinkler systems is not currently being seriously considered within the fire protection community in the state of New South Wales (NSW), Australia. It will be shown that young children, older adults, and people with disabilities are more at risk from fires in the home for a number of reasons, including their inability to react appropriately to the cues associated with fire and then to respond quickly enough to escape. The lack of residential sprinkler legislation in NSW means that an effective, proven engineering solution is currently not being provided for members of these and other at-risk groups.

The purpose of this paper is to investigate potential barriers that may exist in relation to the introduction of residential sprinkler legislation in NSW, by describing the viewpoints of key stakeholders within the fire protection community. This is a descriptive research project and the research questions are:

1. What automatic fire protection measures currently must be installed in residential structures in NSW, including the specific requirements in relation to sprinklers?

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BACKGROUND AND SIGNIFICANCE

The population of NSW is more than six million, and approximately four million people live in the capital city of Sydney. Over 90 percent of fire related deaths in NSW occur in residential buildings and, while the number of residential fire deaths has remained relatively static since 1991, specific at-risk groups continue to be disproportionately affected by fires in the home (Nicolopoulos, 2002). Fire data collected by the NSW Fire Brigades (NSWFB) show that children below the age of 5, adults over 65 years, people with physical or mental disabilities, as well as those under the influence of alcohol or drugs face a higher risk of death or injury as the result of fires in residential structures.

The NSWFB currently delivers a number of fire safety programs that specifically target members of at-risk groups in the community. These initiatives include a juvenile intervention and fire awareness program developed in response to the special fire safety needs of young children and the Smoke Alarm Battery Replacement for the Elderly program that targets older residents living alone in the community. In July 1994, the *Building Code of Australia* (BCA) was amended requiring the installation of hard-wired smoke alarms in all new dwellings, and the NSWFB continues to promote the installation and maintenance of smoke alarms in existing homes, especially in public and rental housing. Despite these initiatives, members of these at-risk groups continue to be over represented in the fire fatality and injury statistics for NSW.

The experience of many jurisdictions in the United States and the United Kingdom is that programs designed to influence occupant behaviour in fire or to increase smoke alarm penetration do not provide the whole answer. It is likely that a significant proportion of the population will not receive or respond to fire safety messages and other educational initiatives, no matter how well they are designed or delivered (Pigot, 2000). Further, even when smoke alarms are maintained and operating correctly, they only provide a short period of additional escape time for the occupants (Craig, 1990). This means that smoke alarms may be of limited benefit for members of the identified at-risk groups, due to the additional time it takes to alert them and then for them to make their escape.

Residential sprinklers are designed to prevent flashover in the room of fire origin and, while they provide a high level of property protection, they also increase the time available for occupants to evacuate their homes safely (Coughlin, 1998). Unfortunately, according to the NSWFB representative on the Building Regulations Advisory Council, which is the body responsible for building code development and reform in NSW, the introduction of residential sprinkler legislation is currently not being considered (K. Bryant, personal communication, February 18, 2004). Further, the NSWFB currently has no strategy to influence the Government or key stakeholders with regard to the introduction of residential sprinkler legislation, or to communicate the benefits of residential sprinklers to the wider community (New South Wales Fire Brigades [NSWFB], 2003).

If legislation were introduced making sprinklers mandatory for all new homes, it is argued that residential property loss would be reduced in the long-term, as the building stock in NSW is replaced or refurbished. If the legislation was extended to include existing public and rental housing, where a high proportion of members of the identified at-risk groups live, then it is expected that a significant number of lives would also be saved in the short-term. This study is therefore important to the NSWFB because it will identify the stakeholders within the fire protection community who must be consulted and the potential barriers that may exist in relation to any proposed residential sprinkler legislation in NSW.

This research project relates to the importance of building support for fire safety initiatives, which is a key element of the community risk reduction model presented in the *Leading Community Risk Reduction* course at the National Fire Academy (NFA). This part of the course emphasized the value of engaging with stakeholders and the requirement to build a relationship with them, even with those who may oppose the community risk reduction initiative. Within this context, a stakeholder may be defined as "any individual or group of people who may be impacted by, or have a special interest in, a community risk reduction initiative" (National Fire Academy [NFA], 2003, p. SM 3-63).

This research project also relates to two operational objectives of the Unites States Fire Administration (USFA): to "reduce the loss of life from fire in the age group 14 years old and below" and to "reduce the loss of life from fire in the age group 65 years old and above" (NFA, 2002, p. II-2). The literature review will show that there is ample research demonstrating that these two groups are among those members of the community who are disproportionately affected by fire, and that residential sprinkler systems are an effective means to significantly reduce the number of deaths and injuries caused by fires in the home.

LITERATURE REVIEW

The purpose of this literature review is to summarize the findings of other researchers in the following three areas that are central to the investigation of stakeholder views of residential sprinkler legislation. First, the use of stakeholder analysis in introducing legislative change is examined in order to guide the selection of the most appropriate methodology for this study. Second, the evidence regarding the effectiveness of residential sprinklers is discussed in relation to specific at-risk groups within the community in NSW. Finally, the factors that were found to be significant in the introduction of residential sprinkler legislation in other jurisdictions are considered, including the likely importance of these for any future legislative change in NSW.

Stakeholder Analysis

Amending the building regulations to include a requirement for residential sprinklers in NSW represents a significant legislative change, and it is expected that the key interest groups will hold a range of political, economic, technical, and social positions on this issue. The research literature suggests that stakeholder analysis is an important first step in developing a strategic plan in relation to implementing such change, and that attention to stakeholder concerns is crucial because "policies and programs are in effect treaties among the various stakeholder groups" (Bryson, 1988, p. 68).

The use of stakeholder analysis as an aid in the development and introduction of public policy is supported by Young (2001), who also cautions that the fire service must use this technique carefully to avoid misleading results. Specifically, Young reminds practitioners not to underestimate the complexity of the legislative environment, and to recognize the dynamic nature of the interaction between the stakeholders involved.

The stakeholders within the fire protection community in relation to the introduction of residential sprinkler legislation in NSW include a range of legislative, construction, and other interest groups from both the private and government sector. Bunn, Savage, and Holloway (2002) developed an approach to marketing innovations that involve numerous stakeholders from different sectors within the community. They concluded that the attributes of each stakeholder in relation to the innovation in question are useful in determining the influence that they will have, and therefore are an important guide to the development of appropriate marketing strategies.

The research conducted by Bunn et al. (2002) also highlighted the importance of recognizing the existence of dynamic relationships among the stakeholders. This involves understanding how stakeholders may operate to maximize the influence they have in relation to the proposed change, for example by forming a temporary coalition with a more powerful stakeholder. This means that the method used in this study should identify where pre-existing relationships between stakeholders exist and how these might change over time, for example as the result of developments in the political, economic, technical, and legislative environment.

Murdock (2001) describes the application of stakeholder analysis for the fire service and endorses the use of a model where stakeholder views are analyzed according to the dimensions of power and interest. Murdock explains that stakeholder power may be positive (initiative will be supported) or negative (initiative will be opposed), direct (based on formal authority) or indirect (achieved through intermediary bodies), and exercised alone (if there is sufficient power) or in alliance with other stakeholders (where there is benefit to each of the parties). The interest of stakeholders may also be predictable (because the stakeholder is well known) or not predictable (where there may be no previous experience to draw upon), specific (related to an actual situation) or generic (related to the concept), and favorable (willing to support) or opposed (may require some form of concession).

The actual method that will be used to analyze the views of stakeholders in this study is a combination of the approaches advocated by Bunn et al. (2002) and Murdock (2001). The benefits and disadvantages for each stakeholder will be described, as well as the resources that they may have available for this issue. In addition, their responses will be assessed according to the dimensions of power and interest in relation to the introduction of residential sprinkler legislation in NSW.

In summary, the literature reviewed in relation to stakeholder analysis confirms that this will be an important and useful initial step in the change management process associated with the possible introduction of residential sprinkler legislation in NSW. The research literature highlights the benefits of using a method that enables stakeholder views to be assessed according to different dimensions. Such an approach will be used in this study and this is expected to allow the interaction between stakeholders and the complexity of the environment in relation to any introduction of residential sprinkler legislation in NSW to be examined more effectively.

Effectiveness of Residential Sprinklers for At-Risk Groups

Nicolopoulos (2002) analyzed NSW fire data collected between 1991 and 2000, including information provided by the NSW Coroner. This analysis highlighted the following statistics relating to deaths from residential fires in NSW in relation to the groups who are at-risk from fires in the home:

(a) almost 10 percent of fire victims were children under the age of five,

(b) people aged 65 years and over have over twice the risk of becoming a fire fatality,

(c) 20 percent of fire victims were physically or mentally disabled,

(d) 20 percent of fire victims were residents in public housing,

(e) 25 percent of fire victims were on medication or affected by non-prescribed drugs, and

(f) 64 percent of those victims whose blood alcohol was measured were affected by alcohol at the time of their death.

A review of the literature in relation to residential fires and the effect of these fires on specific at-risk groups shows that these results are consistent with those detailed in a survey of all Australian states and territories (Queensland Department of Emergency Services, 1998). Similar fire injury and fatality trends for young children, older adults, and people with disabilities are also reported for other developed nations such as the United States (United States Fire Administration [USFA], 1997), the United Kingdom (Pigot, 2000), and New Zealand (Duncanson, Reid, Langley, & Woodward, 2001).

Research into the reasons why members of these groups are more likely to be killed or injured by fires in the home has identified a variety of contributing factors. *Beyond Solutions 2000* (2002) identifies that more than half of the children under the age of five who die from fires in the home were asleep at the time. In addition, the report highlights the fact that young children are at greater risk of injury from fires in the home due to high-risk behavior, such as playing with matches or cigarette lighters. *Beyond Solutions 2000* also noted that children have a limited ability to react quickly to a fire, due to their lack of physical and cognitive development, and often have a poor perception of the dangers presented by fire.

In the case of older adults, Holborn, Nolan, and Golt (2003) suggest that, since many elderly people are infirm or suffer from a disability, they are less likely to be able to react quickly and escape from a fire in the home. The Australian Bureau of Statistics (1999) reports that in a survey of people aged 65 years and over, 90 percent had experienced a recent illness and virtually all (99 percent) reported at least one long-term health condition. The most common conditions were loss of sight and hearing, with arthritis also affecting half of all older people in Australia. These disabilities mean that older adults are less likely to detect the cues associated with fire, and then may be unable to respond quickly enough to escape.

People under the influence of alcohol or other drugs are also at a significantly increased risk from fires in the home. The reasons for this are also related to the victim's inability to react appropriately to fire cues and respond quickly. There is evidence that alcohol "not only impedes the detection of smoke, but also facilitates its passage into the body" (USFA, 1999, p. 13). Intoxication also delays the normal waking response and impedes decision making, which may delay escape in the event of fire. People under the influence of alcohol or drugs also have impaired judgment, and often engage in behavior that actually causes the fire, such as falling asleep while smoking or leaving cooking unattended (Holborn et al., 2003).

The main function of residential sprinklers is to allow occupants to evacuate their homes safely by providing additional time before conditions within the structure become untenable for life. Residential sprinklers however, cannot be seen to be the whole answer in relation to preventing death and injuries due to fires in the home, and there is support within the fire protection community for a multi-disciplinary approach to be used to reduce these statistics.

Solutions 2000 (1999) stated that to "effectively address the fire safety needs of any population the three E's, education, engineering, and enforcement, must be addressed" (p. 3). To

these may be added emergency response and economic incentive, in order to produce a comprehensive set of risk reduction strategies in relation to fire protection (NFA, 2003, p. SM 4-35). Rhodes and Reinholtd (1998) also support the need for a holistic approach to reduce fire fatalities in Australia, and recognize the importance of residential sprinklers as a key component of any fire protection package to reduce the vulnerability of high-risk groups within society.

In summary, the literature reviewed supports the view that residential sprinklers are particularly effective in reducing fire fatalities and injuries in relation to specific at-risk groups within the community. The evidence shows that young children, older adults, people with disabilities, and individuals under the influence of drugs or alcohol are more at risk from fires in the home. There are a number of reasons for these results, including their inability to react appropriately to the cues associated with fire and then to respond quickly enough to escape. The NSW statistics show similar trends to those reported for other developed nations, and therefore the experience of other jurisdictions in relation to the introduction of residential sprinkler regulations is likely to be valuable to legislators in NSW.

Residential Sprinkler Experience in Other Jurisdictions

The value of residential sprinklers is supported by the experiences of other fire departments that have successfully introduced residential sprinkler legislation. The experience in the United States is that residential sprinklers have proved to be effective in saving life and property, and a survey of 112 communities with residential sprinklers showed that satisfaction with the performance of systems in single-family dwellings was very high (Fleming, 2000). Despite this, attempts to introduce such legislation have often been associated with vigorous opposition by some groups within the community. Residential sprinkler legislation has been in place for some time in communities including Scottsdale, Arizona and Prince George's County in Maryland, and there is ample evidence demonstrating the cost-effectiveness of residential sprinklers in these jurisdictions.

An analysis of 10 years of data presented by Ford (1997) for Scottsdale, Arizona clearly demonstrates the cost-benefit of residential sprinklers. Ford's data showed that the average dollar loss sustained as the result of fires in unsprinklered homes was US$11,624 versus US$1,544 for sprinklered homes. Further, while ten people died as the result of fires in unsprinklered, single family homes in Scottsdale during the evaluation period, no people died in fires in sprinklered homes. Ford also reported that the cost of installing residential sprinkler systems in new houses fell considerably during the evaluation period and cited three main reasons for this trend, including the establishment of standards for installation, the improved availability of materials, and increased competition between contractors for the available business.

Siarnicki (2003) undertook a similar examination of the outcomes of the introduction of residential sprinkler legislation in Prince George's County, Maryland for the period 1992 to 1999. The data collected by Siarnicki showed that the average fire loss in non-sprinklered, single-family dwellings was almost US$32,000 compared to about US$3,670 for sprinklered, single-family homes. As for Scottsdale, no fatalities occurred in homes with a residential sprinkler system in Prince George's County during the evaluation period. Siarnicki (2003) also

noted that, although there was some damage due to broken sprinkler water pipes due to faulty installation, "not one accidental activation of a sprinkler head was reported" (p. 57).

Recent research conducted in Australia and New Zealand provides some estimates of the likely cost-effectiveness of residential sprinkler systems in NSW. Using fire data for NSW and actual full-scale experiments, Beever and Britton (1999) calculated the average cost of fire damage in an unsprinklered home in NSW to be A$24,000 versus a projected A$3,900 for homes with a sprinkler system installed. Their study included estimates of the cost of residential sprinkler installations in different types of housing. For a new production home with an internal floor area of 150 m^2 (1,610 ft^2) the cost was estimated to be A$2,550, while the cost of installing a residential sprinkler system in an existing house of the same size was estimated to be A$3,300.

Beever and Britton (1999) also estimated that the cost of installing residential sprinklers in new medium density housing might be as low as A$1,500 per household. Unfortunately, they did not make an estimate for installation in existing apartment buildings, and it is likely that a number of actual retrofit projects would need to be completed to realistically estimate the cost for different types of structures, including public housing. Although the results are now a little dated, the USFA (1989) undertook such a demonstration project involving the retrofit of residential fire sprinklers in six different buildings and found that if residential sprinklers were installed as part of a major building refurbishment, the cost was substantially reduced.

Duncan, Wade, and Saunders (2000) used a similar methodology to Beever and Britton (1999) and reached similar conclusions regarding the cost-effectiveness of residential sprinklers. Their recommendations regarding the introduction of a low-cost, residential sprinkler standard in New Zealand were subsequently implemented in 2002 (O'Brien, 2003). The introduction of this standard was met with resistance from key groups involved in building compliance and the plumbing industry in relation to residential sprinkler water supplies. A fire engineer with the New Zealand Fire Service reports that these concerns raised in opposition to the standard were eventually able to be addressed through a series of practical demonstrations to council and water engineers (S. Davis, personal communication, December 6, 2003).

The experiences of authorities in other jurisdictions are particularly important for this study, since many of the lessons learned involved recognition of the key stakeholders and the need to better understand their positions with regard to the proposed residential sprinkler legislation. The experience in Mesa, Arizona highlighted that introducing residential sprinkler legislation is "one of the most difficult political and educational challenges a fire department can face" (Bruno, 2000, p. 16). Following the passing of an ordinance requiring sprinklers in all new residential buildings in Mesa, a number of interest groups including builders and real estate companies formed an alliance to oppose and defeat the new law. Bruno reports that in this case public opinion was swayed by misinformation spread about residential sprinklers that was unable to be effectively countered by the fire department. The eventual outcome was that a compromise ordinance was passed following extensive consultation with the opposition groups. This experience highlights the importance of the fire service understanding the positions of key stakeholders in the community before attempting to introduce legislative change.

In the United States, there are a number of groups that may assist fire departments to implement residential sprinkler codes in their jurisdictions. Wolf (1998) describes Operation Life Safety as a partnership between government agencies and the private sector, that aims to reduce fire fatalities and injuries by promoting the increased use of residential sprinklers. This consortium provides a range of educational and support material for fire departments, including important advice to "assess their resources and get buy-in from community leaders and builders" even before commencing work on any proposed legislation (Wolf, 1998, p. 63). In addition to Operation Life Safety, there are other groups such as the Home Fire Sprinkler Coalition that brings together industry based organizations to undertake research, lobby key stakeholders, and jointly promote residential sprinklers (Wolf, 1998).

The literature review in relation to the introduction of residential sprinkler legislation in other jurisdictions has identified a number of important factors that are likely to be significant in the introduction of similar legislative change in NSW. Overseas experience shows that stakeholder groups, often acting in coalition, may be successful in defeating proposed residential sprinkler legislation despite clear evidence demonstrating their cost-effectiveness. Identifying the key stakeholders early in the legislative process, understanding their concerns, and educating them, as well as the public about the value of residential sprinklers may assist fire departments to meet this important challenge.

PROCEDURES

A qualitative research method involving three steps was used. The first step comprised a detailed examination of the existing legislation, codes, and standards in NSW in order to identify the automatic fire protection measures currently mandated for residential structures and, in particular, the requirements for sprinklers to be installed. This included reviewing the *Environmental Planning and Assessment Regulation* (2000), the BCA and supplementary guidelines developed by the Australian Building Codes Board (ABCB), and relevant standards published by Standards Australia.

The second step consisted of an unstructured, personal interview conducted with Superintendent John Honeybrook, manager of the NSWFB's Fire Safety Division. This was used to identify the key groups within the fire protection community that have a stake in the introduction of residential sprinkler legislation in NSW, as well as the most appropriate representative of each organization or stakeholder group to be interviewed for this study.

The third step involved the researcher conducting semi-structured, telephone interviews with each of these representatives, using the following questions to guide discussion:

1. What is view of your organization or group in relation to the introduction of legislation requiring the installation of sprinklers in all new residential structures or in existing public housing?

2. What important benefits or limitations does your organization or group see in relation to residential sprinklers?

3. In what ways could your organization or group support or oppose the introduction of such legislation?

4. What other groups do you see as sharing your organization's views in relation to residential sprinkler legislation?

The author carried out the interviews and made written notes to record the responses of each stakeholder representative. At the commencement of each interview, the author stated the purpose of the study and his affiliation with the NSWFB. The time allowed for each telephone interview was 20 minutes, which were scheduled at a time suitable to the interviewee. The responses of each stakeholder representative were summarized to show the following attributes: (a) benefits to the stakeholder, (b) disadvantages or risks to the stakeholder, (c) resources that the stakeholder has available, (d) power of the stakeholder, and (e) interest of the stakeholder in the issue of residential sprinkler legislation in NSW.

Limitations and Assumptions

The development and passing of legislation is subject to a political process that may be influenced by the views of a wide range of interest groups. No attempt has been made in this study to include the views of all such groups. This research was limited to interviews with representatives of organizations that were identified as having a role in the provision of fire protection and related services to the community in NSW, and in particular to the residential building industry.

The purchasers of new homes, as well as the owners of existing residential property that may require the installation of residential sprinklers as a condition of future development approval, are also key stakeholders in relation to the introduction of residential sprinkler legislation. However, the residential property market in NSW is highly segmented, and a large number of interviews would be required to effectively represent the views of these people. Including intending and existing home owners in this analysis was therefore considered to be beyond the scope of this study, although this would be an extremely worthwhile initiative to consider as part of any further research on this topic.

It is assumed that the selected interviewees were able to effectively represent the views of their organizations. A possible limitation of this study is that some stakeholder representatives, particularly those who may oppose the introduction of residential sprinkler legislation in NSW, might not provide full or frank responses during a telephone interview with a fire department officer. This may occur for a variety of reasons, including a desire not to reveal any strategies that may be used to oppose the introduction of residential sprinkler legislation in the future.

Definition of Terms

Automatic fire protection measures--installed systems that detect or control fires, and which operate without the need for human intervention.

Deemed-to-comply design--a building design that satisfies the performance requirements of the BCA by complying with the specific provisions detailed for a building of that occupancy, effective height, and floor area.

Fire detection system--a system of fire detectors with associated local alarms and fire service monitoring that is installed in accordance with Australian Standard (AS) 1670.1 *Fire detection, warning control and intercom systems--System design, installation and commissioning Part 1: Fire* (Standards Australia, 1995c).

Performance-based design--a building design that satisfies the performance requirements of the BCA through an engineered solution that can be shown to achieve the outcomes required for a building of that occupancy.

Residential sprinkler system--a sprinkler system for single dwellings that is installed in accordance with AS 2118.5 *Automatic fire sprinkler systems Part 5: Domestic* (Standards Australia, 1995b), or for residential buildings up to four stories in height, that is installed in accordance with AS 2118.4 *Automatic fire sprinkler systems Part 4: Residential* (Standards Australia, 1995a).

Residential structure--a building in which "sleeping accommodation is provided for normal living purposes and includes all such buildings except for those that are classified as institutional buildings" (NSWFB, 1998, p. 1.66).

Smoke alarm system--a system of mains-powered smoke alarms that is installed in accordance with AS 3786 *Smoke alarms* (Standards Australia, 1993).

Standard sprinkler system--a sprinkler system designed to detect and control fires in buildings with light hazard through to high hazard occupancies, and which is installed in accordance with AS 2118.1 *Automatic fire sprinkler systems Part 1: General requirements* (Standards Australia, 1999).

RESULTS

Research Question 1. What automatic fire protection measures currently must be installed in residential structures in NSW, including the specific requirements in relation to sprinklers?

In NSW, the *Environmental Planning and Assessment Regulation* (2000) specifies that all building work must be carried out in accordance with the requirements of the BCA. Four classes of buildings may be described as residential structures for the purposes of this study and, while these are described fully in Appendix A, they may be summarized as: (a) single dwellings (Class 1a), (b) boarding houses (Class 1b), (c) apartment buildings (Class 2), and (d) hotels (Class 3).

A building may satisfy the performance requirements of the BCA in two ways: by satisfying the deemed-to-comply provisions, or through a performance-based design. In relation to housing, the performance requirements of the BCA state that occupants must be safeguarded from illness or injury by alerting them to fire in the building so that they may safely evacuate,

and also that the spread of fire is avoided (Austrailian Building Codes Board [ABCB], 1996b). The deemed-to-comply provisions of the BCA require specific types of automatic fire protection measures for residential structures and these vary significantly depending on the classification and effective height of the building as follows.

Single Dwellings

Since July 1994, all houses constructed in NSW have been required to have hard-wired, single-point smoke alarms installed that comply with AS 3786. This means that the smoke alarms must be installed on each level of the house, as well as in hallways outside bedrooms (ABCB, 1996b). There is currently no requirement for smoke alarms to be installed in existing homes, unless the building undergoes alterations or renovations that require the issue of a development certificate from the relevant approval authority.

The BCA currently does not require a sprinkler system to be installed in either new or existing single dwellings. The relevant standard is AS 2118.5, which specifies the requirements for the design and installation of sprinklers in Class 1 buildings. AS 2118.5 is similar in its scope and application to the National Fire Protection Association *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Mobile Homes* (NFPA 13D, 2002a). This includes the use of a combined domestic and sprinkler water supply, the use of chlorinated polyvinyl chloride pipe, and the omission of sprinkler protection from areas such as closets and roof spaces, where the incidence of fire is considered to be low.

Boarding Houses

The automatic fire protection measures that must be installed in boarding houses are generally similar to that required for new single dwellings. Hard-wired, single-point smoke alarms complying with AS 3786 must be installed and there are additional requirements that the smoke alarms must be installed in every bedroom of boarding houses as well as in hallways, and that lighting activated by the smoke alarms, is installed to assist evacuation (ABCB, 1996b).

The deemed-to-comply provisions of the BCA do not require that sprinkler systems be installed in boarding houses. However, residential sprinkler systems complying with AS 2118.5 may be installed as part of a performance-based solution, for example to provide an alternative to inadequate compartmentation in an existing building (ABCB, 1998).

Apartment Buildings

The deemed-to-comply provisions of the BCA require that smoke alarms complying with AS 3786 must be provided in all new apartment buildings. The system must consist of hard-wired, single-point smoke alarms installed within each sole occupancy unit, with the alarms installed within the public corridors and other public spaces subject to closer spacing. Where the

effective height of an apartment building is greater than 25 meters, a fire detection system complying with AS 1670.1 is required (ABCB, 1996a).

According to the deemed-to-comply provisions of the BCA, sprinkler systems complying with AS 2118.1 must be installed in apartment buildings where the effective height of the building is greater than 25 meters. Sprinkler systems may also be installed in apartment buildings containing no more than four stories as part of a performance-based design, for example to compensate for the reduced fire resistance of structural elements, and in these cases the sprinkler system would be installed in accordance with AS 2118.4 (ABCB, 1998). This standard specifies the requirements for the design and installation of sprinklers in low-rise Class 2 and 3 buildings and is similar in scope and application to NFPA 13R (2002b) *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to Four Stories in Height.*

Hotels

The deemed-to-comply provisions of the BCA require that smoke alarms complying with AS 3786 must be provided in hotels that have no more than two levels and accommodate no more than 20 guests. Class 3 buildings larger than this must have a fire detection system installed that complies with AS 1670.1 (ABCB, 1996a).

The deemed-to-comply provisions of the BCA do not require that sprinkler systems be installed in hotels unless the effective height of the building is greater than 25 meters. In such high-rise hotels the system must comply with AS 2118.1. Like apartments, residential sprinkler systems complying with AS 2118.4 may also be installed in hotels containing no more than four stories as part of a performance-based design (ABCB, 1998).

Research Question 2. Who are the key stakeholders within the fire protection community in relation to the introduction of residential sprinkler legislation in NSW?

The following 15 stakeholder groups were identified as likely to have a key involvement in the implementation of any future residential sprinkler legislation in NSW:

(a) Building Codes Development and Reform Unit,

(b) Real Estate Institute of NSW,

(c) NSW Fire Brigades,

(d) NSW Department of Housing,

(e) Local Government and Shires Association,

(f) Royal Australian Institute of Architects,

(g) Australian Institute of Building,

(h) Institute of Strata Title Management,

(i) Master Builders Association,

(j) Housing Industry Association of Australia,

(k) Insurance Council of Australia,

(l) Master Plumbers Association of NSW,

(m) Fire Contractors Federation,

(n) NSW Fire Brigade Employee's Union, and

(o) firefighters.

The stakeholder representatives were identified and these are listed in Appendix B. Each person was then contacted by telephone and all agreed to be interviewed for this study.

Research Question 3. What are the views of the key stakeholders in relation to the introduction of residential sprinkler legislation in NSW?

The key responses recorded during each interview are listed in Appendix C. The views expressed by the stakeholder representatives were summarized according to: (a) benefits to stakeholders, (b) disadvantages or risks to stakeholders, (c) resources that stakeholders have available, (d) power of stakeholders, and (e) interest of stakeholders, as follows.

Benefits to Stakeholders

Five stakeholder representatives reported that clear benefits to their organization would probably result from the introduction of residential sprinkler legislation in NSW. These benefits were increased business (Master Plumbers Association of NSW; Fire Contractors Federation) and the safety of firefighters (NSWFB; NSW Fire Brigade Employee's Union; firefighters).

The remaining stakeholder representatives were unable to describe any clear benefits to their organization. Several interviewees expressed the view that more evidence of the cost-effectiveness of residential sprinklers would be required before their organization would support the introduction of any proposed legislation (Royal Australian Institute of Architects; Insurance Council of Australia; Housing Industry Association of Australia; NSW Department of Housing). Several stakeholders also reported that their support of residential sprinkler legislation could depend on incentives being identified that would make the installation cost more acceptable. The concessions identified included a relaxation of the deemed-to-comply provisions of the BCA in relation to compartmentation and travel distances within the common areas of apartment buildings (NSW Department of Housing). The Insurance Council of Australia also identified the

possibility of discounted insurance premiums for homes with residential sprinklers, but that this would have to be supported by evidence of reduced claims.

Disadvantages or Risks to Stakeholders.

Stakeholder representatives reported a number of disadvantages or risks that the introduction of residential sprinkler legislation in NSW may bring their organizations or groups. A major disadvantage reported was the high cost of installation in existing homes, for example in public housing, or where proposed renovations require the submission of a development application (Real Estate Institute of NSW; NSW Department of Housing; Local Government and Shires Association). While some stakeholders (Master Builders Association; Housing Industry Association of Australia) did not see installing residential sprinklers in new homes as being cost-effective, others believed that the additional cost would be acceptable to the community (Australian Institute of Building; Local Government and Shires Association).

Other significant disadvantages reported included the difficulty in legislating change in NSW without the support of the ABCB (Building Codes Development and Reform Unit), and increased call-outs and water damage, especially in public housing (NSW Fire Brigades; firefighters; Royal Australian Institute of Architects).

Stakeholder representatives also identified that installing sprinklers in existing public housing may be a risk, due to concerns with occupational health and safety, and unsatisfactory project management by the owners of the buildings (Master Plumbers Association; Fire Contractors Federation). Both of these organizations also raised the issue that poor quality installation work would be a risk; the Master Plumbers Association would be concerned with the skills of non-member plumbers, and the Fire Contractors Federation with the ability of plumbers to do the work satisfactorily.

Resources that Stakeholders Have Available

Interviewees reported a range of resources that their organization may be able to mobilize to either support or oppose the introduction of residential sprinkler legislation in NSW. In support of residential sprinklers, some stakeholders may be able to commit resources to undertake further research (Building Codes Development and Reform Unit; NSW Department of Housing; NSWFB). Other resources included experience in lobbying government (Insurance Council of Australia; Real Estate Institute of NSW; Fire Contractors Federation), and credibility with other industry groups and the community (NSWFB; firefighters; Royal Australian Institute of Architects; Australian Institute of Building; Fire Contractors Federation).

Resources that may be mobilized in opposition to introduction of residential sprinkler legislation in NSW include large memberships and close links with the residential building industry (Master Builders Association; Housing Industry Association of Australia). In addition, while the NSW Fire Brigade Employee's Union does not currently have a firm position on residential sprinklers, it was reported that it could easily politicize the debate and mobilize firefighters, who are well respected in the community.

Power of the Stakeholders

Each stakeholder was assessed regarding the power that they may have in relation to the introduction of residential sprinkler legislation in NSW. Several stakeholders were assessed to be able to exert a strong, positive influence in support of relevant legislation (Building Codes Development and Reform Unit; NSWFB; Fire Contractors Federation). The Local Government and Shires Association was assessed to have power that was indirect, and was more likely to be exercised through intermediary bodies such as the regional organisations of councils in NSW.

Two stakeholders were assessed as being able to exert a strong, negative influence on any proposal to introduce residential sprinkler legislation (Master Builders Association; Housing Industry Association of Australia). It is also possible that the power of these two organizations could be exercised in the form of an alliance, in conjunction with other industry groups which would be affected by any rise in the cost of new homes. The NSW Department of Housing is likely to use its power alone to oppose the mandatory installation of residential sprinklers in existing public housing. The Insurance Council of Australia and the NSW Fire Brigades Employee's Union were assessed to be stakeholders with a high degree of power, but whose level of support was unpredictable given their low level of knowledge about residential sprinklers.

The interviews suggest that other stakeholders, who were not assessed to have a great deal of power in this area, could form effective alliances with others to provide a significant amount of support for residential sprinkler legislation. This was particularly evident for organizations in the building industry, including the Royal Australian Institute of Architects, the Australian Institute of Building, and the Master Plumbers Association of NSW.

Interest of the Stakeholders

Relatively few stakeholders were assessed to have a high level of interest regarding the introduction of residential sprinkler legislation in NSW. Those who did and were favorable to the concept were the Master Plumbers Association of NSW and the Fire Contractors Federation. The NSW Department of Housing was also assessed to have a high level of interest in the issue, but would likely oppose residential sprinkler legislation that involved existing public housing because of the enormous cost this represents.

DISCUSSION

The results show that the BCA requires that smoke alarms and fire detection systems be installed in residential structures in NSW to provide early warning, and to alert occupants to a fire in the building so that they may escape safely. Despite the introduction of these provisions, the number of residential fire fatalities in NSW has not declined. Further, members of specific at-risk groups in the community, such as children below the age of 5, adults over 65 years, people with physical or mental disabilities, and individuals under the influence of alcohol or drugs continue to be disproportionately affected by fires in the home (Nicolopoulos, 2002). These trends have also

occurred in spite of the introduction of a number of community safety programs by the NSWFB, which have been specifically designed to assist people who belong to these groups.

There is evidence that residential sprinklers would be effective in reducing fire fatalities and injuries for at-risk groups in NSW (Holborn et al., 2003; *Solutions 2000,* 1999; Rhodes & Reinholtd, 1998). The value of residential sprinklers is that they are designed to prevent flashover in the room of fire origin and therefore would operate to increase the time available for escape before conditions become untenable (Coughlin, 1998). Unfortunately, while there are Australian standards for residential sprinklers, the deemed-to-comply provisions of the BCA do not require them to be installed in any type of residential occupancy in NSW. They are currently only installed where the owner chooses to do so, or as part of a performance-based design.

The relevant standards for the installation of residential sprinkler systems in Australia are AS 2118.4 for low-rise apartments and hotels, and AS 2118.5 for single dwellings. These two standards are very similar to NFPA 13R and 13D, which a number of jurisdictions in the United States have successfully introduced into legislation. The long-term results reported for Scottsdale, Arizona (Ford, 1997) and Prince George's County in Maryland (Siarnicki, 2003) indicate that residential sprinklers not only save lives, but are also a cost-effective means to reduce the economic loss associated with dwelling fires. Australian research supports the view that similar legislation would also be effective if introduced in NSW (Beever & Britton, 1999).

If the NSWFB wishes to introduce residential sprinkler legislation in NSW, it would be sensible to heed the advice provided to fire departments in the United States by Operation Life Safety. This organization promotes the importance of first generating support for the concept with stakeholders within the community and the building industry (Wolf, 1998). The 15 stakeholders identified for this study included organizations that were analogous to the interest groups that had opposed the introduction of residential sprinkler legislation in different jurisdictions in the United States (Bruno, 2000; Fleming, 2000). By understanding the concerns of these groups, the NSWFB may avoid some of the conflict and setbacks that fire departments in other jurisdictions have experienced over residential sprinkler legislation.

The responses of the stakeholder representatives who participated in this study indicated that there is a general lack of understanding regarding residential sprinklers within the fire protection community in NSW. In addition, the interviews revealed that some stakeholders believe that water damage resulting from vandalism or the accidental operation of residential sprinklers is common; and that, while smoke alarms are needed for occupant life safety, residential sprinklers are primarily a property protection measure. These are common misconceptions that have been used effectively by opponents of residential sprinkler legislation in the United States to negatively influence public opinion (Bruno, 2000). An effective strategy for countering interest groups that may use this method would be to form a coalition of agencies in support of the initiative and provide a clear, positive message to the community and elected representatives. Operation Life Safety and the Home Fire Sprinkler Coalition in the United States have successfully brought together industry based organizations to undertake research, lobby key stakeholders, and jointly promote residential sprinklers (Wolf, 1998).

The results of the stakeholder analysis also indicated that any future support for residential sprinkler legislation is contingent upon demonstrating their cost-effectiveness for residential property in NSW. While the evidence presented by Ford (1997), Siarnicki (2003), and Fleming (2000) in support of residential sprinklers is clear, caution needs to be used in applying such findings to NSW, where the legislative environment and building industry are very different. In Australia, the work undertaken by Beever and Britton (1999) to estimate the cost of installing residential sprinklers is now over five years old and should be revisited. In the United States the cost of installing residential sprinklers in new homes fell significantly in a relatively short period of time (Ford, 1997). Further, Beever and Britton did not estimate the costs of retrofitting residential sprinklers in existing apartment buildings and the NSW Department of Housing, which is the largest manager of housing in NSW, raised this as a very important issue. Their representative indicated that they would support a pilot program of building upgrades involving residential sprinklers, similar in concept to the demonstration project undertaken by the USFA (1989).

The method of stakeholder analysis that was used as the basis of this study emphasized the importance of recognizing the dynamic nature of the environment (Young, 2001). Some key stakeholders were assessed to have significant power, either acting alone or in coalition with other groups, but their position was unpredictable because they had little experience in this area to draw upon (Murdock, 2001). It will be important for the NSWFB to monitor and perhaps even nurture these organizations in relation to the issue of residential sprinkler legislation. A pertinent example is that the introduction of residential sprinklers could potentially lead to a reduced need for fire department resources in a particular area, or even the downsizing of the fire department in the long term. This is not a given, and clearly a significant amount of further research is required in this area. However, it is important to note that in this case it would be the members of the NSWFB itself and their union who might oppose any residential sprinkler legislation, and this emphasizes the importance of educating all stakeholders regarding the benefits of residential sprinklers. Other groups may require incentives to be identified before fully committing to support the installation of residential sprinklers. These concessions might include reduced insurance premiums, reduced levels of compartmentation or increased travel distances allowed in the common areas of multi-family occupancies.

It is important to build a relationship with all the stakeholders in relation to introducing residential sprinkler legislation in NSW, even with those who will oppose it. In this way, the NSWFB will have a better understanding of all the issues and be able to develop a strategic approach to achieve the required level of fire protection for those groups who are more at risk from fires in the home.

RECOMMENDATIONS

Based on this study, the NSWFB should develop strategies to improve the level of knowledge regarding residential sprinkler systems and the understanding of the benefits that they hold, particularly for members of at-risk groups within our community. While these strategies should apply to the community in general, they should also specifically target the identified stakeholder organizations and groups identified in this study. A good place for the NSWFB to

start to improve knowledge about residential sprinklers and their benefits is with its own staff. Firefighters interact with the public and members of the key stakeholder groups everyday, and can be effective ambassadors for changing attitudes about residential sprinklers.

A key element of this strategy is a further recommendation that the NSWFB should facilitate the formation of a coalition of stakeholders that can combine resources to promote residential sprinklers in NSW. The results of this study indicate that this coalition could provide resources for further research into the cost-effectiveness of residential sprinklers in NSW, for both new and existing dwellings. This research should also specifically include the types of public housing owned by the NSW Department of Housing, with the retrofit projects undertaken by the USFA in the late 1980s serving as an appropriate model for this initiative.

It is also recommended that the NSWFB ensure that any proposed residential sprinkler legislation is integrated into its fire safety programs developed for at-risk groups within the community. It is argued that by adopting a holistic approach to reducing residential fire fatalities and injuries, members of the community who normally do not receive or respond to fire safety advice (Pigot, 2000) may be reached by the fire service. A simple example of this might be to combine the annual maintenance inspection of the residential sprinkler system in the homes of people who are mobility impaired, with a visit by the local fire crew. During this visit, the firefighters could check and replace smoke alarm batteries, as well as provide advice to the occupant regarding appropriate escape strategies in the event of fire.

Finally, further research is also required into the views of the purchasers of new homes and the owners of existing residential property that may require the installation of residential sprinklers. This is an important area that was outside the scope of this study, but which needs to be undertaken in order to more fully understand the potential barriers to the introduction of residential sprinkler legislation in NSW. It is suggested that this research should include an investigation of the possible trade-offs or concessions that could be provided to home owners and residential property developers to make the installation of residential sprinklers more attractive.

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Appendix A
Definitions of Residential Building Classifications According to the BCA (ABCB, 1996a)

Class	Definition
1a	A single dwelling being a detached house, or one or more attached dwellings, each being a building, separated by a fire-resisting wall, including a row house, terrace house, town house, or villa unit.
1b	A boarding house, guest house, hostel or the like with a total floor area not exceeding 300 square meters and in which not more than 12 persons would ordinarily be resident, which is not located above or below another dwelling or another Class of building other than a private garage.
2	A building containing two or more sole-occupancy units each being a separate dwelling.
3	A residential building, other than a building of Class 1 or 2, which is a common place of long term or transient living for a number of unrelated persons, including: - a boarding-house, guest house, hostel, lodging-house or backpackers accommodation; or - a residential part of an hotel or motel; or - a residential part of a school; or - accommodation for the aged, children or people with disabilities; or - a residential part of a health-care building which accommodates staff; or - a residential part of a detention centre.

Appendix B
Selected Representatives of Key Stakeholder Groups

Organization or group	Name
Building Codes Development and Reform Unit	Mr Stephen Durnford
Real Estate Institute of NSW	Mr Geoff Hunter
NSW Fire Brigades	Superintendent Chris Lewis
NSW Department of Housing	Mr Jim Hristovski
Local Government and Shires Association	Councillor Nick Katris
Royal Australian Institute of Architects	Mr Ross Maxwell
Australian Institute of Building	Mr Ron Swane
Institute of Strata Title Management	Mr Bruce Wheeler
Master Builders Association	Mr Barry O'Mara
Housing Industry Association of Australia	Mr Ray Loveridge
Insurance Council of Australia	Mr Brian Hollis
Master Plumbers Association of NSW	Mr Paul Naylor
Fire Contractors Federation	Ms Carmel Coate
NSW Fire Brigade Employee's Union	Mr Michael Wright
Firefighters	Station Officer Tony Furner

Appendix C
Summary of Stakeholder Views in relation to Residential Sprinkler Legislation in NSW

Building Codes Development and Reform Unit

Benefits to organization	None stated
Disadvantages or risks	NSW amendments to BCA are difficult to legislate ABCB is currently unlikely to support Australia-wide amendment
Resources available	Responsible for the building provisions of NSW legislation Able to commit limited government resources to further research
Power	High Coordinates the Building Regulations Advisory Council
Interest	Moderate Homes currently do not have a high priority in regulatory agenda Low level of knowledge of residential sprinklers on the Council

Real Estate Institute of NSW

Benefits to organization	None stated
Disadvantages or risks	Neutral position regarding new housing Expense associated with installation in existing housing is a risk
Resources available	Some links with key government departments Has previously generated support for issues through position papers The cost of real estate in NSW is a salient issue with the public
Power	Moderate Installation cost for new housing not seen as being significant issue
Interest	Low However identified the Tenant's Union as a likely strong supporter

NSW Fire Brigades

Benefits to organization	Residential sprinklers would have positive effect on fire fatalities Could mitigate increasing safety risks with lightweight construction
Disadvantages or risks	Call-outs and water damage due to vandalism in public housing
Resources available	Not generally involved in Class 1 buildings Highly respected by the community and government Technical expertise and access to fire statistics and data analysis Close links with other government departments
Power	High May bring NSWFB into conflict with Department of Housing
Interest	Moderate but could easily become high with internal marketing Current initiatives focus on smoke alarms and occupant behavior

NSW Department of Housing

Benefits to organization	No benefit for new public housing due to fire resisting construction Performance-based solution for existing excessive travel distances Does not see residential sprinklers as a life safety measure
Disadvantages or risks	Upgrade of all existing public housing is not seen as cost-effective
Resources available	May be funding for staged installation on case-by-case basis
Power	High Largest manager of housing in NSW
Interest	Moderate Sympathetic to improved safety of tenants but has limited funding Would support a pilot program used to quantify cost-effectiveness Takes long-term view of its building stock

Local Government and Shires Association

Benefits to organization	None stated Would represent low additional cost for new houses Would require detailed evidence of cost benefit for existing homes
Disadvantages or risks	There may be significant cost associated with building renovations Increased number of inspections by local government officers Unlikely that any additional funding would be provided for this
Resources available	Peak body for all local government in NSW Provides expert advice to councils and assists with implementation
Power	High Could mobilize regional organizations of councils
Interest	Moderate Sees clear benefits in relation to new housing Legislation for existing housing is seen as more problematic

Royal Australian Institute of Architects

Benefits to organization	None stated Want clarity in building regulations and demonstrated cost-savings
Disadvantages or risks	See accidental operation and water damage as risks Applicability in rural areas where flows in water mains are lower
Resources available	Strong links to relevant industry bodies
Power	Low Architects currently design less than 10 percent of homes in NSW
Interest	Low Due mainly to poor understanding of issues across membership

Australian Institute of Building

Benefits to organization	None stated Residential sprinklers represent small additional cost for new homes Could be used to improve fire protection in demountable homes
Disadvantages or risks	Widespread support may only follow large life loss fire
Resources available	Institute develops professionalism in industry so is highly respected
Power	Moderate Will not align with organizations that have commercial interests
Interest	Low Would be influenced by community attitudes

Institute of Strata Title Management

Benefits to organization	None stated Neutral position regarding new housing
Disadvantages or risks	Owners of strata titled property would need to be convinced Expense associated with retrofit legislation is a significant risk
Resources available	Large number of residents in strata titled apartments Able to effectively lobby the Minister of Fair Trading
Power	Moderate Would probably align with Real Estate Institute of NSW
Interest	Low Strata managers would implement changes to BCA if necessary

Master Builders Association

Benefits to organization	None stated
Disadvantages or risks	Residential sprinklers are a cost-impost on the market Sprinkler heads are aesthetically intrusive in clear-span ceilings Fire fatality rate that community is willing to accept is unclear
Resources available	Close links with Housing Industry Association of Australia Large number of members who have close links with consumers
Power	Moderate If legislation were introduced would be liaising directly with owners
Interest	Low Membership is not generally aware of building regulation agenda

Housing Industry Association of Australia

Benefits to organization	None stated Cost-effectiveness must be able to be clearly demonstrated Requires trade-off for home owners such as reduced insurance
Disadvantages or risks	Decreased housing affordability for low income earners No demonstrated need for residential sprinklers in single dwellings
Resources available	Able to effectively lobby state and federal governments Cost of new homes is an emotive and political charged issue
Power	High Significant industry backing with more than 35,000 members Would also be supported by architects and material suppliers
Interest	Moderate Needs to see more research and then canvass issue with members

Insurance Council of Australia

Benefits to organization	Savings resulting from reduced claims needs supporting evidence Smoke detectors relate to life safety; sprinklers save property
Disadvantages or risks	None stated
Resources available	Experience in lobbying governments, for example smoke alarms Provides significant funding to NSWFB
Power	High Would be able to offer premium discounts if effectiveness is shown
Interest	Low Would support only if there was overwhelming public demand

Master Plumbers Association of NSW

Benefits to organization	Increased business Highly regulated industry and plumbers could adapt quickly
Disadvantages or risks	Poor quality work carried out by non-member plumbers Conflict with existing contractors doing commercial sprinkler work Concerns regarding safety with work carried out in public housing
Resources available	Plumbers deal directly with and provide advice to home owners
Power	Low Currently has poor understanding of residential sprinklers Poor links with other groups in the fire protection sector
Interest	High Plumbers would expect to capture the installation market

Fire Contractors Federation

Benefits to organization	Increased business
Disadvantages or risks	Conflict with plumbers who will move into sprinkler work
	Would argue for maintenance of standards found in commercial work
	Concerns regarding safety with work carried out in public housing
Resources available	Experience in lobbying governments
	Good links with other bodies such as ABCB and research groups
	Education of contractors regarding installation
Power	High
	Has strong links with other groups in the fire protection sector
Interest	High
	Has well-defined position on related issues, including maintenance

NSW Fire Brigade Employee's Union

Benefits to organization	Reduced risk to firefighters at residential structure fires
	Generally is uninformed about other residential sprinkler benefits
Disadvantages or risks	Downgrading of firefighting resources in some areas
	Reduction in the number of new firefighters employed in NSW
	May be viewed as defacto-stamp duty on new homes
Resources available	Mobilize firefighters who are well respected in the community
	Links with other unions could lead to widespread industrial action
Power	High
	Could easily politicize issue
Interest	Low
	Currently has poor understanding of residential sprinklers

Firefighters

Benefits to organization	Reduced risks faced by firefighters leading to fewer injuries Would still attend fires, but role may change
Disadvantages or risks	Reduced workload, but would take many years to occur Accidental damage would increase salvage work by firefighters Less need for new fire stations in developing areas
Resources available	Firefighters are well respected in the community
Power	Low Would need to be mobilized through union or department
Interest	Low Firefighters unlikely to install residential sprinklers in own homes