



Fire Protection Association Australia

13 Ellingworth Parade, Box Hill Victoria 3128 Postal Address: PO Box 1049 Box Hill Victoria 3128
T: (03) 9890 1544 F: (03) 9890 1577 FPA Australia ABN 35 005 366 576

FPA Australia Submission

to the

2009 Victorian Bushfires Royal Commission

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2009 Victorian Bushfires Royal Commission

(Formal Submission for 18 May 2009)

1. INTRODUCTION

The Fire Protection Association Australia (FPA Australia) is pleased to have the opportunity to contribute to the 2009 Victorian Bushfires Royal Commission.

FPA Australia is a not-for-profit, membership based organisation which forms a one representative body as the voice of fire protection in Australia.

A broad summary of the organisation and activities of FPA Australia is provided in Appendix A. However, some key points related to the Royal Commissions examination of the Victorian Bushfires is as follows:

- FPA Australia has a very broad membership base with interests in all aspects of fire safety including bushfire practitioners, fire agencies, fire safety engineers, building surveyors, other design professionals, systems and equipment and materials manufacturers, installers, maintenance companies, insurers, training and education specialists, and many others.
- The Association's activities cover fire safety of buildings, infrastructure, industrial and all areas of the built environment as well as bushfire safety. FPA Australia has amongst its members, companies and individuals with bushfire planning and management, building construction and operational bushfire fighting experience, a number of whom who also have contributed to this submission.
- FPA Australia has a series of memoranda of understanding or other formal alliances with organisations such as:
 - Australasian Fire and Emergency Services Authorities Council (AFAC)
 - Bushfire Cooperative Research Centre (CRC)
 - Institution of Fire Engineers Australia (IFE Australia)
 - National Fire Protection Association (USA) (NFPA)
 - CSIRO
 - Standards Australia
- FPA Australia participates in the development of Australian Standards such as AS3959 *Construction of buildings in bushfire-prone areas* on bushfire construction and has a Bushfire Planning and Design (BPAD) certification scheme for bushfire practitioners undertaking assessments of buildings in bushfire prone areas.

In preparing our first submission, we have specifically addressed the two priority areas of warnings, and the "Stay and Defend or Go" policy. These are so strongly linked to public information and education, and we have made those linkages in many of our comments and recommendations.

We have chosen to prepare our submission and address the issues within a risk management framework based on a community based, disaster resilient model

that builds on concepts developed in Australia and overseas for finding better approaches to disaster prevention.

We believe a fully integrated and holistic approach to bushfire safety is required, and we are currently preparing a second submission on a number of the broader issues in the terms of reference where we believe we have expertise and ideas to offer.

In this first Submission we have not provided any comments on the Australian Standard AS3959 or our FPA Australia BPAD Certification Scheme for Bushfire Practitioners. The Royal Commission will be aware that our National President Mr Chris Orr will be making separate representation on these issues in a meeting with the Commission's Counsel on 22 May 2009.

This submission addresses our framework for the evacuation, specific comments on the warnings and Stay or Go policy, including some potential solutions, the other issues we will address in our second Submission, and finally a broad summary.

2. FRAMEWORK FOR EVALUATION

2.1. Fire Environment

Black Saturday, 7 February 2009, heralded some of the worst weather conditions ever experienced in Victoria. The fire outcomes in terms of loss of life was amongst the most devastating that has occurred over Victoria's history.

The pre-conditions for a major bushfire disaster in Victoria on that day were evident.

These weather conditions were:

- A long period of drought
- No significant rain for the weeks leading up to 7 February, 2009
- Forecast of very high winds and extremely high temperatures and low humidity
- The normal prediction of a significant wind change later in the day

The other significant trend contributing to the event has been the threat over the past couple of decades for many more people living in the urban-rural interface, or within forested areas particularly around Melbourne but also within and on the outskirts of other regional and rural cities, towns and villages. The exposure or vulnerability of significantly more people in bushfire prone areas in Victoria has clearly increased the risk. Some areas of Victoria are considered to be the highest bushfire risk in the world.

Victoria and other parts of Australia have experienced major bushfire disasters on a regular cyclic basis. The 2004 National Inquiry on Bushfire Mitigation and Management^[2] has documented over 30 periods of major bushfire activity in Victoria in the period 1837 – 2003, often with extensive areas burned and substantial loss of life, houses and other buildings, animals, community facilities and damage to the natural environment. In five of these fires, over 20 lives were lost (1926, 1938/9, 1944, 1969 and 1983), but not to the level of the 173 lives lost in the February 2009 fires, particularly on 7 February, 2009.

Considerable research has been undertaken into bushfires, including both forest fires and grass fires, and their impact over many years. A number of Royal Commissions, Parliamentary Committees and Coronial Inquiries have also been undertaken, often after major bushfire seasons and major disasters. The Council of Australian Governments (COAG) report of March 2004 has reviewed many of these inquiry reports and has summed up the situation we faced in 2004 and now. In essence, the status of this Report has not changed. The Inquiry Report stated: "There is no way we can 'fire proof' Australia, nor should this be our objective. We can reduce the risk, and both better understand and prepare for the impact of bushfires".

In looking at how we may reduce the risk of loss in bushfires in the future, we need to recognise that climate change is likely to lead to a higher frequency and more severe weather events. These, in turn, are likely to create more frequent bushfires with greater potential for catastrophic consequences.

The Victorian community is asking – *Why did Black Saturday occur?*. There is no simple answer, but we believe that by taking a holistic approach, the impact of high intensity bushfires can be minimised in the future. Some of the key elements of failure on Black Saturday would appear to include:

- Insufficient attention to targeted fuel reduction
- Deficiencies in planning policy and implementation
- Few ember-resistant buildings
- A lack of resilient, community based communication and response systems
- Insufficient attention to community education programs on bushfire behaviour and personal decision making
- A lack of maintenance and enforcement of fire safety measures.

2.2. Evaluation Framework

In studying this problem of safeguarding Victorian communities it is necessary to develop a framework for evaluation of the problem, in which structured and integrated recommendations can be made. Two broad frameworks suggest themselves and are inter-related. They are:

- The community based disaster resilient model
- The risk management approach.

The first framework, built on the concept of disaster resilient communities, was presented to FPA Australia's National Conference and Exhibition, *Fire Australia*, in Perth in 2007 Gary Lawrence, an internationally recognised expert on planning, sustainability and climate change^[3]. Disaster resilience is defined by Lawrence as the building of sustainable communities through the design of "*flexible, adaptive and redundant systems, typically through an integrated approach*".

Lawrence made some key points:

- Natural hazards such as bushfires and floods, exist (and are likely to increase). Disasters occur when communities are created that put them in "harms way" or in a manner where the buffers that provided protection are eliminated.
- Prevention strategies need to be linked to buildings and infrastructure, particularly for public utilities, and designed in a manner where they fail 'gently' rather than cataclysmically and at specific points so repairs can be made easily and quickly.
- Energy, water and communication strategies need to be designed to function detached from city-wide, regional or national grids so they can still serve community needs when large systems fail.
- From an ecological, economic and life safety perspective, there is certainly land which should not have been developed, or should not be developed.

- Disaster resilient communities are sustainable communities which utilise all available risk management tools.

This mention of risk management leads to the second useful framework, highlighted in the COAG National Inquiry. This is a structured and integrated risk management process, based on models of Bushfire Risk Management, called the 5R's framework, being:

- **R**esearch, information and analysis
- **R**isk modification
- **R**eadiness
- **R**esponse
- **R**ecovery

While education and training are not spelt out specifically under the 5 R's framework, community education, information and action is considered central to bushfire mitigation and management in the COAG report and in this risk management approach, especially under the concept of "**R**eadiness". Community education, includes fire preparedness, prevention strategies, understanding fire behaviours, fire plans, ember-resistant houses, maintenance and total fire ban days.

This risk management approach is consistent with the 'Swiss cheese' model for disaster mitigation, which suggests layers of defence that are flexible and adaptable so that the risk of the holes in the various layers lining up to 'let through' a disastrous event is minimised. Disasters are minimised by strengthening all the layers, not just one. This is the layered concept also practised in building security management, where a number of layers of defence, or "barriers", are employed to minimise the likelihood of intruder entry.

These conceptual frameworks and approaches capture the recommendations from previous inquiries^[2, 3] which highlight:

- The need for a holistic, integrated approach, based very strongly around community education
- The need for prevention as well as protection and response strategies in redundant layers of defence, with clear organisational responsibilities for each layer, and clear co-ordination of the efforts of all organisations
- The need for flexible and adaptable communication and emergency response systems at community level, not necessarily just state or regional level
- The adoption of a systematic risk management approach by local councils and communities
- The need for governments to implement inquiry recommendations in reasonable time frames, and in a comprehensive, integrated approach.

It is within this framework and approach that FPA Australia will identify issues and provide solutions or at least ideas for further research in looking at the overall events on 7 February, 2009.

2.3. Past Events

A useful part of this holistic approach is to look at past events and see whether previous inquiries or research have identified key issues which are relevant to Victoria and the February 2009 fires. Again the 2004 COAG inquiry report provides a useful summary of the consistent themes to emerge from reports of inquests and inquiries into bushfires in Australia since 1939. These consistent themes needing attention are:

- Increased emphasis on risk reduction, including prevention activities
- The value of volunteers
- Education and awareness
- Complacency in communities
- Adequacy of resourcing
- Protective burning
- Communication, and telecommunications infrastructure support
- Importance of access
- Local knowledge
- Local government
- The insurance industry

The FPA Australia will touch on many of these same issues and related questions in an integrated approach to our submissions and recommendations. However, some questions particular to Black Saturday and the 2009 bushfire period will be addressed here, namely:

- **Was Black Saturday a worst case scenario or extreme event beyond authority and community control and beyond reasonable design standards based on affordable community costs, or not?**

Without having access to all of the data and evidence that will come to the Royal Commission we are not in a position to form a view and answer that question as yet. However for building fire safety, a framework for looking at fire scenarios including worst cast scenarios and extreme events has been developed and is now being trialled for buildings^[4]. This may offer some insights into one aspect of the holistic approach. In our next submission we will address this in more detail. In particular we will address the issue of whether, for some weather and fire conditions, we may be beyond the point at which communities can reasonably provide protection of their properties.

- **Are our bushfire strategies aimed at life safety first and foremost, with property and other fire safety objectives second?**

We say that clearly life safety has to be the highest priority, with other fire safety objectives important but secondary. We note that the Performance Requirement for construction of residential premises in bushfire prone areas in the Victorian Regulations declared on 11 March 2009 after release of AS3959 on 10 March 2009 appear to be directed primarily at property protection of

houses. However, given the old adage "People save houses; houses save people", they are clearly inter-related.

- **Are we ready to better legislate and regulate planning and construction of all buildings in bushfire prone areas, or rather provide guidance for land owners to follow at their will?**

It seems that the Victorian Government has already taken the stance to legislate and regulate, and we would support that approach. However, much more work is required in this area.

- **How do we strike the right balance to significantly increase education of the public and training of all in the community including fire practitioners and fire fighting personnel, compared with more facilities and resources for the emergency services?**

Again the State Government to some extent has already pre-empted the answer to this question by announcing more funding for new CFA vehicles. However in our second submission we will address this balance in more detail, with at least a preliminary view for the present that substantially more funding needs to be provide for community education and training than has been the case up to now.

- **Can we use the risk management and fire scenarios approaches adopted in fire safety engineering of urban buildings and industrial facilities to improve our understanding of hazard, vulnerability, community resilience, disaster prevention and recovery?**

We believe the answer to this is yes. We believe we can demonstrate the usefulness of this approach in this first submission and in our subsequent submission.

- **What are the priorities now for bushfire research to provide the scientific evidence on those matters for which we still do not have good policies or technical provisions?**

While we will suggest a number of areas for further research we believe that the Royal Commission needs to and certainly will identify all the areas for future fire research and set the priorities.

It is within this broad framework and key areas of concern that we will address the specific issues of warnings and "defend and stay or go" policy in this submission.

3. WARNINGS, STAY OR GO

3.1. General

One of the major issues for this Royal Commission is the Country Fire Authority's (CFA) 'Stay and defend or leave early' policy, and the warnings provided. These two issues of warnings and 'stay or go' policy are clearly inter-connected. The decision making by residents as to whether to stay and defend themselves and their property, or evacuate and go to what they perceive as a safer place, is critically dependent upon the information they receive.

It is suggested by some that had most people applied the leave early philosophy on 7 February 2009, many lives would have been saved. However, the application of this policy is often misunderstood. In the horrendous shock of flames, smoke, and noise of a bushfire, people tend to react impulsively and leave their homes when they actually see the fires. By that time it is too late to evacuate. For country towns, hamlets, and within bushland itself there are few egress routes and often only one way out.

We await the final research results that will reveal how many people died in vehicles during these fires. However, it is well documented that a fire can outrun a car. To drive when in immediate danger from a bushfire shows a lack of understanding of the 'leave early' policy. The only realistic method of overcoming this lack of understanding is through specifically designed bushfire education programs.

Such education programs will need to be delivered state wide and in bushfire prone areas, in particular in greater detail than the current CFA 'Fire Ready Victoria' and 'Community Fire Guard' programs. From experience it is our considered opinion that these programs need to provide much more specific information about bushfire behaviour. Furthermore, it must be frustrating for the presenters to have what are reported as poor attendances at such sessions when it is critical that all in the community attend. [It is understood that records of attendance are available from the CFA].

While the intent behind these education programs is sound, the inadequacy is in providing a thorough understanding of the fire prevention and response strategies required in to be in place within the community prior to the Fire Danger Period, as well as the necessary actions to take when fire threatens. Experience has confirmed that these programs rarely prepare people for a realistic response to bushfires. What is needed is in-depth programs to be developed by people with sound knowledge of bushfire operation. The next key element is to ensure that people living in these areas attend the education programs. Presenters must be trained to a high level and have the detail knowledge of the subject to be effective. Peer inspections to ensure Fire Prevention works are completed prior to the Fire Danger Period may be a requirement.

3.2. Fire Behaviour

The Fire Danger Index on 7 February was over 150. The probability of firefighters successfully containing a fire once the Fire Danger Index is over 40 is less than 10 percent. This was established by research done by McCarthy and Tolhurst in 1998^[5].

Eucalypts in a fire that are subjected to wind produce flying brands that can be carried by the wind, starting new fires several kilometres beyond the zone of direct ignition by the main fire. Eucalypts have been recorded to have caused spotting 25 kilometres ahead of the main fire. (Reference Peter Ellis CSIRO 2000)^[6] Spot fires can accelerate towards one another and burn out large areas of fuel in a short time. The coalescence of numerous spot fires can produce intense fire behaviour, a crown fire or a firestorm.

This means that although the main fire front may still be several kilometres away, an area may suddenly come under fire attack due to spot fires starting from burning embers even though the main fire had not travelled directly to that area. This now becomes the new main fire front.

The changing wind direction on the 7th February would have made prediction of fire travel difficult. Residents waiting to see the main fire front would not be aware that the embers falling were already putting them under direct threat and leaving even at that point would have been extremely risky.

Given this behaviour of bushfires that may not be readily understood by many in the communities in bushfire prone areas, it would seem that one way to give people at least one piece of good information would be to develop a simple Fire Threat Index. This would probably need to be community specific, and have a simple five point scale or similar that could be communicated and understood by all in each community. The highest level might be the potential for a Firestorm as appeared to have occurred on 7 February 2009. This is perhaps an area for further research.

3.3. Human Behaviour

Currently both of the CFA education programs indicate residents are expected to make a decision to evacuate prior to 10 am on a Total Fire Ban Day, even if there is no fire nearby. Many who had a plan to leave did not carry this plan out. Research is needed to analyse the human behaviour and decisions made by people in the fire-affected areas and why they made those decisions. Anecdotal evidence indicates for some there was a reluctance to leave their home, where they feel safe. For others, the weather was too hot to go out and they preferred to stay home and watch TV/DVD's. Some had left on other occasions where fires had not affected their area previously, so they stayed home on this occasion.

The weather experienced by Victoria for the weeks prior to the 7 February would have necessitated residents with a leave early policy to leave their home on many occasions. This major disruption to their lives, including work, school and home life and the logistics and co-ordination for a family to undertake this task on many

days would have discouraged many from leaving before 10 am. Particularly if they saw no fires.

In relation to families, it would not seem reasonable to expect parents to leave an area while their children are still at school in the threatened area and then come back at 3pm to pick them up, fire strategies would suggest is the time of the day with the highest fire risk.

For commercial operations in bushfire prone areas, it would not seem reasonable for them to close every time it is a high bushfire risk day particularly if there is no fire nearby.

If fires occur and residents are away from home many will try and return if there are still family members or even pets and livestock at home. Human behaviour cannot be ignored in developing a plan and these situations need to be addressed.

Alan Rhodes^[7] from the CFA and Royal Melbourne Institute of Technology (RMIT) wrote a paper titled *The Australian "Stay or Go" Approach: Factors Influencing Householder Decisions in 2007*. In his report he states that those who decide to "wait and see" before making a decision usually either stay or leave too late. He highlights the fact that those who stay may not be adequately prepared to deal with the fire threat.

It is also important to recognise that many people in past fires died in their homes but again for many reasons. We know from research^[8] on the Macedon, Ash Wednesday fires, of the 47 victims only 7 died in their homes – all over the age of 55 [Wilson & Ferguson]. *"all were aged 55 or more, and one was disabled. Of the three houses concerned, two were exposed to relatively low intensity surface fires which did not even fully scorch the garden vegetation.... In our opinion, able-bodied residents would not have lost their lives."*

Whilst early evacuation needs to be encouraged for those who plan to leave early it is imperative that they also have a plan they can fall back on if they have left it too late to leave. Late evacuation offers little chance of survival if caught by an approaching fire.

Those who plan to stay and defend also need a multi layered plan so that they are not overcome by fear and panic as the fire intensity increases. This fear may trigger the flight mechanism in the human brain and lead to a risky decision to evacuate in the face of an approaching fire, thus reducing their chance of survival.

Some of these plans may include bunkers or safer areas within a house or leaving but only going as far as a neighbour's defensible house. Again time is an important factor as there may not be time for any of this. This stresses the importance of **effective** education that will ensure the residents make the right decision.

As stated previously, the CFA's Fire Ready and Community Fire Guard programs attempt to educate the residents in bushfire prone areas about the hazards, and mitigation of these hazards, as well as addressing the issue of whether to stay

and defend or to leave early. Whilst this is moving in the right direction a lot more needs to be done. The program does not capture a high percentage of residents.

In January this year, three Fire Ready sessions were held in a Victorian hamlet with a population of approximately 1000 and yet only 45 people attended those sessions. The sessions were held at different times and days, and a flyer was put into every letterbox. Some of the residents attending these sessions had attended previously and had a firm plan to leave early. When questioned, many had not left on earlier total fire ban days. These same people had not addressed any hazards around the home as they did not plan to be there if a fire went through.

The Stay and Defend or Go Early Position can produce safe outcomes for some residents. However, fire can create a vast range of scenarios and situations that influence people's decision-making response. Complex processes such as instincts, emotional factors as well as learned responses will affect their decision-making and fire plans need to be flexible and adaptable.

Based on past experience, had most of the houses been ember-resistant and the occupants had understood more about bushfire behaviour and human behaviour, (such as what it will feel like in the middle of large bushfires), many may not have perished. Further, it is recognised in hot fires, houses generally provide excellent protection from radiant heat, although in the conditions of Black Saturday, such protection would have been more problematic in some areas.

3.4. Key Issues

While FPA Australia does not have access to data on the exact locations of those who died or were injured on 7 February 2009, nor to the locations of property or assets lost on that day or other days, media reports and other anecdotal evidence would suggest:

- People in the fire affected areas were probably mostly aware it was going to be a day of extreme fire conditions due to statements, and media releases from the Premier of Victoria, CFA, Department of Sustainability and Environment (DSE), Bureau of Meteorology, Premier and any general media reports, commencing on the Thursday before Black Saturday.
- Only a limited number of people appear to have chosen to evacuate prior to 10 am on that day, some of whom had a plan to do so.
- Early in the day and often up to the time of imminent arrival of the fire front at their property, many people thought they could stay and defend their property and protect themselves, and that was their plan.
- Most people did not fully understand the likely fire severity on that day.
- A good number of people appeared to have a very limited period of warning between when they identified the fire was approaching and its arrival at their property.

- Many people appeared to have no proper fire plan, inadequate protective clothing, inadequate water supplies, little fire fighting equipment or other essential means for a proper defence, as in previous fires over the years.
- A number of people, sensing that the fire might be more severe than they expected, tried to evacuate from their properties but at too late a stage. Many people perished in their cars or were forced back by the fire conditions trying to return to their property or join with others for self-protection.

Presumably, evidence collected by the Royal Commission from community consultations, community by community investigations, and other evidence will identify the full extent of the lack of warnings and where the stay or go policy broke down.

However, evidence for the fact that Victorian communities were not properly prepared for the adequate implementation of the 'stay or go' policy includes:

- The largest loss of life in a bushfire event in Australia's history.
- A low level of prescribed burning and a lack of fuel reduction in a comprehensive state-wide manner that meant that the threat level was very high on days of extreme weather conditions.
- A failure and a lack of adequate and timely warnings to motivate people to make appropriate decisions to evacuate or stay and defend.
- The failure to adopt appropriate comprehensive and integrated Planning Policies and Building Construction Regulations for bushfire prone areas in Victoria so that not enough people could understand whether they had defensible properties or not.
- A lack of preparedness training and comprehensive training and education of people in Victorian communities in bushfire prone areas.

In those circumstances, the simple 'stay or go' policy applied state-wide across differing communities without all the other supporting mechanisms needed as part of an integrated bushfire management plan, meant that the chances of failure of the policy were significant.

In terms of community education and training, it appears that primary responsibility lies with the CFA. We believe that far too little has been spent on this critical task. A much greater amount needs to be spent by the emergency services and those who support community education and fire awareness training.

3.5. The Potential Solutions

3.5.1. General

The COAG report of 2004 and its recommendations

- How 'defend in place' or 'evacuate' is practiced in urban building fire protection design and construction, and the research on which it is based.
- The research program of the CRC on Community Self Sufficiency for Bushfire Safety.

- The principles of the sustainable, disaster resilient community concept.

3.5.2. COAG Report 2004

The 2004 COAG report in its Section 8.3 and its recommendations are generally consistent with almost all the issues associated with warnings and the decision of people to go early or stay and defend. This means they should be very well known.

The COAG report of 2004 in section 8.3 identifies the key issues:

- To decision to 'stay and defend' depends upon having a defensible property.
- Planning, construction, and vegetation management as well as other factors such as access and water supplies all contribute to an assessment of whether a property is defensible by owners/residents – many properties in fire prone areas of Victoria do not meet these defensible characteristics.
- Preparedness of residents for what they will face as a fire front passes is crucial, including an understanding of the noise and the particularly frightening circumstances to which people defending their property will be confronted. This is critical to preparedness.
- Many people, including the young, disabled and elderly are likely to feel they will not be able to defend their properties or adequately protect themselves. Yet, they still must have a fire plan.
- If people cannot stay and defend their property, then evacuation is the only alternative, but timing is critical and adequate warnings are essential. However, due to the rapid speed of some fires, such warnings may not always be possible.
- Effective community education programs are required to 'improve preparedness and support timely and informed decision making' (COAG Recommendation 8.7).

3.5.3. Fire Safety in Buildings

In large, urban buildings, a concept of 'Defend in Place' has been developed. There is a good deal of research in this field, and the concept is utilised in a number of countries. In Australia, it is just starting to be considered for implementation into building codes. Research by David Barber^[9] for FPA Australia has summarised the knowledge in this area. The concept is for people to stay in a building in a fire and not evacuate. This must be based upon a strongly fire protected building with automatic sprinklers, fire rated construction, and adequate fire warning and communication systems amongst its key features. The reason why building owners or designers might utilise this concept of 'defend in place' is that the building could be very tall, evacuation times could be long, and/or residents may include the elderly, children, disabled, or others for which evacuation may be difficult and possibly put them in more danger than if they did not evacuate.

This concept of a 'defend in place' strategy is essentially used in high rise residential buildings in Singapore, Hong Kong and the UK with a high level of success.

On the other hand, many buildings in Australia are designed for evacuation in the event of fire. High levels of fire protection are provided together with adoption of AS3745 on emergency control organisations and procedures for buildings, structures and workplaces. This requires training and education of occupants through awareness, training, evacuation drills, an emergency control organisation, and equipment and systems to provide clear messages of warning linked to timely alarm systems. In most buildings, more than one exit is provided, so that if one exit is blocked by fire or smoke, an alternative evacuation path is available.

Fire and human behaviour research in buildings, including in large assembly occupancies such as high rise buildings, airports and rail stations, shows that people will respond, and better fire safety outcomes will be achieved, when:

- The quality of the warning or messages is high; and
- there are multiple cues.

In building fire evacuations, if occupants receive a clear voice message, hear an alarm tone, are directed by a Fire Warden, smell smoke, and have been well trained, they will be much more motivated to evacuate or take other safety actions, than if they are untrained and just hear a bell sound. Research by Proulx, Sime and others have been taken up by building codes and standards around the world as a result of large scale fire disasters in buildings up to 20 years ago.

The lessons from building fire safety for achieving good outcomes are:

- Buildings must be made highly defensible if people are stay.
- If people are to evacuate, timely and high quality messages, with multiple cues for evacuation, must be provided.
- Occupants in these buildings must be provided with a high level of training and have an emergency response organisation which can provide information to assist appropriate decision making.

3.5.4. CRC Research

The Bushfire Co-operative Research Centre (Bushfire CRC) is undertaking major research programs on many aspects of bushfires.

A key program in relation to the "Stay or Go" policy and public warnings and other information is the program entitled "Community Self Sufficiency for Fire Safety".

This program has six sub-programs, of which four are pertinent to "Stay and Go", warnings and related matters of communication and education. These are:

- Understanding communities
- Effective risk communication
- Evaluation of the Stay or Go Policy
- Evaluation of Bushfire Community Education Programs

We have no doubt that the Royal Commission will be looking extensively at this research. A key question will be the extent to which this research has been applied and implemented within communities, fire agencies, local councils and State Government policies. Research does not change safety outcomes without implementation. Without any real evidence, we believe insufficient attention has probably been given to implementation of this research, and that it must become an urgent priority for the future.

Without canvassing all of the research undertaken, we highlight what we consider a few important contributions of the Bushfire CRC Research.

Under the sub-program or the "Stay or Go" policy, Alan Rhodes (CFA) presented a paper presented to a conference in Auckland in 2005 entitled "Stay or Go – What do People Think of Choice". This paper was based on a large telephone survey, asking people the choice of decision they would make under some degree of bushfire threat. The results were:

- Decided to stay (20%)
- Go early (20%)
- Wait (60%)

This goes to the heart of the problem. For the majority it is not Stay or Go, but wait until they gather more evidence of fire threat or other information to inform them to make a different decision. This is critical to a better understanding in the future of this policy.

Warnings and information from seasonal, previous day, and pre-fire conditions, through to imminent arrival of a fire front form a continuum that requires warnings and building of information for a better response and improved outcomes.

This is reinforced in the research of Paton and Johnston in the effective Risk Communication sub-program. They have a number of papers and a book highlighted on the CRC website concerning the need for:

- A holistic, community based approach to hazard recognition and emergency management, and
- Preparedness and education through clear warnings and information programs

Their key publications are:

- Disaster Resilience, An Integrated Approach, Douglas Paton, David Johnston (Eds), 2006; Charles C. Thomas Ltd.

- Paton, D., "Disaster Resilience: Integrating Individual, Community, Institutional and Environmental Perspectives", Disaster Resilience; An Integrated Approach, 2006.
- Paton, D., "Promoting Household and Community Preparedness for Bushfires: A Review of Issues that Inform the Development and Delivery of Risk Communication Strategies, School of Psychology, University of Tasmania.

In this last paper, Paton quotes from a summary of "Laws of Effective Public Hazard Education" from:

Mileti, D., Nathe, S., Orr, P. & Lemersal, E., (2004) Public Hazards communication and Education: The State of the Art, Boulder Co: National Hazards Research and Applications Information centre, University of Colorado at Boulder, USA".

The critical aspects of communication of risk information and education, which in our view includes warnings, are:

- Be clear.
- Use varied sources.
- Render information consistent and repeat it.
- Use a stream of communications.
- Tell people what to do.
- Support people in their search for more information.
- Use words and great graphics.
- Position additional information in the community.

Based on this paper, other things that help include:

- Partnerships work best.
- Feature specialists.
- Adapt materials to locals.
- Use different ways to communicate.
- Tailor information for special groups.
- Use multiple languages.
- Use a good mix of the verbal and the visual.

3.5.5. Disaster Resilient Model

Taking all the above information, and applying it to a community based, disaster resilient and sustainable model, our recommendations would be:

- Organisations for emergency response and their communications need to be built 'bottom up' from a local community level to regional, state and national level, not as 'top down' organisations as they appear to be at the moment.

- Warnings of bushfire threat must be timely, specific to all communities, be delivered in multiple ways but in a consistent fashion, and give clear directions as to whether residents have time to evacuate or not, erring on the side of stay and defend if there is any uncertainty.
- Communication systems, awareness, training and education and a well structured emergency command system must be implemented at community level and upwards to the incident control to ensure appropriate community response.
- For those who choose to 'stay and defend', their level of knowledge must be such as to have them extremely well prepared and fully understanding the risk and implications of staying. Education on all aspects of properly defending properties is the key.
- The stay and defend or go policy should apply to all buildings within a community, and not just residential dwellings.
- For those people who choose to 'go' they need to know where to go – they need good preparedness training to understand their options including the need to move well away from their communities or to local community refuges and safe houses if necessary and safe to do so.
- Even if communication and warning systems are improved as recommended all people need to be educated that in some circumstances, such as Black Saturday, and for whatever reason, there may be insufficient warnings to allow safe evacuation for a community, precinct or individual property. This could be due to extreme conditions, under-estimation of fire travel, spotting and ember attack far in advance of the fire, or a failure of multiple, redundant communication systems.

In that event, all people in the communities should be educated to have a multilayered plan, including at least a Plan A for staying in their own property or moving short distances to neighbours' defensible property or community refuges. They should also have a Plan B that if all else fails, they have protective equipment, dams, bunkers or some other means of potential survival. This whole process will need a much more thorough community education program than is currently in place.

- The stay and defend or go policy needs to be flexible enough to be applied in different ways in different communities. For example, for those living on the outskirts or the 'suburbs' in places like Horsham and Bendigo, they may have different roads to choose through areas of fairly modest fire load and paths into the centre of those towns or cities. However, on the other hand, towns like Marysville, Warburton and other towns are surrounded by forest and steep terrain, with few 'flee paths' and most through lengthy, high fire load areas. For these towns, the likelihood of safe evacuation, except at times long before the fire front arises, are much more problematic. That is, the application of the stay and defend or go policy must be community specific and planned according to the disaster 'resilient community concept'.

3.5.6. Summary – Warnings and Stay or Go

Our key conclusions on warnings and the stay and defend or go policy is as follows:

- The defend and stay or go policy must be community specific and needs more development as a policy.
- If people choose to stay, they must have the knowledge and skills to make their property defensible.
- If people are encouraged to go then they must be given timely warnings and have safe paths to travel.
- Warnings must come via multiple communication paths to ensure people will respond – the quality of the messages and information, and number of cues, is critical. The wording of the warning is crucial to people responding with the right actions.
- The involvement of community based organisations with emergency response agencies and local government through Fire Prevention Committees is vital as a tripartite arrangement.
- The community actions and communications must be built 'bottom up' from community level. For some communities that are less defensible, community refuges must be available for those who cannot defend their property.
- For those who choose to stay and defend their properties, they must have flexible, multi layered plans to cover a range of circumstances.
- Future application of stay and go policies must be more sophisticated and be based on risk management and mitigation principles and the community based, disaster resilience model.

4. OTHER ISSUES

In attempting to answer those other questions which are contained in the terms of reference of the Royal Commission, we believe the key issues upon which we have the expertise to provide a level of input to the Royal Commission are as follows:

- Fire threat index and community warnings (pre-fire conditions)
- Fire spread and control – operational response
- Community warnings and modes of communication
- Planning and building construction
 - Issues of the standard AS3959
 - Class 1, 2, 3 and other occupancies
 - New versus existing construction
- Fire plans – stay and defend or go, refuges, clothing etc.
- Community shelters, flee routes
- Maintenance, including vegetation management
- Audits, enforcement, regulatory control, including building permit, occupation certificate process
- Education and training
- Fire terms and definitions for community communication
- Threat, interruption and consequences as a result of fire damage to public infrastructure and community services
- International experience, data and strategies for emergency management in bushfires
- Further research and priorities

In summary, a broad framework has been defined in which our identification of problems, potential solutions and recommendations can form part of an integrated approach to bushfire safety. We will address these issues in a second submission, currently in preparation.

5. SUMMARY

- FPA Australia is pleased to have an opportunity to make a submission to the Royal Commission into the Victorian Bushfires, and make a contribution where it can to the lessons learned and the solutions for better outcomes in forthcoming fire seasons.
- We have suggested the risk management and community based, disaster resilient model as a broad framework in which we will make our submissions and we suggest this could be a useful framework for the Royal Commission recommendations and future implementation of all key findings.
- In this first submission we have given particular consideration to the issues of warnings and the "stay and defend or go" policy, and made a series of recommendations for your consideration.
- Warnings and the stay or go policy must be integrated with planning and bushfire-resistant construction measures in a fully integrated approach that is adaptable and flexible and be community focussed.
- As part of our preparation for this submission we have recognized that many if not all the issues surrounding bushfire risk management have been identified in previous bushfire inquiries, but successive governments have not implemented many of them in an integrated manner.
- We believe education and training needs to be a much higher priority for not only the property owners but all professionals working in the field of bushfire mitigation, including planners, councils, designers, building surveyors, builders and building inspectors, CFA and many others.
- Major resources and attention to on-going compliance are required if all the measures suggested as needed to avoid such major disasters in the future are to be successful. This requires political will and broad community support without which bushfire tragedies will continue.
- We are preparing a second submission on many of the other issues identified in the terms of reference of the Royal Commission that will complement this first submission.

6. REFERENCES

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APPENDIX A

Background on FPA Australia

The Fire Protection Association Australia (FPA Australia) was formed on 1 January 1997 when the members of two former associations – Fire Protection Industry Association Australia (established in 1926) and the Australian Fire Protection Association (established in 1960) agreed to amalgamate and form one representative body to be the voice of fire protection in Australia.

Today FPA Australia now represents some 10,000 Australians working in all aspects of fire protection, providing products and services for the protection of life, assets and the environment. This covers buildings, infrastructure, and industrial facilities as well as bushfire safety.

The Association is a not-for-profit organisation run by a permanent staff of 14 in its Melbourne-based head office. The Association is governed by a Board of Directors appointed from the membership.

Key office bearers are:

Mr Chris Orr	National President
Mr Glenn Talbot	Senior Vice president
Mr Trevor Voevodin	Junior Vice President
Mr Peter Johnson	Treasurer
Mr Scott Williams	Chief Executive Officer

Funding

FPA Australia is funded through membership subscriptions; attendance at our annual conference & exhibition and national events; trainees under the nationally endorsed asset maintenance package and sales of specialist technical material. The Association also provides a registration service for Cablers on behalf of the Australian Communications and Media Authority and has been appointed by the Department of Environment, Water, Heritage and the Arts as the Implementing Agency for the *Ozone Protection & Synthetic Greenhouse Gas Management Regulations 1995* as it applies to the fire protection industry.

Main Activities

Membership

FPA Australia has a broad membership base, representative of the entire fire safety community. There are a number of membership levels available, including Corporate,

Individual (including students) and Organisational Membership (specifically for users/consumers) - allowing members to join at a level appropriate to their needs.

Members can contribute to industry through many voluntary roles available through the Association, including Technical Committees, Special Interest Groups, State Divisional Committees and Board level participation. Members also support the Association through the provision of information in the form of articles for Fire Australia Magazine and through various items published through the Technical Committees. Many members are leading experts in their field and are an invaluable resource to the Association.

Technical Committees

The work of the Technical Committees is fundamental to the industry, providing input into the development of fire-related Australian Standards, contributing to the technical policies of the Association, and preparing submissions to regulatory bodies. The members of the Technical Committees often sit on the related Australian Standard committee and put a lot of their time and expertise into ensuring that the regularly updated Standards provide an appropriate level of protection for the Australian community.

Fire Australia Magazine

The quarterly Fire Australia Magazine is the premier Australian publication devoted to fire safety and fire protection, featuring topical issues in fire protection, the latest in research and news from the industry. The magazine is circulated to around 5,500 people involved in the industry, including FPA Australia members, government representatives, the building industry and fire services.

Fire Australia is a joint publication of FPA Australia, the Australian Fire and Emergency Services Authorities Council (AFAC), the Bushfire Cooperative Research Centre (Bushfire CRC) and the Institution of Fire Engineers (IFE Australia).

Fire Australia – Annual Conference and Exhibition

The annual Fire Australia Conference and Exhibition is a major event on the fire industry's calendar. Fire Australia visits each of Australia's major cities in turn, focussing the attention of the industry on a specific topic. This year's event is entitled "Fire Protection: The Great Debate" and will bring together industry professionals for a comprehensive look at contentious industry issues. As in other years, this year's conference will address issues on bushfire safety and fire protection of the built environment.

The conference provides delegates the opportunity to keep up-to-date with trends in the industry, while providing important opportunities for networking and socialising. A fundraising dinner held during the event is a highlight of the fire industry social calendar and is always a memorable night, having raised tens of thousands of dollars for burns-related charities.

Seminars & Workshops

Each year, the Association runs national series of seminars and workshops, often in regards to the release of a new fire-related Australian Standard or other important change in the industry. These events help ensure that the industry is kept informed of national and local legislative changes.

Certification Schemes

In order to promote good work practices, the Association has set up two certification schemes for specific areas – Bushfire Planning & Design, and Workplace Emergency Response. Certification ensures that practitioners are fully qualified to deliver the services they offer and that the quality of these services is raised to best practice. The value of certification schemes increase as they are brought into legislation in each state.

Ozone Protection Project

In 2004, the Association was appointed by government as the implementing agency for ozone protection in the fire protection industry. Certain gases which are very damaging to the ozone layer have previously been used in fire protection due to their excellent fire retarding properties. The use of these substances was restricted by the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and it is our role to support government in setting up a regulatory framework to meet its objectives and to develop longer term plans to implement the Act and regulations.

Cabling Registrar

In 2000, the Association was accredited by the Australian Communications & Media Authority to register cabling technicians under the Cabling Provider Rules, allowing technicians to carry out the installation of cables for a range of systems. FPA Australia is one of only five organisations able to offer this accreditation.

Publications

FPA Australia is responsible for a range of newsletters focussing on specific sub-groups in fire protection, such as hazardous material professionals, cabling and extinguishing agent handlers. The Association also produces a variety of Fact Sheets available to the industry and the general community through our website.

Technical Resources

FPA Australia provides a very extensive range of fire-related publications, standards, books, DVDs and related materials through our online catalogue, supplying local and imported items to members and non-members alike. An extensive online library is available to members providing a vast range of information, much of it available electronically.

Education

The Association has Registered Training Organisation status to deliver fire related training programs including Certificates II and III in Asset Maintenance (Fire Protection Equipment).

FPA Australia members who would like to gain national units of competency in passive fire protection will shortly be able to undertake online training with FPA Australia. Passive Online is an online training program that assists fire service technicians to identify, inspect and test passive fire protection products and systems. The program provides current and comprehensive information on passive fire protection equipment and systems, including videos and interactive activities and prepares learners for assessment against specific units of competency.

In addition to training, FPA Australia has established the Barry Lee Scholarship. The scholarship is awarded to individuals who would like to further the cause of fire safety, through pursuing an overseas investigative project that is not fully available in Australia. To date the scholarship has seen the completion of two important research projects.

Alliances

FPA Australia has a Memorandum of Understanding (MOU) with the Australasian Fire and Emergency Services Authorities Council (AFAC) which represents fire and emergency services in Australia and New Zealand. We also conduct our annual conference and exhibition in partnership with the Institution of Fire Engineers Australia.

The Association has an MOU with our equivalent US organisation, the National Fire Protection Association (NFPA). The Association has worked closely with the NFPA over last year, undertaking a project to localise certain US codes for use in Australia, where an Australian Standard does not exist.

FPA Australia also has co-operative arrangements with CSIRO and Standards Australia.

The Association is a member of the Confederation of Fire Protection Associations – International and an active member of the regional sub-group, the Confederation of Fire Protection Associations – Asia, for which we provide the secretariat services.

Summary

FPA Australia is Australia's major technical and educational fire safety organisation. The work carried out by the Association and its members is of value to every Australian citizen. Fire risk is always present in Australia, whether it relates to the bushfire or buildings. However, as products and practices improve, it is easy to ignore the dedicated work towards ensuring our safety that goes on in the background. FPA Australia brings together committed individuals and organisations who continue to put fire safety at the top of their priority list, and it is thanks to their work that Australia is one of the leading countries in the world when it comes to fire safety.

For more information on FPA Australia and its diverse range of services and benefits, please visit www.fpaa.com.au or contact Scott Williams, Chief Executive Officer on (03) 9890 1544 or scottwilliams@fpaa.com.au.

APPENDIX B

Alternative Warning Systems

It's important to realize that a fire close by or a fire with a long spotting distance will not allow enough time for an early alert that will allow safe evacuation for everyone and therefore all homes should be made defensible.

There needs to be more than one type of alerting system.

On 7th February some stayed in side and watched DVD's. Phone lines and phone towers can be lost to fire. Messages transmitted on radio can be effective but only if the information being received and transmitted is up to date. Residents must also be triggered to turn the radio on or to seek more detailed information. Sirens can do this. The CFA web site provides some detailed information on fires that are likely to impact on local residents. The detail on many fires is restricted to the location of fires and does not always give the detail needed such as impact on actual roads, direction of travel, forward rate of spread, intensity and expected time of change and effect of change on the fire.

This information is needed for residents to make an informed decision ahead of time, and must be relayed through a number of alternative warning systems. All systems have advantages and limitations, some of which are identified below.

System	Advantage	Limitations	Comments
Fire Siren	Can be heard over a long distance	Can't be heard everywhere	
	Can be used as a trigger to seek more information	Does not give residents detail of event	
		May not go off if firefighters at station	Should have the option to go off continuously and not time out
ABC Radio 774	Gives reasonably up to date information of events	Not useful for a fire that has just started	Must be battery operated
		A conscious decision (or trigger) must be made to turn the radio on	

Phone - Mobile	Reaches many people	Not all have a mobile or have it turned on	
		Message may not go to tourists, travellers and visitors	
		Wont work if fire affects phone towers	
		Smoke may affect signal	
	Can give detail of fire	Not useful for a fire that has just started	
Phone - Landline	Reaches many people	Not everyone has a phone	
		Must be near the phone	
		May loose phone lines and electricity in fire	
	Can give detail of fire	Message may not get to tourists, travellers and visitors	
TV	Can reach many people	A conscious decision (or trigger) must be made to turn the TV on	
		May loose power in a fire	
On Line	Can give detail of fire	Not useful for a fire that has just started	Needs to give more information than it currently does

		A conscious decision (or trigger) must be made to turn the Computer on	
		May lose power in a fire	
Fire Towers – direct info on fire spread to HQ	Ideally placed to observe fire travel	Info still needs to be disseminated to residents	May need more towers
	Useful alternative means of communication to fire trucks and back up to the control centre when information is not going back into the control centre		
Phone Tree	Localised	Can be slow	
Residential Alarm System	Locals know it is meant for them	Fire may be too close to evacuate.	Currently in place at Ferny Creek