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FIRE AUSTRALIA

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We aim to bring the latest news, developments and technical information to the fire protection industry, emergency services and fire research organisations. *Fire Australia* is produced quarterly and distributed throughout Australia and New Zealand.

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Welcome to *Fire Australia* Spring 2012

By Gary Morgan
Chief Executive Officer
Bushfire CRC

The breadth of topics at our three-day annual conference in Perth in August was quite astounding, even more so considering no topics were repeated from last year's conference in Sydney. In Melbourne in 2013, a whole new set of issues will be presented.

This edition of *Fire Australia* reports on some of this activity at the Bushfire CRC and Australasian Fire and Emergency Service Authorities Council annual conference at the Perth Convention and Exhibition Centre. The conference attracted over 1300 participants, including more than 140 trade expo booths. This is the largest annual fire and emergency management conference in the southern hemisphere. In this edition, read about how you can get online access to the presentations and other outputs from the conference.

Despite the amount of activity currently underway, it is still appropriate to stop and think about areas that are not being fully examined by our scientific research efforts.

The Bushfire CRC was funded to examine the main issues arising from the 2009 Black Saturday bushfires in Victoria. Many of these issues are relevant across Australia and New Zealand, but there are many other important questions that still need to be addressed.

The Bushfire CRC is well advanced in its planning to move towards a national research institute for fire and other natural hazards. This new research program will expand current projects and branch into new fields including engineering and aviation, legal and policy matters, economics, communications and media, incident management, effects of global climate change, carbon impacts, northern savannah fire, indigenous burning, occupational and fatigue management, human physiology, epidemiology, history and cultural studies, data management and public health.

The research outcomes will be relevant to many sectors beyond the traditional target audience of fire and land management agencies. Power and gas utilities, water managers, insurance companies, law-makers, local government, regional and urban planners, policy developers, communications agencies and fire protection agencies will all find the research outcomes useful.

Many representatives of these sectors were in Perth in August for the annual conference, seeking ways to get more involved with the research program. In recent weeks the Bushfire CRC has been involved in discussions with the power industry on long-term research into the impact of bushfire on infrastructure.

We are only scratching the surface with our current research program but the long-term vision is far broader than that.

Fire Australia is a clear demonstration of how the research sector, the emergency services agencies and the fire protection industry can work together and benefit from creating and promoting new knowledge.

The Bushfire CRC research posters at the annual Bushfire CRC and AFAC conference covered a range of topics.

Celebrating 25 years of ozone protection

As the annual ozone hole forms over Antarctica this spring, it is worth reflecting on one of the international community's most significant environmental success stories—the Montreal Protocol on Substances that Deplete the Ozone Layer.

This year is particularly important as 16 September marked the 25th anniversary of this historic agreement, which is on track to restore the ozone layer to 1980 levels by mid-century.

Australia has been at the forefront of efforts to protect the ozone layer. Our scientific institutions continue to play key roles, especially in southern hemisphere ozone science.

But the success of Australia's contribution has also been based on strong support from key Australian industry sectors. Without this support and positive approach, we would not now be completing our phase-out of ozone-depleting substances.

The fire protection industry has played a significant role in this success, which has included finding alternatives to halon and hydrochlorofluorocarbons (HCFCs) for most uses. However, these gases are still used in the aviation and maritime industries, so technicians must be appropriately trained and licensed through a national licensing system. This system is run by the Fire Protection Industry Ozone Depleting Substances and Synthetic Greenhouse Gases (ODS & SGG) Board. Using licensed technicians helps to avoid emission of ozone-depleting gases into the atmosphere and helps to create a culture of good practice and environmental sustainability.

Although governments laid down the legal framework for action, the readiness by industry all over the world and in different sectors to transition to alternatives is a key success factor.

A second factor is consumers' willingness to switch from ozone-depleting products such as some hairsprays and cleaning agents to more environmentally friendly products.

Many organisations and individuals have contributed to the success of the Montreal Protocol and the fire protection industry can be justifiably proud of the role it has played.

The Montreal Protocol 25 years of Ozone Protection

Storage at the National Halon Bank

National Halon Bank relocation

The National Halon Bank (NHB) is relocating to Laverton North, Victoria. It will be managed by Agas (Australia) Pty Ltd on behalf of the Australian Government. The move commenced mid-September and is expected to be completed by December 2012. The present site as well as the new site at Laverton North will operate until the move is completed. National Association of Testing Authorities, Australia (NATA) accredited certificates will still be sold to essential users.

The NHB laboratory will be unavailable for analytical services for 12 weeks from 31 August 2012. The NHB freecall number remains 1800 658 084 and halon collection will continue as usual. Destruction will be carried out off-site.

Alan Wilson named NIBA Victorian Broker of the Year

Fire Protection Association Australia (FPA Australia) insurance scheme provider and Platinum member Alan Wilson, of Alan Wilson Insurance Brokers, has been awarded the Victorian Broker of the Year Award by the National Insurance Brokers Association (NIBA).

Alan was praised for his strong business practices, commitment to the development of staff and the success of the FPA Australia insurance scheme. The awards panel also recognised the compassion Alan showed during the Black Saturday Fires, where he assisted anyone requiring help with their insurance claims, whether they were clients or not.

FPA Australia congratulates Alan on this fantastic achievement.

Alan Wilson, NIBA Victorian Broker of the Year, showing his award

Carbon pricing panel

Scott Williams, CEO of FPA Australia, addressing seminar participants

Successful carbon pricing seminar series comes to a close

FPA Australia has completed a series of important seminars on the impact of carbon pricing legislation on the industry. These free educational events were held in Adelaide, Perth, Sydney, Melbourne and Brisbane from 25 July to 10 August.

The seminars informed the industry about the important changes to the import and sale of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6).

Experts from across industry and government presented the seminars. Speakers included Mathew Dadswell—Assistant Secretary, Environment Standard Branch DSEWPC, Brett Staines—Australian Technical Development Manager, UTC Fire & Security, Daniel Wilson—National Engineering Manager, Kidde Australia, Carlos Santin—Executive Officer, Ozone Protection Fire Protection Industry Board and Patrick Harrington—Managing Director, Fire Protection Technologies.

FPA Australia CEO Scott Williams said the events were important for the industry to properly inform all stakeholders.

"These events helped to highlight the very important changes to the industry as a result of carbon pricing. On behalf of the Association I would like to thank our panel of speakers as well as everyone who attended the seminars."

FPA Australia in the news after tragic Bankstown fire

FPA Australia Deputy CEO and Chief Technical Officer Matthew Wright has been featured in television, print and radio outlets providing comment on the Association's position on the requirements for sprinklers in apartment complexes after a tragic fire in Bankstown, Sydney, in September.

One person died and another was seriously injured when the pair jumped from their fifth-floor apartment trying to escape a devastating fire that ripped through the building. Although it was only three years old, the apartment was not fitted with residential fire sprinklers.

The tragic fire comes on the back of news that all aged care facilities across NSW will be required to be fitted with automatic sprinkler systems after the Quakers Hill Nursing Home Fire of 2011.

NSW nursing home operators will now have up to three years to install sprinklers in existing residential aged care buildings, with a possible extension of one year for exceptional circumstances. This complements the existing requirement since 2002 to install sprinklers in new aged care facilities.

The regulation, which begins in January 2013, will apply to nearly 600 aged care facilities, which care for around 24,000 people across NSW.

AFAC Strategic Command Program

The inaugural AFAC Strategic Command Program (SCP) *Leading into the Unknown* was held at the Australian Institute of Police Management (AIPM), with support from Leading Emergency Services, from 30 July to 3 August 2012.

The program is designed for senior leaders responsible for managing operations at zone, region and state levels. With a focus on strategic operational command, participants were given the opportunity to examine and challenge some of their fundamental assumptions around their own leadership and control of operations, providing opportunities for further personal development. Agencies need senior operational staff who can oversee multiple incidents concurrently, assess the competence of Incident Controllers while they are 'on the job' and gauge the effectiveness of incident response and information operations. Agencies need to anticipate and manage the critical interplay of political and strategic concerns at key times during incident response, and maintain a credible and vital personal leadership approach that ensures their staff are well supported and working to the best of their ability.

The SCP explored the interdependencies of personal adaptive capacity, crisis command, strategic leadership and the building of high-performance organisational capabilities for emergency management. Participants examined each of these interdependencies, drawing on the experience of current Chief Officers and external presenters, and recent operational events. In this way the participants improved their own capabilities.

The program is built around three phases:

1. A pre-residential **Focus** component that consists of a streamlined guided reading program. Participants can integrate their understanding of the material with their own experience and knowledge in this phase.
2. A one-week residential **Delivery** component conducted at AIPM's Manly Campus in Sydney. Eight focus areas are designed to challenge participants' understanding and capability of leading and managing operations at the highest level.
3. An ongoing **Currency** component that builds on work undertaken during the program. Participants are supported during this phase with annual updates and advice on recent developments.

Senior incident managers within the fire and emergency services identified the need for a high-level strategic command program. The SCP evolved from the 2010 and 2011 AFAC Executive Command Forums.

Awards recognise innovation and excellence

AFAC and Motorola Knowledge Innovation Award

Damien Thomas, from Queensland Fire and Rescue Service, and the Australian Emergency Management Institute, Victoria, have each been recognised at the AFAC and Bushfire CRC conference in Perth last month for advancing knowledge management in the emergency services. Both awards are sponsored by Motorola Solutions.

Damien, recipient of the Individual Award, has been acknowledged for the development and design of the eDoctrine browser application, which houses all of the Queensland Fire and Rescue Service (QFRS) operations doctrine available for operational firefighters and staff. Damien is the Operations Doctrine Officer and a Station Officer at QFRS.

The Australian Emergency Management Institute (AEMI—Attorney-General's Department) developed the DiasasterMapper. An interactive resource for schools, the DiasasterMapper brings to life the Natural Disasters Database, which forms part of the online collection of materials available from the AEMI website. The Disasters Database contains records of all natural and non-natural disasters within Australia from 1622 to the present day. The database provides the historical information and statistics that populate the DisasterMapper. The DisasterMapper has been well received in the schools sector.

Prabhakar Rajagopal, General Manager of Motorola Solutions, presented both recipients with their awards at the opening ceremony at this year's AFAC & Bushfire CRC conference.

Laurie Lavelle Award

The prestigious Laurie Lavelle Achiever of the Year Award was also presented at the opening ceremony. Brian Graham, Manager, Commercial & International Relations, and Russell Taylor, Group Manager, both from the NSW Rural Fire Service, were joint recipients of the award. Brian and Russell were recognised for their outstanding achievements in advocating the Botswana Fire Management Program and introducing Incident Control Systems to this country by developing training packages specifically designed for Botswana. As a result of Brian and Russell's dedication and commitment to this program, a partnership has been secured between the Australian Government (AusAID) and the Republic of Botswana. The NSW Rural Fire Service is highly regarded for this program internationally, and Botswana is now seen as a centre of excellence in emergency response and management for Southern Africa. Further information on the Botswana Fire Management Program will feature in a future edition of *Fire Australia*. Congratulations to all award winners.

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Make sure you and your communities 'Know Risk'

What is Know Risk?

'Know Risk' is a national community resilience initiative designed to help the public better manage their practical and financial risks. Know Risk does this through a network of mobile tools and web-based applications. These tools include engaging videos, quizzes and simple guides that assist the community to appreciate the risks they face in their lives and understand how to best manage them.

Know Risk's main objective is to help Australian individuals, families and businesses better understand and protect themselves against risk.

How Know Risk came about

The concept of Know Risk arose following the devastating bushfires and floods that have occurred in recent years.

These tragic events have caused incredible damage and financial losses to individuals, families, businesses, neighbourhoods and communities. These natural disasters have demonstrated that too many people in the community are unprepared and insufficiently equipped for the worst.

How will it work?

Know Risk doesn't sell or promote any products or brands. It is a completely independent service that assists the general public to be better informed about risk management and to improve community resilience.

Know Risk has been developed with the understanding that the most powerful and effective approach to promoting behaviour change in large audiences is through the reach of online social communities and technology.

The public can access a range of engaging tools and information through web-based activities at www.knowrisk.com.au and the Insurance Tracker mobile application, which is available on the website and as an iPhone app through the App Store.

The Know Risk Insurance Tracker

Do you know who all of your insurance policies are with? Eighty-seven per cent of Australians have house and contents and car insurance and many couldn't tell you. Insurance Tracker is a free mobile application that allows users to store all of their insurance policy information in one place.

Renewal time is very important as that is where most people's policies come undone and underinsurance becomes an issue. It is estimated that up to 80% of households are underinsured. For a house and contents policy, underinsurance can occur by simply renewing the policy every year without adding new purchases or changes to the house. By using the reminders in Insurance Tracker users can set up prompts to remind them to either update their policy regularly or that renewal time is approaching.

Users can also use Insurance Tracker to create a photo inventory of their home contents to ensure that they have an accurate record of all of their valuable items. When making a claim, Insurance Tracker will provide the user with all the information users they need to make the claims process easy.

The Know Risk website

Insurance Tracker acts as a link to the Know Risk network. This contains a vast range of information, tools and guides so people better understand risk management and insurance when they need it.

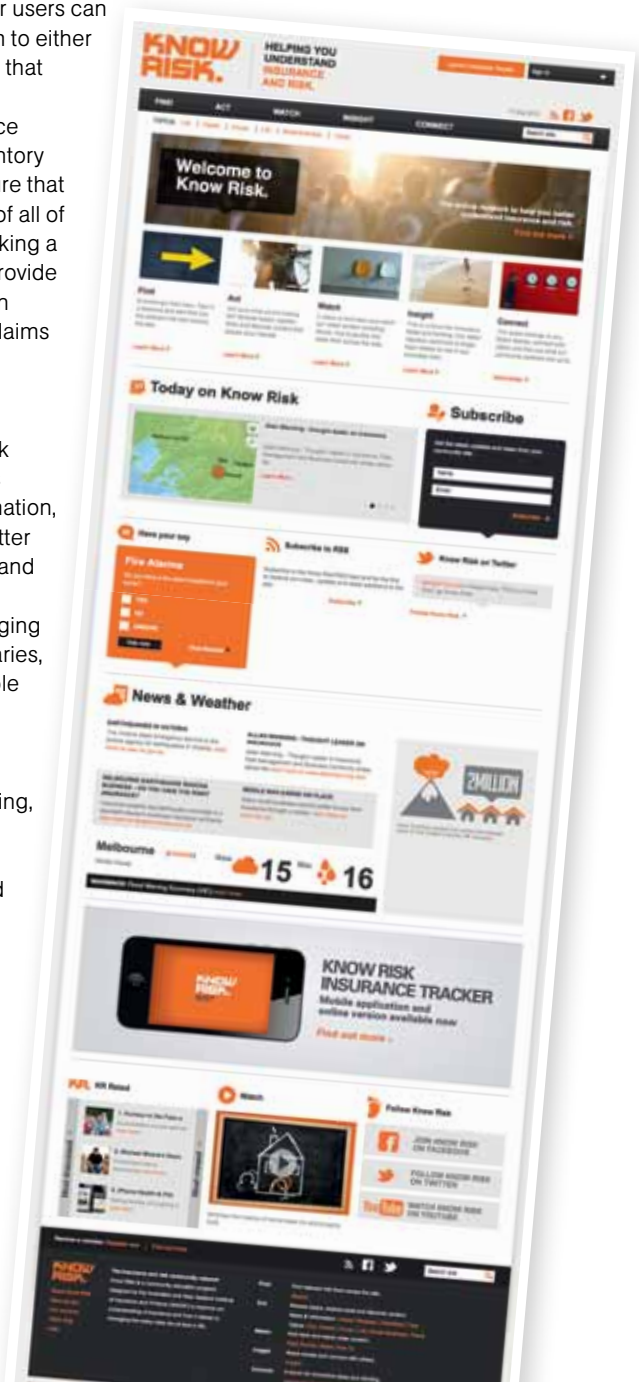
The website presents engaging tools such as short documentaries, quizzes and facts to help people be prepared and make safe choices when it counts.

Throughout the site, users find information that is interesting, relevant and important to them. The site also provides the right contacts if users need further information.

Know Risk community launch

Later this year Know Risk will be launched to the public. The Know Risk team is spreading the word as far as possible to let people know about the tools. The team is seeking expressions of interest to partner with and communicate the value of Know Risk to communities. Only through active participation and encouragement can Know Risk truly make a change for a safer and more risk-aware Australia.

For more information or to speak to the Know Risk team about helping with the roll-out of information on the program in your community, please contact Rose Taylor at rtaylor@theinstitute.com.au, visit www.knowrisk.com.au or visit the App Store to download Insurance Tracker.



Bushfire CRC fire research

Fire research boost at the Bushfire CRC

Bushfire research in Victoria has progressed with the Bushfire CRC to undertake a series of new projects investigating fire behaviour, fire weather, smoke emissions and fire ecology.

The $6.45 M package of projects is funded by the Victorian Department of Sustainability and Environment with the Bushfire CRC to engage research partners from across Australia and New Zealand over the next three to four years.

Gary Morgan, CEO of the Bushfire CRC, said the new projects complemented the current national research program, which is funded by the Australian Government and state and territory partners.

"Over the last decade the Bushfire CRC has built up a capacity to properly research the key issues out of major fire events and their potential impacts into the future. This targeted contract research work, while clearly aimed at Victoria's requirements, will be an additional benefit for our partners, the fire and emergency service agencies across Australia, who already benefit from the nationally coordinated program of fire research out of the CRC Program.

"The Bushfire CRC will now work closely with research partners to find the right researchers to conduct this new research. We are in the fortunate position of having a network of expert researchers across Australia and New Zealand that can be drawn upon as new research needs arise."

The contracted projects under this new agreement cover the following broad areas: bushfire climatology, severe fire behaviour characterisation, Black Saturday and other large fires, landscape moisture modelling, fire severity rating, fire transitions across urban boundaries, probability of fire ignition and escalation, smoke impacts on community health and social perceptions, smoke transportation and emissions modelling, managing scale and uncertainty in fire management planning, and growth stage and habitat analysis.

More information about each project is available at www.bushfirecrc.com/research/contract.

Bushfire CRC on show during Science Week

Research into communicating fire and emergency messages to children was featured at the Bushfire CRC's display at the Cooperative Research Centre Association's National Science Week celebrations at Parliament House, Canberra, in August.

The event allowed the Bushfire CRC to emphasise to Members of Parliament, as well as to other CRCs from around the country, the important work currently being undertaken.

Science Week is an annual celebration of science in Australia. It has been running for 15 years, providing an opportunity to enjoy and explore the wonders and benefits of science.

PHOTO: ROELLEN LITTLE

Bushfire CRC display at Science Week

Perspectives on shared responsibility documented

Shared responsibly and what this means were discussed at a stakeholder workshop conducted by the Bushfire CRC, RMIT University and the Emergency Management Network of the National Climate Change Adaptation Research Facility in March.

More than 80 researchers, partners, non-government organisations, community members and representatives from across government shared their responses to two questions.

- What does the idea of 'shared responsibility' mean, and what are its implications?
- Is it a useful policy concept and, if yes, what needs to be done to implement it and what could undermine it?

The written account of the workshop captures the richness of the day's talks and discussion. It is a valuable resource for anyone who is wrestling with the implications of the shared responsibility idea for emergency management. It is available for download at www.bushfirecrc.com.

The Australian and New Zealand Incident Management Team in France

Bushfire CRC research with France

Research using a 3D fire suppression simulator was undertaken when representatives from the Bushfire CRC travelled to France in July as part of a study tour to exchange best practices in fire response.

Bushfire CRC CEO Gary Morgan and research leader Dr Christine Owen (University of Tasmania) were joined in France by an Australian and New Zealand Incident Management Team. The team was made up of Bushfire CRC and AFAC partners:

- Andrew Lawson (Country Fire Service South Australia)
- John Hayes, Bryan McCarthy and Dr Claire Johnson (Country Fire Authority Victoria)
- Reegan Key (Victorian Fire Services Commissioner)
- Steve Yorke (New South Wales Rural Fire Service)
- Paul Turner (New Zealand Fire Service)
- Bob Evans (New South Wales State Emergency Service).

The Bouches-du-Rhône Fire Brigade in Marseille hosted the contingent.

Using the 3D fire suppression simulator located at France's National Research Dissemination and Training Centre, the international research collaboration participated in forest fire exercises, allowing participants to observe and discuss differences in organisation, tactics and decision-making processes.

Dr Owen and Dr Johnson, with the assistance of French researcher Dr Renaud Vidal, observed the exercises to research the comparative strategies used and the way the different teams functioned.

The data collected during the exercises will be further analysed and a report prepared for the AFAC Australasian Inter-Service Incident Management System (AIIMS) committee.

The research undertaken will also assist in identifying additional areas of mutual interest for ongoing collaboration between the Bushfire CRC and the Bouches-du-Rhône Fire Brigade.

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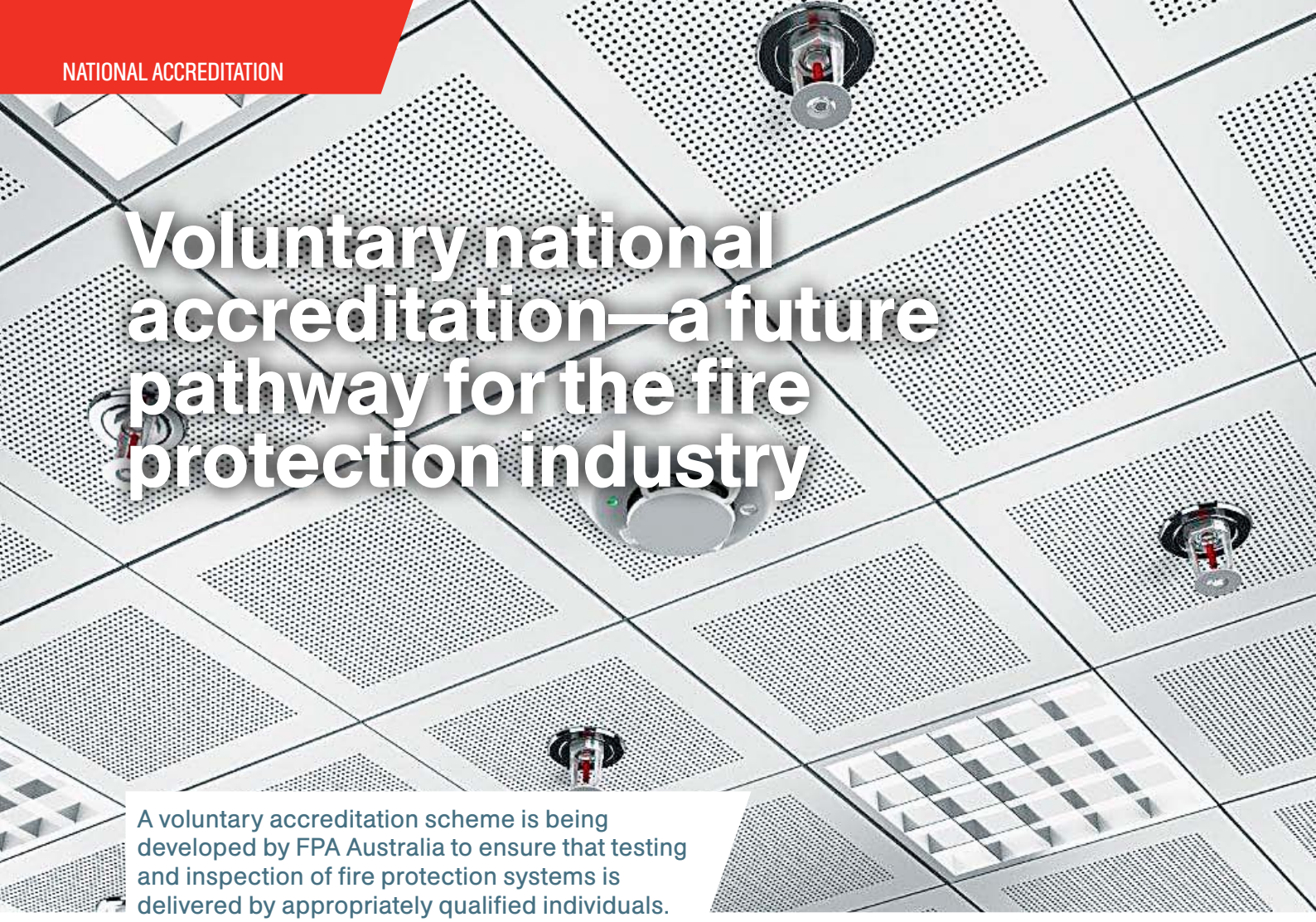

Voluntary national accreditation—a future pathway for the fire protection industry

A voluntary accreditation scheme is being developed by FPA Australia to ensure that testing and inspection of fire protection systems is delivered by appropriately qualified individuals.

By Joseph Keller, FPA Australia Communications Manager and *Fire Australia* magazine Joint Editor

Today in Australia there is an appreciation, if not an expectation, for standardised licensing frameworks across industry. We make informed decisions every day based on the confidence that service providers we engage are both suitably qualified and hold the appropriate licenses. Often these licenses are referenced in legislation.

Many trades and occupations in the construction industry, for example, are licensed by government regulators or recognised through accreditation schemes from independent bodies or organisations. Trades such as plumbing, building and electrical work have long-established licence requirements aimed at ensuring minimum industry competencies, consistency of work practices and public confidence.

The fire protection industry involves many individual occupations because fire protection equipment and systems installed in buildings and other facilities are complex and varied. Although there are many specific individual fire protection industry occupations, they are linked by a common objective—installing and maintaining equipment and systems to protect life, property and the environment.

The importance of installing and maintaining fire protection systems to achieve health and safety goals is reflected in building regulations across Australia. However, despite the shared objectives of these regulations, not all states and territories have licensing requirements for fire protection industry occupations. In fact Queensland is the only state that has licensing requirements specifically targeted at fire protection.

Thus, the question becomes: given the dire safety implications for work carried out incorrectly by poorly trained individuals, why is there no nationally recognised competency-based accreditation for fire protection work in Australia?

Current regulatory framework—an incomplete patchwork

With the exception of the requirements stipulated by the *Ozone Protection and Synthetic Greenhouse Gas Regulations 1995,* which cover some limited activities in the industry, in most states of Australia no strong framework exists to licence fire protection work. Queensland is a notable exception, where the Building Services Authority's (BSA's) Fire Occupational Licences have delivered a benchmark for the industry, and a level of peace of mind for end users.

The BSA fire occupational licensing scheme means that all practitioners carrying out or supervising fire protection work in Queensland require a licence. There are some exceptions for plumbers and electricians performing certain tasks.

The BSA framework was introduced after the report into the Childers Backpacker Fire of June 2000 recommended tighter regulation of the fire protection industry in Queensland.

This resulted in the creation of 12 licensing classes in total under the BSA framework, covering most fire protection occupations. No other state or territory currently administers a licensing framework that comprehensively targets the fire protection industry the way the BSA framework does, although some less-extensive requirements are in place in other states.

For example, the Plumbing Industry Commission in Victoria and the Tasmania Fire Service maintain some limited requirements.

However, this fragmented patchwork of regulation means it is difficult and complex for end users to determine if a fire protection contractor operating on their site has the appropriate skills and is competent. Moreover, technicians moving from state to state struggle to map their skills across to the different requirements under each jurisdiction.

This situation has not gone unnoticed by regulators. The independent Productivity Commission established by the Federal Government has identified that the overlapping and inconsistent approach of the states and territories to licensing requirements is resulting in reduced efficiency and productivity and labour mobility issues affecting the national economy.

Accordingly, the Council of Australian Governments (COAG) signed an intergovernmental agreement on 30 April 2009 to establish a national occupational licensing system for a range of occupations: the National Occupational Licensing Authority (NOLA).

Some of the first occupations considered by NOLA in the property area include electrical, plumbing and gas fitting occupations. The second review will focus on building and building-related occupations. The intention is that individual state and territory licences will be transferred to a new national system that entitles licence holders to work anywhere in the country. The new licences will be granted based on a single set of nationally agreed eligibility requirements.

However, the current Regulatory Impact Statement released by NOLA relates to the electrical trades and makes extremely minor, if not insignificant, reference to activities associated with fire equipment and systems that have electrical components. There is currently no firm indication as to whether NOLA will eventually review specific fire-protection-based occupations in consideration for national licensing. At the time of writing this article NOLA had released the RIS for Plumbing and GasFitting, for which the Association is currently compiling its submission.

Although the BSA scheme has been established in Queensland and the activities of NOLA may address fire protection occupations in the future, the lack of dedicated licensing requirements in other states and territories continues.

It was with these considerations in mind that Fire Protection Association Australia (FPA Australia) identified the need to initiate work on the development of a suitable framework for accrediting individuals in the fire protection industry nationally through a voluntary accreditation scheme.

FPA Australia is the peak not-for-profit association for the fire protection industry. It is governed by a Board of Directors, with its national head office in Melbourne. The Association plays a pivotal role in providing advice and information on all aspects of fire safety and related emergencies through a range of services to the industry and the wider community.

The scheme will be voluntary and aims to attract industry participants who wish to be independently recognised and promoted as holding the minimum skills and business requirements to undertake certain activities in the marketplace.

The nationally harmonised scheme would have a dual benefit for end users. It would provide confidence by validating an individual through the checking of their recognition card, and also act as a strong marketing tool for accredited technicians and businesses.

Implementation and delivery

Following indicative approval from the Association's Board of Directors earlier this year, work has commenced on development of the scheme including:

- classes and categories
- minimum qualification, competency and training requirements
- application processes.

The working group identified the 'inspect and test' area of fire protection work as the most practical avenue to commence the accreditation scheme. This is because there is already in place a well-established competency and training regime to support accreditation in this field. When implemented, the scheme would be designed to:

- provide confidence and assurance to building owners, building occupiers, facility managers, insurance companies, fire services and the community that individuals and business entities accredited under the scheme have met minimum 'benchmarks' to undertake the scope of work for which they are accredited, including minimum competencies, business requirements and insurance

- introduce a consistent approach to accreditation, initially focusing on the 'inspect and test' activities of the fire protection industry based on nationally endorsed qualifications
- subsequently provide businesses within the fire protection industry with a clear process by which they can be accredited as providers of quality work and offer improved levels of reliability, confidence and safety for people and property throughout Australia
- be adopted by and applied to individual states and territories while implemented within a national framework that recognises the qualifications and licences of fire protection
- integrate with existing accreditation for technicians covered by other schemes including the BSA Queensland or the Fire Protection Industry (ODS & SGG) Board licences.

Scott Williams, CEO, FPA Australia, said the Association was the right organisation to deliver the scheme for the industry.

"FPA Australia is in a prime position to develop, drive, implement and manage the scheme thanks to our close involvement with the development and maintenance of industry standards and our strong relationships with government and key stakeholders around Australia," he said.

"In addition, FPA Australia currently manages accreditation and licensing schemes both at a state and federal level."

"The fire protection industry has, in recent years, been in the spotlight as a result of devastating fire incidents such as the Quakers Hill Nursing Home Fire in NSW, Black Saturday Fires in Victoria, the Childers Backpacker Fire in Queensland and the recent tragic unit fire in Bankstown, Sydney, among others.

"These events have highlighted varying levels of competency among fire protection industry individuals as well as inadequate supervision, training shortfalls and the need for skills-based accreditation of the fire protection industry workforce.

"It is these kinds of community concerns we we will address with the scheme, while also effectively marketing the scheme in order to make it an attractive prospect for individuals and companies to be part of."

FPA Australia expects to promote members of the scheme as 'providers of choice' to encourage an increase in the professionalism of the industry, recognise skills and foster confidence about the professionalism of the industry to other stakeholders relying on fire protection contractors.

The accreditation scheme is currently in a working draft format and the Board has agreed to support the scheme for future implementation.

The working draft document proposes that the first accreditations for 'inspect and test' could start in early 2013. This would begin with an initial voluntary accreditation for individuals and a subsequent accreditation of businesses.

Mr Williams said the recognition of experienced individuals was a vital component of the scheme.

"The accreditation scheme will have three specific pathways to recognise the skills of individuals. The first will recognise the skills of experienced individuals working within the industry. The second will recognise those individuals with relevant qualifications, while the third will recognise trainees who have entered the industry and wish to become qualified. Any individual will have 24 months to transition to a qualified status.

"The scheme will incorporate existing essential components of the Australian Government training agenda on competency-based training and assessment, and the accreditation levels will meet the requirements of individual state government regulators based on qualifications recognised by the Australian Qualifications Framework (AQF)."

The accreditation scheme will be financed by a fee-based system on application and attainment of accreditation. Business accreditation will also attract a fee, however, this may be introduced over time.

The road ahead

The Association expects and is prepared for the hurdles that lie ahead with the introduction of the scheme. The process of introducing the scheme to FPA Australia members, the fire protection industry, legislators and the broader community will no doubt prove to be both challenging and complex.

A consultation group will be established in each state comprised of key stakeholders. This group will provide feedback to the working group on the implementation of the scheme. The stakeholder consultation group will likely be comprised of national peak bodies such as the Property Council of Australia, Insurance Council Australia, Facility Management Association, Fire Protection Industry (ODS & SGG) Board and state regulatory bodies.

Further, FPA Australia, with the help of the stakeholder group, intends to demonstrate to state and territory regulators and NOLA that this scheme provides appropriate requirements for future national adoption.

FPA Australia expects to offer the scheme to occupations associated with 'inspect and test' of fire protection equipment and systems in early 2013. At a later date, the scheme will be expanded to include design, installation and commission, and certify and maintain activities.

More information on the voluntary fire protection accreditation scheme is expected to be released shortly. This will be announced through FPA Australia, including on the Association's website at www.fpaa.com.au.

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GRASS WILL AGAIN POSE THE BIGGEST FIRE RISK THIS SUMMER

By Nathan Maddock,
Fire Australia magazine
Joint Editor

Determining the expected bushfire potential across the country is a scientific process. The Bushfire CRC recently brought together fire and weather experts from around Australia to discuss the upcoming bushfire season.

Vast parts of Australia face above-average bushfire potential this bushfire season, according to the Bushfire CRC's partners the Bureau of Meteorology and fire agencies across the country.

Fire and weather experts met in Sydney at the headquarters of the New South Wales Rural Fire Service (RFS) in late August for a two-day workshop to discuss the fire potential across Australia.

The workshop produced the Bushfire CRC's bushfire outlook for the upcoming season across southern Australia (below the Tropic of Capricorn). When combined with the northern Australia bushfire outlook, produced in early August in Townsville and covering northern Queensland, the Northern Territory and northern Western Australia, the result is the bushfire outlook across the country. These seasonal outlook workshops, supported by the Bushfire CRC, have been held each year since 2006.

Simon Heemstra of the RFS hosted the Sydney workshop and noted that, like last summer, grass will again pose a major threat.

"This season, the above-average forecast is due to the abundant grass growth from the high amount of rain from two strong La Niña events seen in the past two years across the eastern seaboard and South Australia.

"Fuel moisture content within forests is still high, but the rainfall has continued to provide widespread vegetation growth in the grasslands, which pose an above-average threat," he added.

Australia has endured significant natural disasters in the past two years, mainly due to the back-to-back La Niña events that have strongly influenced our weather—events such as the record flooding experienced in Queensland, New South Wales and Victoria, as well as Tropical Cyclone Yasi, which hit northern Queensland.

The influence of these La Niña events has dramatically altered the warmer months over much of Australia in recent times, but this summer most of the country can expect a return to conditions usually associated with summer in our great southern land.

The Bureau of Meteorology's Dr Aaron Coutts-Smith noted this when reviewing the weather and climate patterns since last year's workshop. He also took into account the climate outlook for the coming three months, based on the Bureau's various predictive models.

"This year has again seen Australia under the influence of La Niña," said Dr Coutts-Smith.

"Combined, the last two years have yielded both Australia's wettest 24-month period on record and the wettest two calendar year period. We've seen a new record average rainfall, 1411 mm in 2010-2011, which is 4 mm more than the previous record average from 1973-1974.

"The latest La Niña resulted in cooler than average maximum temperatures between January and March 2012 across most of the country, with the notable exceptions of Tasmania and south-west Western Australia.

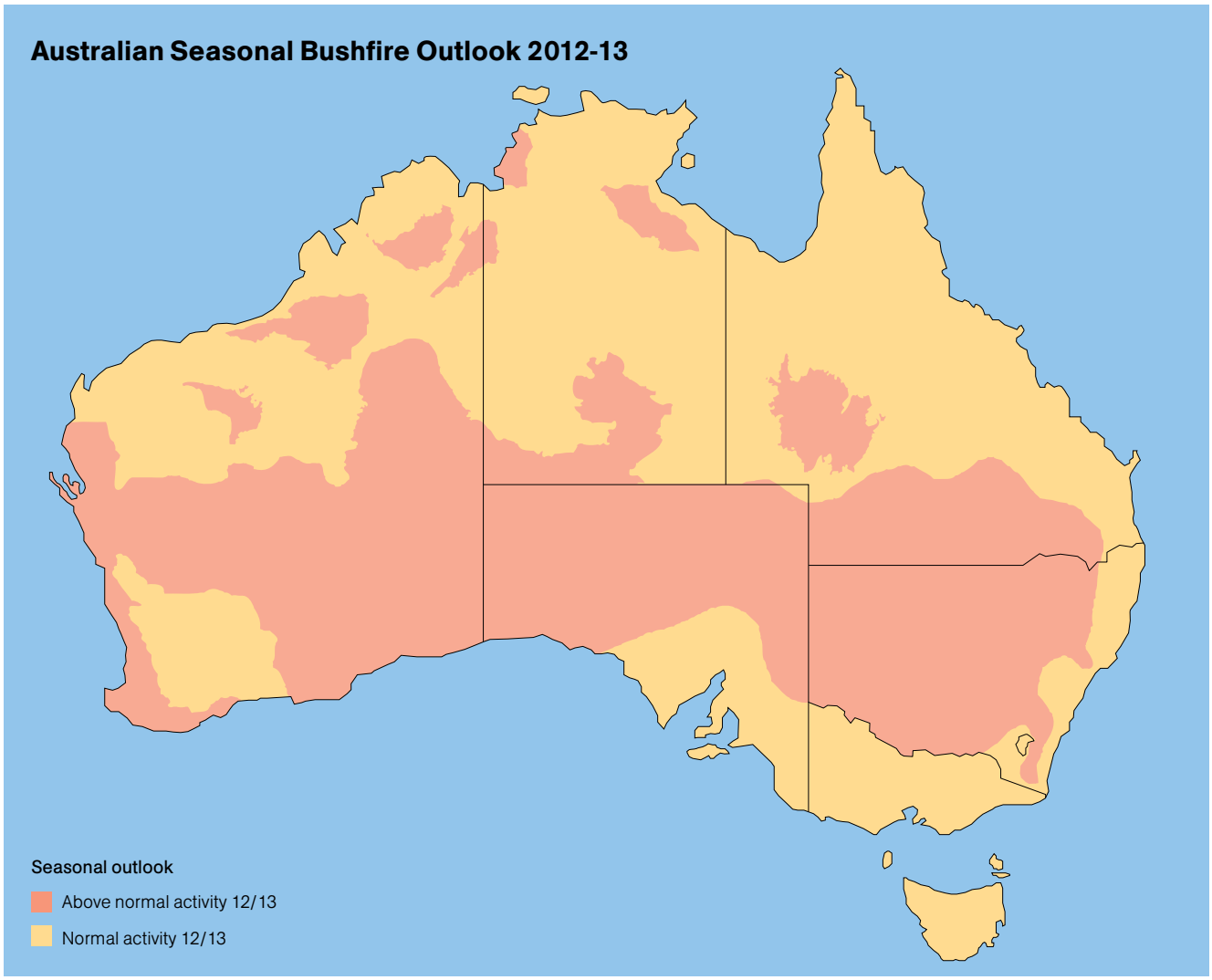
"But since April, the breakdown of this La Niña has seen a return to drier weather across southern Australia," he added.

There will not be a La Niña this summer.

"The indicators have been trending towards the development of an El Niño, although if we do see a return to El Niño conditions, it is likely to be a weak El Niño," Dr Coutts-Smith said.

The Bureau's official spring seasonal outlook indicates an increased chance of below-average rainfall in central to south-east South Australia, southern inland New South Wales, northern and eastern Tasmania and much of Victoria.

In contrast, a wetter spring is more likely in south-west Western Australia, southern Queensland and north-eastern New South Wales. This is a result of emerging warmer than normal waters in the tropical Pacific Ocean and persistent warmer than normal waters in the Indian Ocean. The maximum temperature outlook shows an increased chance of a warmer than normal spring in eastern South Australia and the eastern states.



All workshop participants noted throughout the two-day meeting that while large areas from the Great Dividing Range through to the west coast face above-average conditions, it is critically important to note that Australia is one of the most fire-prone environments in the world.

Paul Brockhoff from Victoria's Department of Sustainability and Environment made it clear that average fire conditions across Australia can still produce fast-running and destructive fires.

"It's critically important to remember that average fire potential will still yield the possibility of serious fires.

"Fires are part of the landscape; we will still experience hot weather and total fire ban conditions, and we may still encounter fast-running grass fires."

Ralph Smith of Western Australia's Fire and Emergency Services Authority (FESA) noted that producing the seasonal outlook is a scientific process, and a number of factors are taken into account in assessing the bushfire risk for certain areas.

"The methodology that we use is to look at the rainfall deciles and the vegetation types by interim biogeographic regions," he said.

A decile is a statistical technique that ranks sorted observations into 10 equal groups. A decile rainfall

Attendees at the workshop included representatives from:

- Australasian Fire and Emergency Service Authorities Council
- Australian Capital Territory Emergency Service Agency
- Australian Capital Territory Parks, Conservation and Lands
- Bureau of Meteorology
- Bushfires NT
- Bushfire CRC
- Charles Darwin University
- CSIRO
- Far North Queensland Regional Organisation of Councils
- Fire and Rescue New South Wales
- New South Wales National Parks and Wildlife Service
- New South Wales Rural Fire Service
- Northern Territory Fire and Rescue Service
- Queensland Fire and Rescue Service
- Queensland Parks and Wildlife Service
- South Australia's Country Fire Service
- Tasmania Fire Service
- Townsville City Council
- University of Western Australia
- Victoria's Country Fire Authority
- Victoria's Department of Sustainability and Environment
- Western Australia's Department of Environment and Conservation
- Western Australia's Fire and Emergency Services Authority.

map will show whether the rainfall is above average, average or below average. Interim biogeographic regions are made up of groups of interacting ecosystems that are repeated in a similar form across the landscape. Australia is divided into 89 of these regions.

Mr Smith added, "We then compare this with the Keetch–Byram Drought Index data, the soil moisture deficit data and the Queensland Government's Long Paddock Grass Fuel Rates.

"From this we work on a table that gives us different interim biogeographic regionalisation for Australia, Bureau of Meteorology regions and vegetation types, such as woodland forest, shrubs or grass. From this we can work out the fire potential for each area."

Each state and territory looks at Queensland's Long Paddock Grass Fuel Rates to ensure consistency.

A key output from the workshop is the map of Australia highlighting which areas can expect above normal bushfire potential and which can expect normal or below normal bushfire potential. The shaded areas are drawn generally rather than specifically—it is meant to be a broad-brush map, not one that tries to predict the outlook for particular towns or shires. As such, no cities or towns are named on the map.

In **Western Australia**, above-average fire potential is expected across the Mid-West, Desert and Nullarbor regions as a consequence of high fuel loads from extensive rainfall, which have resulted in very high annual grass growth. In the south-west, the bushfire potential is also above average as a consequence of reduced rainfall, soil moisture deficit and high fuel loads. Prescribed burning operations have also been hampered because of the weather. The Wheat Belt is expecting average bushfire conditions.

South Australia is forecasting above-average fire potential in the western part of the West Coast, North-East Pastoral and North-West Pastoral districts due to abundant and continuous grass fuels. For the remainder of the state, including the southern settled areas, the most likely scenario is for near average levels of fire activity.

Current grass fuel levels throughout **Queensland** are considered abundant and continuous. The grasslands have cured rapidly because of below-average rainfall and temperatures, and extensive frosts. Fast running, high-intensity grass fires can be expected over most of the state, with southern and western Queensland of particular concern. This includes the grasslands and pastures incorporating the areas from Stanthorpe and the Granite Belt district, north to Toowoomba, Dalby, Miles and Taroom, west to the South Australian border and south to the New South Wales border.

Above-average rainfall for much of the last two years has resulted in heavy grass fuel loads across **New South Wales** and the **Australian Capital Territory**. This incorporates the grassland areas west of the Great Dividing Range, the Tablelands, the Upper Hunter and the far west. Winter frosts and snows have increased curing rates, so above-average fire potential is predicted in the Monaro region and Murrumbidgee corridor. Forested regions east of the Great Dividing Range, including the southern slopes, are expecting average conditions.

Victoria is expecting an average fire season, although it is important to note that fast-running grass fires occur in Victoria every year. Key grassland areas that authorities are monitoring include the Mallee, Wimmera and the south-west. With warmer and drier conditions expected over the coming months, ideal growing conditions will be present for grass throughout Victoria. This will be the main contributor to the fire hazard, beginning in the west.

Normal to below normal fire potential is expected for the fire season up until the New Year in **Tasmania**. Large fires may be possible in grasslands in the late summer due to retained thatch combined with expected spring growth. The Moorlands are currently wet so the fire potential has been assessed as normal.

Below right: Simon Heemstra from the RFS putting together the bushfire outlook map, with the CFS's Rob Sandford looking on.

Below: Discussions around the northern outlook.

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NATIONAL BURNING PROJECT PROGRESS REPORT

There is smoke at the end of the tunnel for the National Burning Project. The ambitious collaborative project has made good progress but more light is needed.

Active management of native ecosystems using prescribed burning remains controversial.

By Gary Featherston, Manager, Rural and Land Management, AFAC

The use of fire in the landscape to manage fuels and ecosystems remains topical and controversial. Recent events adding to the controversy include the publishing of research results and disastrous escapes from prescribed burns. Questions continue to be asked about the appropriateness of various public policy positions. The community still has a poor understanding of the risks natural vegetation fuels pose to them and to their assets, and even less understanding of actions required to manage these risks. Much of the debate is based on one issue or risk at a time and there is little work to address these issues holistically. The fire and land management agencies in Australia and New Zealand are hoping to improve the situation through the National Burning Project.

The National Burning Project is a joint venture between the Australasian Fire and Emergency Service Authorities Council (AFAC) and the Forest Fire Management Group (FFMG). It is a ten-year undertaking that commenced in 2010. The project currently consists of ten subprojects that are linked to form a framework of coordinated actions to improve the efficiency and effectiveness of prescribed burning in meeting public policy objectives. The subprojects are:

1. Review of Science and Knowledge
2. Analysis of Objectives
3. Risk and Monitoring Framework
4. Best Practice Guidelines for Prescribed Burning
5. National Bushfire Fuel Classification System
6. National Position
7. Prescribed Burning Competencies
8. Training Material
9. Training Delivery
10. Resource Optimisation

The Steering Committee has agreed in principle to add a further subproject to the framework for performance measurement. An objective and consistent framework for measuring strategic and tactical performance is expected from the community.

The National Bushfire Management Policy Statement for Forest and Rangelands has been approved by the Council of Australian Governments (COAG) and will be published shortly. It sets national goals and principles for land management in Australia's fire-adapted landscapes. It provides suitable policy direction to ensure people can be integrated into our burning landscapes, and establishes the principle that fire should be managed according to the landscape objectives. This has created the need for subproject six on a National Position. AFAC will propose, consider and adopt a National Position on prescribed burning that is consistent with the policy statement and will clearly enunciate the shared view of member agencies on the value and role of managed fire in the landscape.

Good progress has been made on some subprojects and results will be available shortly. Four subprojects have received funding from the Commonwealth Government through the National Emergency Management Program (NEMP). These funds were used to compile the science review and a review of current practices to inform the preparation of a best practice guide. The National Bushfire Fuel Classification System was created by compiling a glossary and fuel assessment guide. The funds also paid for the preparation of a risk management framework for two of the four major risks, fuel and smoke. The remaining risks that are proposed for analysis are operational and ecological.

The priority for the next 12 months is to complete the best practice guide and to trial, test and refine the National Bushfire Fuel Classification System. Funding from various sources will be needed to complete the balance of the subprojects.

The science review has been completed and will be turned into a document suitable for interested stakeholders and the public. It has identified the role fire plays in our natural ecosystems and how we need to adapt to fire. Managed fire is lacking from many of our ecosystems and it will be a reasonable replacement for 'natural fire'.

Subproject two will use proven methods to create a discussion and resolution over competing objectives in the landscape and between elements within communities. The Bushfire CRC will use the methodology for case studies in New Zealand and the Adelaide Hills. These results will inform the subproject on the suitability of the method. We will seek funding to do three more case studies in different jurisdictions and to determine the requirements to operationalise the methodology and the results.

Prescribed burning used for reducing fuel hazards.

Above: Prescribed burning used for keeping fire regimes within ecological parameters.

The risk framework has been outlined and populated with the smoke and fuel risks. This framework is an important tool to manage risks in a holistic manner. The draft reports on these risks will be improved, approved and distributed. It is very important that future risk analysis uses the framework and the project will seek urgent funding for the remaining two risks. These are the ecological risks posed by prescribed burning and fire regimes in terms of frequent fire, the absence of fire, and the operational risks of fire escape; and the health and safety of fire crews working on prescribed fires.

The review of current practice has been completed and much was learnt about the practices conducted around the country. This will now be turned into advice on the best practices that can be used by the agencies. This work was undertaken by the consulting firm GHD, who will be engaged to complete the subproject.

The National Bushfire Fuel Classification System is now well advanced. The last two years of NEMP funding was used to scope a system and framework and to prepare a glossary and fuel assessment procedure. This work, undertaken by the CSIRO, involved two national workshops to get practitioners and experts together to inform the consultants of their needs from the system. The next steps are to test and trial the system and to further refine and define it. After that, the subproject must make more people aware of the system and encourage its application. The system is flexible enough to ensure all users of fuel information can use it or adapt it to their needs. The next key market for the system is with the academic and research communities to ensure it underpins all new knowledge generation.

The fuel classification system deliberately focused on the needs of agencies to determine fire behaviour. The next stages of the system can look at a broader range of objectives such as ecology, carbon accounting and risk assessment.

The three training subprojects are about increasing the capability of agencies to manage fire in the landscape. There is currently only one nationally recognised competency for prescribed burning with plans underway to grow this to five. They will cover separately planning and conducting prescribed burns at two complexity levels, for simple and complex, or high-intensity, burns. Uniform training material offers major efficiencies for the agencies and avoids duplicating costs. In the US, a school for burning practitioners in Florida delivers training for the nation. Funds will be sought to investigate the application of such a model to Australia and New Zealand.

Resource optimisation is about finding national solutions to the capability requirements. The burning season around Australia moves south as seasons progress. Early season burning in the tropical savannahs starts at the end of the wet season in May. South-west WA has a major spring burning program in August to November each year with the remaining southern states conducting autumn burning during March and April. The possibility of resource sharing between these programs needs to be considered in some detail. Prescribed burning can be used as a major training tool for bushfire control so the integration of burning crews and fire control crews is common and its application could be expanded.

The new subproject to be added will consider how to measure the performance of prescribed burning programs. The use of an area target as recommended by the Victorian Bushfire Royal Commission has been widely criticised. A practical and realistic way to measure the residual risk after fuels have been treated needs to be developed and tested before it can be considered for adoption as public policy.

Overall, the National Burning Project will set land management agencies and those managing fuel risks down a path of review and reform over the next ten years. The project framework and its creation of interlinked subprojects will make for a holistic consideration of a complex, risky and controversial undertaking. Fragmented funding arrangements are currently the biggest risk to the project. There may be light at the end of the tunnel but it is shrouded in smoke at the moment.

For further details contact Gary Featherston, Manager, Rural and Land Management, AFAC, on 03 9418 5217 or email gary.featherston@afac.com.au.

Safety and the new equivalent carbon price on synthetic greenhouse gases—what you need to know and do now

By Carlos Santin,
Executive Officer,
Ozone Protection

The Australian Government's Clean Energy Future Plan means that synthetic greenhouse gases (SGGs) now attract a levy. This raises important considerations, and regulations to observe, for businesses that use SGGs.

As part of the Australian Government's Clean Energy Future Plan, importers and domestic manufacturers of synthetic greenhouse gases (SGGs) are now required to pay an equivalent carbon price on these gases in the form of a levy.

The fire protection industry may be required to address broader safety considerations as the refrigeration and air conditioning (RAC) sector moves away from the use of SGG refrigerants towards natural alternative refrigerants.

It is also important that the fire protection industry is aware of the effects of the equivalent carbon price and their extended responsibilities.

This article provides authoritative information on the impact of the equivalent carbon price on the fire protection industry and provides a handy checklist to help you keep abreast of imminent changes following the introduction of the scheme on 1 July 2012.

New equivalent carbon price and SGGs

SGGs are industrial chemicals used in refrigeration, air conditioning and fire protection equipment. The import, export and Australian manufacture of these SGGs are regulated by the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

Following the commencement of the equivalent carbon price, a levy is now applied to all products containing the regulated SGGs. This occurs whether they are imported as bulk gases such as bulk extinguishing agents, or contained in products or equipment such as systems installed in specialised equipment or vehicles.

The decision to pass on the levy is a commercial decision for each business.

For a guide on determining carbon price claims, visit www.accc.gov.au/carbon.

The equivalent carbon levy is intended to provide an incentive for businesses and consumers to explore low or no global warming potential alternatives, provide increased incentive for correct installation and regular maintenance, and provide increased incentive for end-of-life recovery and recycling of the gases.

SGGs will continue to be available

SGGs will continue to be available and can still be used in fire protection systems to top up cylinders after their regular maintenance, or in the event of a discharge. Businesses and technicians who still to use these gases must continue to comply with all legislative and regulatory requirements, which include:

- appropriate training, skills and licences
- relevant codes of practice and standards
- work health and safety legislation
- competition and consumer legislation.

The gas in these systems will also considerably increase in value because of the levy. In order to minimise the cost of operating these systems, fire protection businesses should review how these gases are used, stored, supplied, serviced, disposed of and managed. For instance, if technicians avoid accidental discharges of extinguishing agent then the costs of replenishing extinguishing agent will be reduced.

Fire protection systems—design and alternative refrigerants

If a change to an alternative system is being considered, then this should be planned well in advance and discussed with the client.

The client may then get more timely and accurate advice, with risks better identified and managed. This approach may also minimise the period in which there is no operational fire protection system.

In Australia, some alternative refrigerants are now being used in RAC equipment. These refrigerants include ammonia, carbon dioxide and hydrocarbons. All have different hazard characteristics:

- ammonia—high toxicity and medium flammability
- carbon dioxide—operates at very high pressures
- hydrocarbons—highly flammable.

Each can be used safely and effectively when manufacturer instructions and relevant standards are followed.

Companies that design and install fire protection systems may need to consider both:

- the type of charge in any refrigeration or air conditioning plant that the system might cover
- any other building codes that are applicable as a result of switching to an alternative.

It is important that companies regularly review their state or territory legislation and the National Construction Code.

Emergency services and alternative refrigerants

As the use of alternative refrigerants is expected to increase, fire and emergency services may also need to review how they respond to situations that could involve RAC equipment. Good practice would have the equipment appropriately labelled and maintained, but it may be prudent to consider these hazards in any risk assessment undertaken before entering a site.

For example, there have been a small number of major incidents where hydrocarbons have been used in place of hydrofluorcarbons, which has resulted fire and explosion. The most significant was the 2008 Tamahere Cool Store explosion in New Zealand where leakage of a hydrocarbon refrigerant gas resulted in a fatal explosion.

Regulatory change

The Department of Sustainability, Environment, Water, Population and Communities regularly reviews the effectiveness and efficiency of the regulations under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*. If you are interested in being involved in future consultation, subscribe online at www.environment.gov.au/equivalentcarbonprice in the latest news section.

More information about the equivalent carbon price on SGGs is available at the above website.

Checklist for fire protection businesses

What must I do if my business imports synthetic greenhouse gas in bulk or if the equipment I import contains synthetic greenhouse gas?

- Make sure you have the correct import licence. Go to www.environment.gov.au/equivalentcarbonprice and also check your licence is still current.
- If you do not have the right import licence, or it has expired, pay the non-refundable application fee—this varies between $400 and $15,000 depending on the type of licence you require.
- Lodge your import activity quarterly report within 15 days of the end of each calendar quarter.
- Pay the quarterly import levy—this must be paid within 60 days of the end of each calendar quarter but do not pay it until you receive an invoice from the department.
- Only pass on legitimate costs to your customers.
- Be aware of the government's national compliance program.

What must I do if my business handles SGGs?

Make sure you have the right licence. To apply for a licence or authorisation, go to www.fpaa.com.au/licencing, click the 'Ozone Depletion Registration Scheme' link, then select the application forms tab from the side bar.

- Ensure safe use of alternative extinguishing agents.
- Provide your client accurate advice on any safety issues.
- Conduct a risk assessment of each situation before proceeding with an installation or undertaking work.
- Follow all relevant workplace health and safety requirements.
- Handle all gases in accordance with relevant international and national standards and codes of practice and national, state and territory and local laws.
- Only pass on legitimate costs to your customers.
- Be aware of the government's compliance program.

FM200 system cylinders.

Principles of fire safety, part 9

BUILDING CODE OF AUSTRALIA

Part of the National Construction Code, the BCA provides national guidelines on minimum standards for health, safety, amenity and sustainability in building design and construction. Importantly for fire safety in buildings, the BCA provides guidance on fire resistance, firefighting equipment and construction in bushfire-prone areas, to name a few. This article, part of a series on fire safety, outlines the goals and definitions of the BCA, while the next installment in the series will outline ways to achieve compliance with the code.

By Russ Porteous,
CEO, Firewize

The Building Code of Australia (BCA) forms part of the National Construction Code (NCC). The Australian Building Codes Board (ABCB) published the NCC to provide a nationally consistent framework for the construction of buildings and structures throughout Australia. The NCC currently comprises three volumes:

1. BCA, Volume One (Class 2 to Class 9 buildings)
2. BCA, Volume Two (Class 1 and Class 10 buildings)
3. Plumbing Code of Australia, Volume Three.

In Australia, the *Commonwealth of Australia Constitution Act 1900* ('the Constitution') sets out the roles and responsibilities of the Federal and State Governments. By convention, matters not specifically addressed in the Constitution remain the power of the states and territories.

The health, safety and amenity of people in buildings are not addressed in the Constitution. As a result, the states and territories have assumed responsibility for these matters, leading to an array of differing regulatory frameworks throughout Australia.

Almost 50 years ago, in 1967, the complexity of Australia's regulatory system for buildings and construction was identified as a legislative nightmare. As a result, an intergovernmental committee was established by agreement between the states to pool their resources and draft a uniform technical code for building regulatory purposes. The result of their cooperation was a document first published in the early 1970s called the Australian Model Uniform Building Code (AMUBC).

Again in the early 1980s it was recognised that the building industry required further reform to encourage national consistency and support modern methods of construction and materials. A new committee was formed. This led to the first edition of the BCA, which was developed in 1988 and published in 1990.

In 1991 the Council of Australian Governments accepted a recommendation to establish a new body with the objective of once again reforming building codes throughout Australia. In 1994 the ABCB was established, leading to a performance-based building code that was published in 1996.

Since 2003 the ABCB has moved to a yearly amendment cycle for the BCA, accommodating developments in construction related to health, safety, amenity and construction materials and methods.

Goal of the BCA

The goal of the BCA is to achieve nationally consistent, minimum necessary standards for relevant health, safety, amenity and sustainability objectives. Safety includes structural safety and safety from fire within a building and fire-spread to and from other buildings on the allotment and the allotment boundaries. The BCA's goal is applied so that:

- there is a rigorously tested rationale for the regulation
- the regulation generates benefits to society greater than the costs; that is, there are net benefits
- the competitive effects of the regulation have been considered and the regulation is no more restrictive than necessary for the public interest
- there is no regulatory or non-regulatory alternative that would generate higher net benefits.

Anyone may submit a proposal to change or amend the BCA. However, all changes must be reviewed by the Building Codes Committee and are then subjected to a Regulatory Impact Assessment process.

The BCA contains technical provisions for the design and construction of buildings and other structures. It covers such matters as structure, fire resistance, access and egress, services and equipment, energy efficiency, and certain aspects of health and amenity (ABCB, 2011).

Legislative support

The BCA is given legal effect by building legislation in each state and territory. This legislation consists of an Act of Parliament and subordinate legislation that empowers the regulation of certain aspects of buildings and structures. The legislation contains the administrative provisions necessary to give effect to the legislation.

Any provision of the BCA may be overridden by, or subject to, state or territory legislation. The BCA must therefore be read in conjunction with that legislation (ABCB NCC, undated).

Structure of the BCA

While the BCA is in two volumes, Volume One and Volume Two, this article relates specifically to the requirements of Volume One. However, the principles covered apply to both volumes.

First, though, it is vital to explain the application of each volume. To do that, we need to explain the principles of classification of buildings. The classification of a building or part of a building is determined by the purpose for which it is designed, constructed or adapted for use.

Just as the BCA is given effect by each state or territory building regulatory legislation, that legislation may also affect the way the BCA classification system is applied.

Application of the technical provisions of the BCA depends on the classification of the building or structure. Therefore it is critical to ensure that the classification applied reflects the purpose or use of the building or structure that is proposed to be constructed.

Some buildings or structures do not fit neatly into these descriptions and therefore require careful consideration by the authority that has jurisdiction to determine what requirements will be applied.

The general table of contents of the BCA shows its structure is divided into sections:

- Section A—General Provisions
- Section B—Structure
- Section C—Fire Resistance
- Section D—Access and Egress
- Section E—Services and Equipment
- Section F—Health and Amenity
- Section G—Ancillary Provisions
- Section H—Special Use Buildings
- Section I—Maintenance
- Section J—Energy Efficiency.

The General Provisions section sets out the application and framework of the BCA, establishing the important principles and assessment methods to satisfy the *Performance Requirements for a Building Solution*.

The concept of a *Deemed-to-Satisfy* solution underpins compliance with the mandatory *Performance Requirements*, as it provides a solution that designers can adopt and is deemed to comply. It gives confidence to designer and authority with jurisdiction alike that the solution will meet the mandatory *Performance Requirements*. This is explained in more detail below.

Because Australia is a large, geographically diverse country, the BCA also provides guidance for regional (state or territory) Performance Requirements, taking into consideration climate, environment and geology.

Suitability of materials

In addition to establishing the provisions for construction, the BCA also sets out the requirements for the suitability of materials used.

A2.1 Suitability of materials: Every part of a building must be constructed in an appropriate manner to achieve the requirements of the BCA, using materials that are fit for the purpose for which they are intended (ABCB NCC, undated, Part A2.1).

There are a number of detailed methods included in the BCA to satisfy the evidence requirements for materials to ensure that they are fit for the purpose for which they are intended.

Reference documents

The BCA directly references almost 80 material, equipment, design, installation and performance standards.

Important definitions

The following definitions have been extracted directly from the BCA.

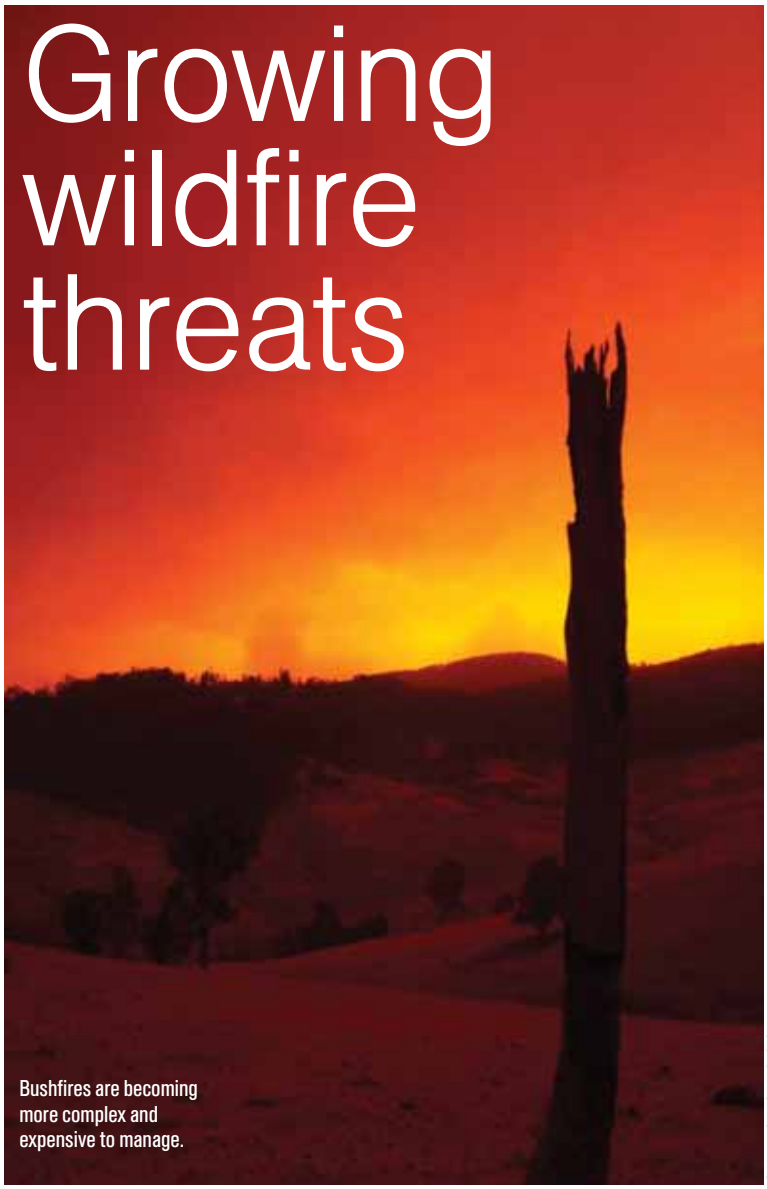
Wherever any of these terms are referenced in this article they appear in italics.

- Alternative Solution means a Building Solution that complies with the Performance Requirements other than by reason of satisfying the Deemed-to-Satisfy Provisions.
- Building Solution means a solution that complies with the Performance Requirements and is:
  (a) an Alternative Solution or
  (b) a solution that complies with the Deemed-to-Satisfy Provisions or
  (c) a combination of (a) and (b).
- Deemed-to-Satisfy Provisions (DtS) means provisions that are deemed to satisfy the Performance Requirements.
- Expert Judgement means the judgement of an expert who has the qualifications and experience to determine whether a Building Solution complies with the Performance Requirements.
- Functional Statement means a statement that describes how a building achieves the Objective.
- Objective means a statement contained in the BCA that is considered to reflect community expectations.
- Performance Requirement means a requirement that states the level of performance that a Building Solution must meet.
- Verification Method means a test, inspection, calculation or other method that determines whether a Building Solution complies with the relevant Performance Requirements.

This concludes the first installment of Principles of Fire Safety Part 9 - Building Code of Australia: BCA Goals & Definitions. Look out for the second installment on the BCA, Achieving Code Compliance, in the summer edition of *Fire Australia*.

About the author: Russ Porteous is the CEO and one of the founders of Firewize. He has over 22 years experience in the installation and maintenance of fire and essential safety measures. Russ is a contributor to a variety of Australian Standards including AS1851 *Maintenance of Fire Protection Systems and Equipment*. Russ is regularly invited to speak at industry conferences as a subject matter expert and is also a popular blogger and author.

Growing wildfire threats



Bushfires are becoming more complex and expensive to manage.

PHOTO: CFA PUBLIC AFFAIRS

By Jerry Williams, former National Director of Fire and Aviation Management, US Forest Service (Retired)

Context is everything in today's wildland fire debate. This paper focuses much attention on the dry forest types in the Western United States—which means Ponderosa pine (Pinus ponderosa) and associated species. These forests are where many of our worst wildfires occur. I want to use these short-interval fire-adapted ecosystems to make some points about the relationship between their dynamics, our management of them, and the wildfire outcomes that we should expect. This paper suggests that understanding their dynamics can be a cornerstone for strategies to protect them … and us. I believe you may see similarities to forest types in Australia, but I want to leave it to you to draw those conclusions.

I am here as a visitor. I've had the good fortune to see the large fire problem from the field level, to the program level, to the policy level, but I am not here to lecture. Believe me, in the US, we are a long way from solving the high-consequence wildfire problem.

"Americans can always be counted on to do the right thing … after they have exhausted all other possibilities."—Winston Churchill

Background and introduction

Over five years ago, at a Bushfire CRC gathering in Canberra, the question was posed: Are big fires inevitable? Since then, big, catastrophic bushfires have plagued countries around the world. Just two years after the Canberra conference, the Black Saturday Fires (2009) tragically became the country's worst civil disaster on record. They are among the most recent in a long string of 'worst-ever' bushfires.

Australia is not alone. The so-called 'high-impact megafire phenomenon' is a global problem.

Similar disasters in Greece (2007), Russia (2010), Israel (2010), Spain (2006), Portugal (2003 and 2005), Canada (2011), Mexico (2011) and elsewhere have shocked survivors and stunned those responsible for protection. In many cases, public outrage has reached the highest levels of government. All of these disasters have had deep, long-lasting social, economic and environmental impacts. People don't soon forget them.

In the US—with perhaps the largest firefighting capacity anywhere in the world—over the last several years, 'worst-on-record' incidents seem to have multiplied and surpassed one another with a growing frequency. In Texas, last year's (2011) wildfires were that state's most costly ever. They persisted all year. In Arizona, the massive Rodeo–Chediski Fire (2002) was exceeded by the even larger, more destructive Bear Wallow Fire. In New Mexico, the Ponil Fire (2002) was surpassed by the Las Conchas Fire (2011) and was eclipsed again this year (2012) by the Whitewater–Baldy Fire. Colorado's Hayman Fire (2002) burnt fewer homes than this year's High Park Fire, but it devastated Denver's watershed. The most recent Waldo Canyon Fire (2012) forced the evacuation of 32,000 people and resulted in the loss of some 350 homes, becoming Colorado's worst wildfire on record.

Across federal lands in the US, suppression costs have reached nearly US$2 billion per year (2006, 2007 and 2008). While firefighting costs of any one wildfire can be staggering—$30 M to $40 M or more—they often represent only a small fraction of the total impact. Private property losses and natural resource damage can be five to ten times more.

Year-to-year impacts may wane somewhat, but the trends indicate that wildfires are burning hotter, getting larger, costing more, having greater impacts and claiming more lives. These incidents represent a clear defeat of our protection objectives.

But what if the high-impact megafire problem is not about how we fight fire? What if it is about how we manage the condition of fire-prone landscapes? In anticipation of deepening droughts, accumulating fuels and growing values at risk, there is little indication that what may have worked yesterday will work tomorrow. What is our plan to deal with future wildfire threats? It seems unlikely that we can simply 'soldier on' and be successful.

Discussion

Most wildfire protection programs set out to 'prevent the loss of life and property and, without compromise to firefighter safety, minimise natural resource losses and environmental damages at the least suppression cost.' This is our protection objective.

Against this measure, when doing well most of the time—but not all of the time—is not good enough, the evidence indicates that we are not getting it done. Internal to the fire services, we have made tactical adjustments here and there, but—in a lot of places—we haven't done much to adapt our wildfire protection strategies in a broader, more comprehensive way. We have been unable to balance fire programs and address the land use factors that may be setting the stage for catastrophic wildfire outcomes.

In the US, after countless reviews, reports, commissions and inquiries, for the most part we have failed to stem mounting costs, losses and damages. The fact is, for all the corrective actions bent on fixing operational failings, we have not had much of an effect on reducing the incidence of catastrophic wildfires.

Maybe we are working on the wrong problem and chasing the wrong solutions. Maybe we are overlooking the new realities that confront the fire services today.

If we were to do a situational assessment at the program level, what would we see?

- Our fire seasons are becoming hotter and drier.
- Money is getting tight.
- Our demographics have changed.
- Fuel accumulations are growing at a rate faster than we can treat them or they can otherwise decompose.

At the end of the day, there are simply more large fires that we cannot control. Among all of the catastrophic wildfires listed in the opening of this paper, all were 'off the chart'; none abated until firefighters got relief in weather or benefited from a break in fuels.

There are places where, despite the same drought and the same extremes in fire weather, wildfires have swept the land with much less consequence. Their protection strategies work at the highest level of threat.

What sets these places and their protection strategies apart? The organisations in these places:

- understand fire's role and they apply that knowledge
- fight fire when they have to, but they use fire when they can
- have programs anchored in land and resource management activities that are consistent with the fire regime dynamics that describe their holdings
- have patient, persistent leadership with an enduring strategic vision
- are engaged with their publics
- have established ongoing political relationships
- have integrated science at the program and the project levels
- in their plans and in their assessments, place at least as much emphasis on displaying the long-term effects of no-action as they do on the action alternatives.

These organisations do these things by design, not by chance or by happenstance. They have a strategic framework (social, political, economic, legal, ecological and institutional) anchored in maintaining safe, healthy, resilient fire-adapted ecosystems.

Conclusions

In his book *Burning Bush*, Stephen J Pyne (1991) describes DR Douglas's lament in solving the wildfire problem. He said that there comes, first, an elaborate inquiry followed by an excellent report. On occasions some legislative reform follows, typically addressing the need for strengthening bushfire suppression. There is talk of mitigation. Funding flourishes for a few years, then withers away. As the years pass, there is a slow but steady decline in the enthusiasm to mitigate bushfire risks.

Meanwhile, the next disaster—in wait for the next drought—quietly incubates.

We need to get past asking: 'how big does the tragedy have to be before our people and our governments take bold and meaningful actions?' Maybe we cannot be so passive anymore. Maybe we have to help them do what we ask of our firefighters: get up on the ridge, reassess the situation, confront the realities around us, adapt our strategies, and lay out a new plan … a plan based on aligning bushfire protection strategies with land management strategies that are, in turn, grounded in fire regime dynamics.

We are watching a crisis in slow motion. It is a story where we have a terrible foreboding but, battling great myths and powerful misconceptions, we find ourselves being carried along in a script we neither want nor can live with.

We need a plan—a strategy—to deal with wildfires we presently cannot control—the ones occurring at the highest level of threat. The ones where people really count on us. If the fire services don't pursue the development of this strategy, who will?

This is an edited extract of Jerry Williams's keynote address to the AFAC and Bushfire CRC Annual Conference in Perth in August 2012. The full presentation, with a more detailed discussion, can be found at knowledgeweb.afac.com.au.

Jerry Williams presenting his keynote address at the Bushfire CRC and AFAC annual conference in Perth in August 2012.

DIVERSE COUNTRY.
The AFAC and Bushfire

The 19th AFAC and Bushfire CRC Conference was held in Perth, Western Australia, 28–31 August 2012. It attracted more than 1,300 people in emergency services throughout Australasia, and a cohort of high-calibre presenters from Australia and around the world.

Naomi Brown, CEO, AFAC, said the annual conference is the keystone event in the knowledge-sharing program for AFAC, ensuring that the collective industry knowledge and experience is captured and shared.

"It is one of AFAC's key goals to strengthen industry capability, and this significant event, attended by so many of our senior practitioners from agencies throughout Australasia, is central to that endeavour.

"Each year this conference gets better and the Conference Program Committee has worked very hard over the past 18 months to deliver another superb, world-class program," said Ms Brown.

The Bushfire CRC's Research Forum was a great way to kick off the conference. It provided an opportunity for focused discussions between the research community and emergency managers on

The conference Gala Dinner featured a carnivàle theme!

"First class conference from start to finish.

Left to right: Naomi Brown, CEO AFAC; Hon. Dr Barry Jones AO; Bernard Salt, Partner and Demographer at KPMG; AFAC President Commissioner Lee Johnson of QFRS.

"I found the program very useful. The sequencing of the speakers and the range of topics were well thought out. The way the topics were streamed was fantastic—well done.

COMMON GROUND.
CRC Annual Conference

important industry issues.

Bushfire CRC CEO Gary Morgan said the Research Forum showed why research across natural hazards is more important than ever, and contributed to the knowledge-sharing and learning culture within fire, land management and emergency service organisations.

"The Research Forum highlighted the diversity of the research being conducted across all hazards, and the science on show from the researchers emphasised the significant work the Bushfire CRC is delivering.

"The Research Forum was not just about what we have learnt so far, but also that we are looking forward to defining the big issues we may face in the future and developing the research knowledge to deal with them," he said.

Delegates heard from expert speakers and researchers from Australia and around the world over the three days. Topics focused on the conference theme *Diverse country. Common ground.* and included the future for fire and emergency management, environmental challenges, community engagement and managing complex incidents. A series of panels

continued on page 32 ...

"The poster display and Knowledge Lounge were excellent ... having a focal point for the speakers to head to following their presentations is a great concept.

Bushfire CRC research students.

Major conference sponsor Scania.

The Trade Exhibition covered 5,500 square metres of the Perth Convention and Exhibition Centre, making this once again the largest trade expo for the emergency services.

Entertainment at the conference Gala Dinner.

Tweets

Fascinating talk from James Schwartz, Arlington County Fire Dept. Chief on interagency response to the 9/11 attack on the Pentagon. #afac2012

#afac2012 Great presentations from Public Safety and Bushfires panel. Community capacity building introduces a new way of working for ESOs.

Very impressed by #afac2012. Great speakers and thought provoking content.

#afac2012 conference over for another year. Plenty of food for thought and a good helping of inspiration!

Lyn Beazley Chief Scientist WA says biodiversity is worth fighting for in WA #afac2012

#afac2012 @bernardsalt "Is volunteering glue to connect disaffected communities to larger communities."

#afac2012 brain may explode after listening to Prof. Carmen Lawrence—so much to take in—wow!

... continued from page 31

engaged delegates and provided opportunities for discussion among peers and with speakers and session chairs.

The Hon Dr Barry Jones, AO, captivated the audience on day two of the conference with his awe-inspiring opening keynote address 'A vision for Australia and the role of science in policy development'. Demographer Bernard Salt presented the latest Census figures in his presentation, 'The volunteering decade: how baby boomers will want to make a contribution to the fire and emergency services sector'. He argued that this will be a retirement in which baby boomers will want to use their skills in a meaningful volunteering capacity and that the challenge for fire and emergency services will be to harness 'boomer goodwill' to leverage community advantage.

The conference was also an opportunity to view and learn about the latest technology and equipment, with a huge trade display on show.

Thank you to our major sponsor, Scania, and supporting sponsors Motorola Solutions, Dräger, GAAM, Luxfer and Isuzu.

An extended thank you to all delegates, AFAC and Bushfire CRC staff and the conference planning and steering committees for all their hard work and dedication in making the conference so successful. Thank you also to all the exhibitors, who followed the correct procedures and approached the conference with enthusiasm and good humour. It can be a stressful time for all concerned and the attitude of everyone is critical to relieving the stress and ensuring the continued success of the exhibition.

Audio recordings, speaker presentations and conference images can be found at knowledgeweb.afac.com.au/conference.

Professor Carmen Lawrence (left) with delegates in the Dräger Knowledge Lounge.

> **"The best thing this year was the quality of the keynote speakers. Quite a privilege to hear from some of those people.**

> **"AFAC and the Bushfire CRC provide the best range of relevant Emergency Management information from overseas and across the country ... in my opinion it is the only Emergency Management forum/conference to attend.**

Bagpipers led delegates to the Welcome Ceremony following the Research Forum on day one of the conference.

POSTERS ON SHOW IN PERTH

One of the highlights of the AFAC and Bushfire CRC conference each year is the poster display, which provides an alternative way for researchers to share their projects with others. The posters report on research or an organisational project that invites the reader to make contact with the author for more information.

A record number of posters, 136, were on display this year—84 from Bushfire CRC researchers and students and 52 from AFAC. The record number shows the popularity of the poster display among delegates.

There were two awards for best poster—one voted by a panel of judges, the other by delegates. Winner of the judges' vote was Bushfire CRC student David Barton of RMIT University for his poster Disaster in Relation to Attachment, to Community, and to Place: The Marysville Experience.

Winner of the People's Choice Award was Ken Eccles of ACT's Emergency Service Agency for his poster Incident Management—Leadership and Accountability.

The awards were presented at the conference closing ceremony.

Poster presentations by Ken Eccles, top, and David Barton, below

Societal impact of fire sprinklers

Two office fires with very different outcomes

By Brendan MacGrath, Manager, International Codes and Standards Group, FM Global

At around 11 pm on a Saturday night in February 2005, a small fire started in a room on the 21st storey of the Torre Windsor high-rise office building in downtown Madrid, Spain. By morning, and despite the efforts of the permanent security staff and the professional fire brigade, the 32-storey, 100-m-high building had been engulfed in flames. The fire left in its wake a partially collapsed and ultimately destroyed building. Fears of further collapse prompted a 500m exclusion zone to be established around the building. As a result, nearby commercial property was forced to close for several days, affecting some 30,000 workers. The underground road, suburban and metropolitan rail networks feeding this important business district were also shut down, causing long delays to commuters. Around six million litres of water was used in the firefighting efforts to prevent the fire from spreading to adjacent neighbouring properties. The estimated cost of this fire, including the insured damages to third parties, was expected to be in excess of € 300 M. Given the location, demolition had to be carried out by gradual dismantling of the building, which resulted in continued significant disruption to the general area for a further six months. This highly publicised catastrophe was not favourable for Madrid's image as the business capital of Spain's economy and an important tourism destination. And it certainly wasn't welcome during the selection process for the host city of the 2012 Olympic Games, in which Madrid was a front-runner.

A few years earlier, on New Year's Day 2002, again in Madrid, a short circuit from an operating portable electrical heater started a fire in an unattended seven-storey office building. Unlike the Torre Windsor, however, this facility was fitted with a fire sprinkler system. Three sprinkler heads successfully controlled and indeed extinguished the fire by the time the public fire brigade, who had received notification thanks to the water flow alarm, arrived. The limited effect of the fire is shown in the image of the sprinkler-controlled fire in an office (see page 35). An estimated 26,000 litres of sprinkler water was applied; in other words, 230 times less than that consumed by hose streams in the Torre Windsor office fire. The estimated total loss cost was € 175,000, or at least 1,700 times less than the measurable cost of the Torre Windsor fire. In this case, the staff returned to their workplace the following day, without any significant interruption to their livelihoods or to those in the immediate community.

Remains of the Torre Windsor, Madrid, after its devastating fire—access and operability of adjacent properties, roads and underground rail networks was severely affected.

Societal impacts of fires

In 2007, there were many examples of catastrophic fires right across Europe and around the globe in facilities accommodating very different types of activities and levels of fire hazards.

In Denmark, separate fires in April and July 2007 destroyed two large pork-product processing facilities. As a result, more than 1,300 workers were made redundant for the duration of the demolition, rebuilding and repairs. In March 2008, it was announced that due to the fire, one of these plants was to close with the permanent loss of 550 jobs while the other had shut down its deboning operations, causing additional significant redundancies. The affected workers initially exposed to a lot of uncertainty now found themselves permanently unemployed, which in turn greatly affected the local economy, especially in a rural area. In such cases, people may be forced to relocate in search of an income, thereby causing a long-term impact on the area. There is equally a knock-on effect on the staff of companies that supply raw materials and services to these facilities, further compounding the impact. The overall unemployment benefit costs incurred by the state during this period can be quite significant. A further aggravating factor in cases like these is the interim and even permanent closure of facilities, with the relocation of jobs to another country with lower costs. Such was the fate of 200 jobs following a major fire at an electrical manufacturing plant in the UK in 2001. The plant closed and the operations were transferred to a facility in Greece. Therefore, not only can such fires affect the local economy but there are also losses at a national level.

In Treviso, Italy, a domestic appliance manufacturing facility employing 800 staff suffered a catastrophic fire in April 2007. The thick black smoke emanating from the plant resulted in orders to evacuate and close nearby schools and to keep windows closed in the surrounding urban area. A local prosecutor has subsequently considered a case against the company involved for not having taken due measures to prevent this event and its consequences.

In Atherstone-on-Stour, Warwickshire, UK, in November 2007, a fire at a vegetable goods packing and storage facility tragically claimed the lives of four firefighters.

Societal impacts of sprinklers

Each of the recent cases highlighted above had one thing in common: the buildings involved were not fitted with an automatic fire sprinkler system. Had an adequately designed, installed and maintained sprinkler system been provided, the outcome and overall impact would almost certainly have been far different. Fire sprinklers, a proven technology, can prevent these types of catastrophes, as shown by the photo of the full-scale rack storage fire test. They very effectively limit the consequences of fires to minor proportions. They do this by automatically responding to and attacking fires in their early stages, limiting their size to proportions such that the responding emergency services are typically faced with the task of extinguishing a minor residual fire. Without sprinklers, more often than not, the only viable and safe

Far left: Limited effect of a sprinkler-controlled fire in an office—normal operations recommenced the following day.

Above left: Full-scale rack storage fire test at FM Global's Research Campus—such tests determine the design criteria necessary to adequately and cost-effectively protect warehouses.

alternative is to deploy defensive tactics in an attempt to prevent spread to adjacent properties, often with no appreciable impact on the building of fire origin.

This was further demonstrated to great effect one Friday evening in August 2007. Following an argument with some colleagues, a disgruntled employee at an 8000-square-metre spare parts warehouse in France decided to set fire to the facility by igniting high rack stores of cartoned goods. Four sprinkler heads operated promptly, which limited fire damage to one bay of the rack. All employees safely evacuated the building and, on arrival, the fire brigade's task was to extinguish a small incipient-sized fire. The results: there was no reported impact to the environment, either in the form of airborne pollutants or contaminated fire water runoff. Operations at the facility recommenced as usual the following Monday.

The main conclusion from studying and comparing the above types of incidents is clear: automatic fire sprinkler systems do prevent catastrophic events from occurring, and hence reduce and indeed eliminate the often very significant impact and consequences a fire can have beyond a property's boundary to society as a whole.

Full cost of fire

While the property insurance costs of major fire events are readily quantifiable, the total economic cost and the broader impact on society, in terms of the safety of occupants and emergency services, the disruption to the community and the ensuing environmental damage, is not. While further studies are planned, the 'tip of the iceberg' concept, where the visible property and business interruption loss costs represent only a portion of the total impact and cost of fires to society, appears to be valid. As shown in figure 1 accompanying this article, insurance covers only part of the full impact of fires on society.

Viewed from this perspective, automatic fire sprinklers make sense. They are not just devices for the protection of properties and the assets they house, but also for people, their livelihoods, the environment, the local community and the economy—and hence its sustainability.

Given both the impact of fires on today's society—estimated by several macroeconomic studies at between 1% and 2% of a country's gross domestic product (GDP)—and the potential benefits of sprinklers, it is appropriate that legislation should regulate for positive change in this area. This can be achieved through the provision of requirements and incentives in building codes for the installation of fire sprinklers in public, commercial and industrial buildings.

Regulatory environment

It is true that there are some existing requirements for the installation of sprinklers in national building codes in Europe and Australia. These are often targeted, though, at the relatively small number of applications considered to be beyond the traditional and perceived abilities of the responding professional fire services. Currently, European building codes mostly focus on detection and passive measures, which by themselves, demonstrated by the examples above, do not prevent major fires and their ensuing societal consequences. The reality is that firefighting challenges have greatly increased, notably due to the increased incorporation of plastics in construction and in the products and materials handled in many buildings. All of this contributes to today's current environment where accessing a burning building is an extremely challenging and hazardous task. The UK's Chief Fire Officers Association strongly advocates the use of automatic water suppression systems (sprinklers) in potentially all premises as "these represent the single most significant aspect of a fire management program".

By requiring sprinklers as per codes, new buildings (above a certain size and fire hazard threshold) would be provided with an automatic sprinkler system right from its inception. An adequately designed, installed and maintained sprinkler system provides the ultimate protection against fire hazards that are present in practically every type of building and activity. This greatly contributes to a building's resilience and sustainability, and the benefits the property brings to society.

Cost impact

By requiring fire sprinklers in building codes, their design and installation is significantly simpler and, most importantly, cheaper. Typically, savings of around 40% are achieved when these are incorporated into a new building's design and installed during its

Figure 1 The social impact of fires — iceberg concept

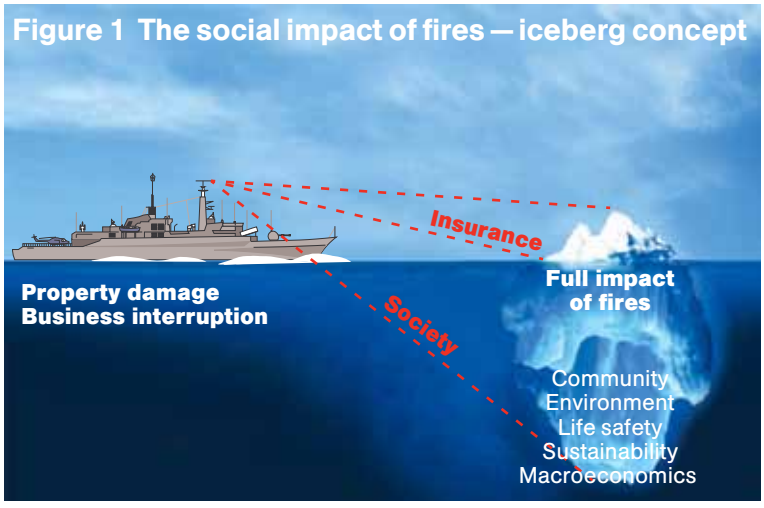
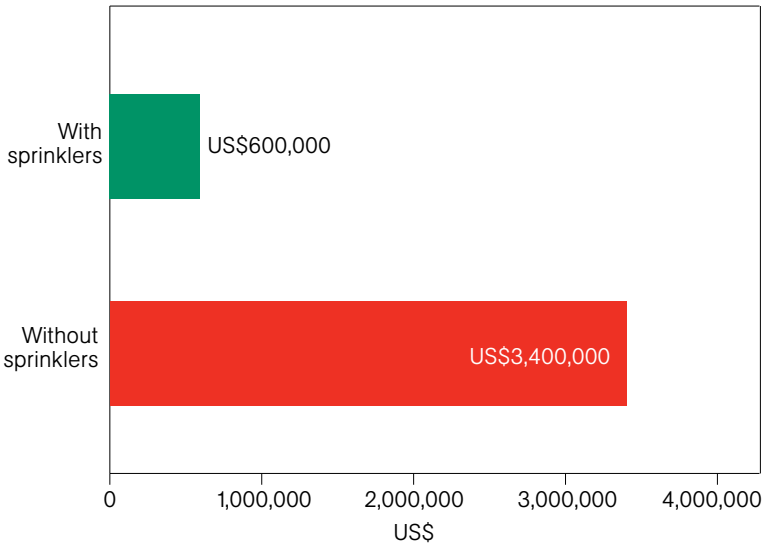


Figure 2 Average cost of property damage and business interruption



Average fire loss history (1997–2007) reported incidents.
Sprinklers reduce average property damage and business interruption by at least a factory of 57.

construction compared to retro-fitting them in an existing facility. Expressed in another way, if sprinklers are not installed during the construction of a building, it can cost 66% more to fit them when the building is newly completed and in operation.

A sprinkler system protecting an office building and its occupants can be installed for half the price of its comfort-providing carpet. Overall, sprinklers can represent as low as 1% to 2% of a new building's cost. Further savings and architectural advantages are achievable with sprinklers, as requirements can be relaxed for internal fire-rated partitions and longer egress travel distances.

Research and data

Sprinklers are very effective in reducing the impact of fires. FM Global's fire loss data, measured in terms of property damage and business interruption costs, shows that from 1997 to 2007 the average fire loss to an adequately sprinklered FM Global-insured location was US$600,000; the average fire loss to locations needing sprinklers was US$3.4 M. Therefore, sprinklers reduced the impact of fire losses by a factor of 5.7, as demonstrated in Figure 2 above, which shows average cost of property damage and business interruption. Many successfully sprinkler-controlled fires—estimated as at least 80 per cent—go unreported because their loss cost is below insurance policy deductibles. Therefore, the average sprinkler-controlled fire loss value is far less, and so this reduction in impact is even greater. And in the same way that sprinklers greatly reduce the cost of fires when measured in terms of policy-holder claims, they also greatly reduce—if not eliminate—many of the societal impacts highlighted in the examples above.

A subject of much study is the overall reliability and effectiveness of sprinklers. The above figures show how effective adequate sprinkler protection is when provided. This begs the question, How often do sprinklers systems reliably and effectively control fires? FM Global concludes that the reliability of the most common type of sprinkler installation, a wet-pipe system, ranges between 94% and 98%. When adjusted for an estimated number of successfully sprinkler-controlled fires, these figures increase to over 99%. This is in line with the findings of other studies, for example from Marryatt Australia (99%) and the Association of German Property Insurers (97.9%).

Common misconceptions

Popular cinema that shows all the sprinklers in a building operating at once highlights one of the many myths associated with this safety device. Another myth is that their installation is a matter solely for insurance companies and their policy-holders. The reality is that the insurance premium incentives for installing sprinklers vary widely depending on the conditions of market and the competitive pressures at any particular time. While a properly designed and installed sprinkler system will reduce both the probability and severity of a major fire, savings in insurance premiums for individual premises will rarely justify the cost on a traditional cost–benefit analysis. Those enlightened companies that decide to install sprinklers are doing so to protect their highest value-creating assets—their business and their people—and insurance savings are a secondary consideration. However, such companies will certainly benefit from better and more stable insurance premiums than those companies that do not see the value of sprinklers. Sadly, the latter approach will leave many unprotected facilities at increased risk of a major fire, with wider economic, societal and sustainability consequences should it occur.

Conclusion

Providing automatic sprinklers in a building protects the occupants and its activities. Sprinklers make the building a far more resilient facility, and hence installing sprinklers makes a major contribution to sustainable development. Sprinklers protect society against the broader impact of fires and therefore should ultimately be the starting point and mainstay of a building's fire protection philosophy. It is therefore appropriate that legislation has, through building codes, requirements and incentives for the provision of fire sprinklers in all public, commercial and industrial buildings. ■

Brendan MacGrath will be delivering a keynote address on 'The true cost of fire' on day one of Fire Australia 2012, 14 November 2012, Melbourne Convention and Exhibition Centre. To find out more or to register as a delegate visit the Fire Australia 2012 website at www.fireaustralia.com.au.

This is a modified version of an article first published in *International Fire Protection Magazine*, February 2008, Issue 33. Visit www.ifpmag.com.

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Fire development in focus

Large bushfires can be destructive, but how do they progress to this state? A team of Bushfire CRC researchers is investigating how bushfires develop.

By Nathan Maddock, *Fire Australia* magazine Joint Editor

All bushfires start small, but how do they progress to large fires that can impact on communities and cause wide-scale destruction? Until now, our existing knowledge of fire behaviour and tools for prediction assumed steady-state spread of a fire. Understanding the chances of a fire occurring and developing into a large fire, as well as the likelihood of spot fires, is essential to understanding the behaviour of bushfires under all possible weather conditions. This is exactly what a team of Bushfire CRC researchers is looking at.

The team, comprising Dr Andrew Sullivan, Dr Miguel Cruz, Dr Peter Ellis, Mr Jim Gould and Dr Matt Plucinski, brings together fire behaviour and suppression specialists from the CSIRO with the Bureau of Meteorology's atmospheric boundary layer meteorologists.

Three key aspects are being investigated: the potential for a fire to start; the potential for a fire to develop beyond initial attack; and once a fire starts spotting, when these spot fires will be beyond initial attack.

Understanding these important phases of fire development will help clarify resource demands placed on fire brigades, provide greater confidence in preseason planning and assist in issuing public warnings.

Dr Andrew Sullivan is the Bushfire CRC's research leader for the project and a Senior Research Scientist at the CSIRO. He said the team is looking at the problem from a number of different perspectives, which hasn't been done in the past.

"We are taking a multi-pronged approach to the research," he said.

"We're considering a large number of experimental fires that were conducted in the 1950s and 1960s by Alan McArthur and his associates. These fires were lit at one particular point and then studied for a period of time, sometimes minutes, sometimes up to an hour, before they were extinguished."

In conjunction with the historical data, the team is conducting tests of its own using the CSIRO pyrotron. The pyrotron is a horizontal wind tunnel that allows fires to be studied under repeatable conditions in safety. "We cannot control all the variables in field research," said Dr Sullivan.

"It's also very hard to be in the right place at the right time to make observations.

"We're looking at the rate of growth of fires that are at different sizes when ignited," Dr Sullivan added.

Dr Sullivan noted that the McArthur experiments have played an important part in fire science, science that is still used today.

"The experimental fires conducted in the past have been instrumental in the development of the current McArthur fire danger rating systems for forests and grasslands," he said.

In addition to developing the fire danger rating systems, vast amounts of data collected during McArthur's experimental fires weren't used. Dr Sullivan and his team will also be using these data.

"The rate of growth, which is how fast a fire will develop from a point ignition to a fire that is burning at its steady-state, wasn't analysed in the past."

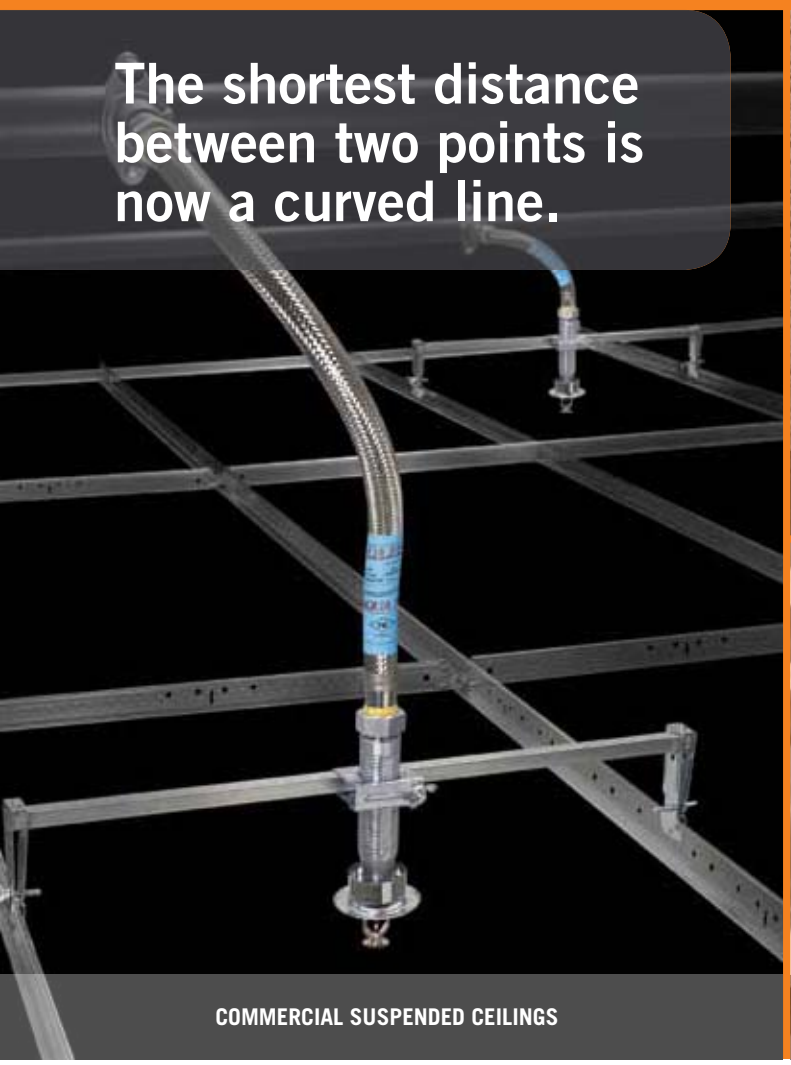
Point ignition refers to fires that start at one point, such as from a lightning strike or from a match. This is distinct from fires that may have been burning for some time, or lit in a line, such as prescribed fires.

This also includes spot fires, as Dr Sullivan explained.

"Spot fires are fires that have been started during a bushfire by firebrands carried ahead of the main fire."

A firebrand can be any type of fuel that becomes airborne while still burning, such as twigs or bark.

The shortest distance between two points is now a curved line.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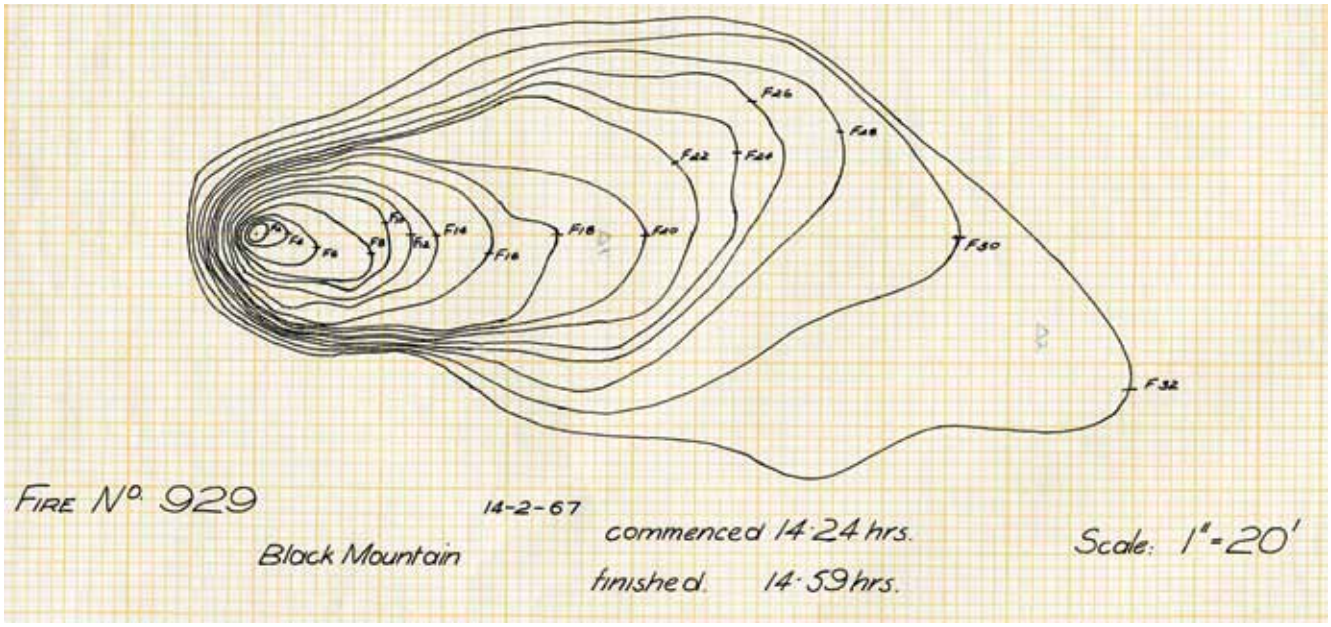

A fire-spread map for experimental fire 929 in dry eucalypt forest at Black Mountain, ACT, conducted by Alan McArthur in 1967. The fire was started with a point ignition and the fire isochrones show the growth of the fire perimeter at two-minute intervals.

"Spotting is one of those aspects of bushfire behaviour that's been recognised for many years, and has been investigated a number of times, but is so complex."

Spotting behaviour can fluctuate in response to variations in fuel, topography and weather, and interactions with the atmosphere.

The three aspects of the project come together to help predict the spread of a fire.

"We want to be able to provide fire authorities with better information on the potential of a fire to be beyond initial attack by the time the first fire crew gets to the site.

"If a fire is beyond the first crew's control, then fire authorities need to move to the next phase of suppression," said Dr Sullivan.

Simon Heemstra, Manager of Community Planning at the New South Wales Rural Fire Service (RFS), is the lead end user for this project. He believes the project has the potential to fill one of the major gaps in fire behaviour prediction.

"The implications for both the RFS and firefighting agencies in general are significant," he said.

"A greater understanding of fire growth during the initial development of a fire has the potential to increase the accuracy of fire-spread predictions.

"This will help with protecting and warning communities, as it will increase the accuracy of the predictions of what time a fire may impact.

"The project also has the potential to increase suppression efficiency, and in turn assist in better resource allocation, which may enable fires to be contained faster, increasing the number of fires that can be contained on days when there are many fires occurring."

The outcome of the research project will be new knowledge on fire behaviour—knowledge that can be incorporated into existing fire behaviour modelling systems or used to improve planning for prescribed burning operations.

This will provide support for fire managers' evolving decision needs, including community warnings, planning, operations, monitoring and assessment.

This research was published as a Bushfire CRC Fire Note, Issue 94, available from www.bushfirecrc.com/firenotes.

More information can be found on the project's webpage at www.bushfirecrc.com/research.

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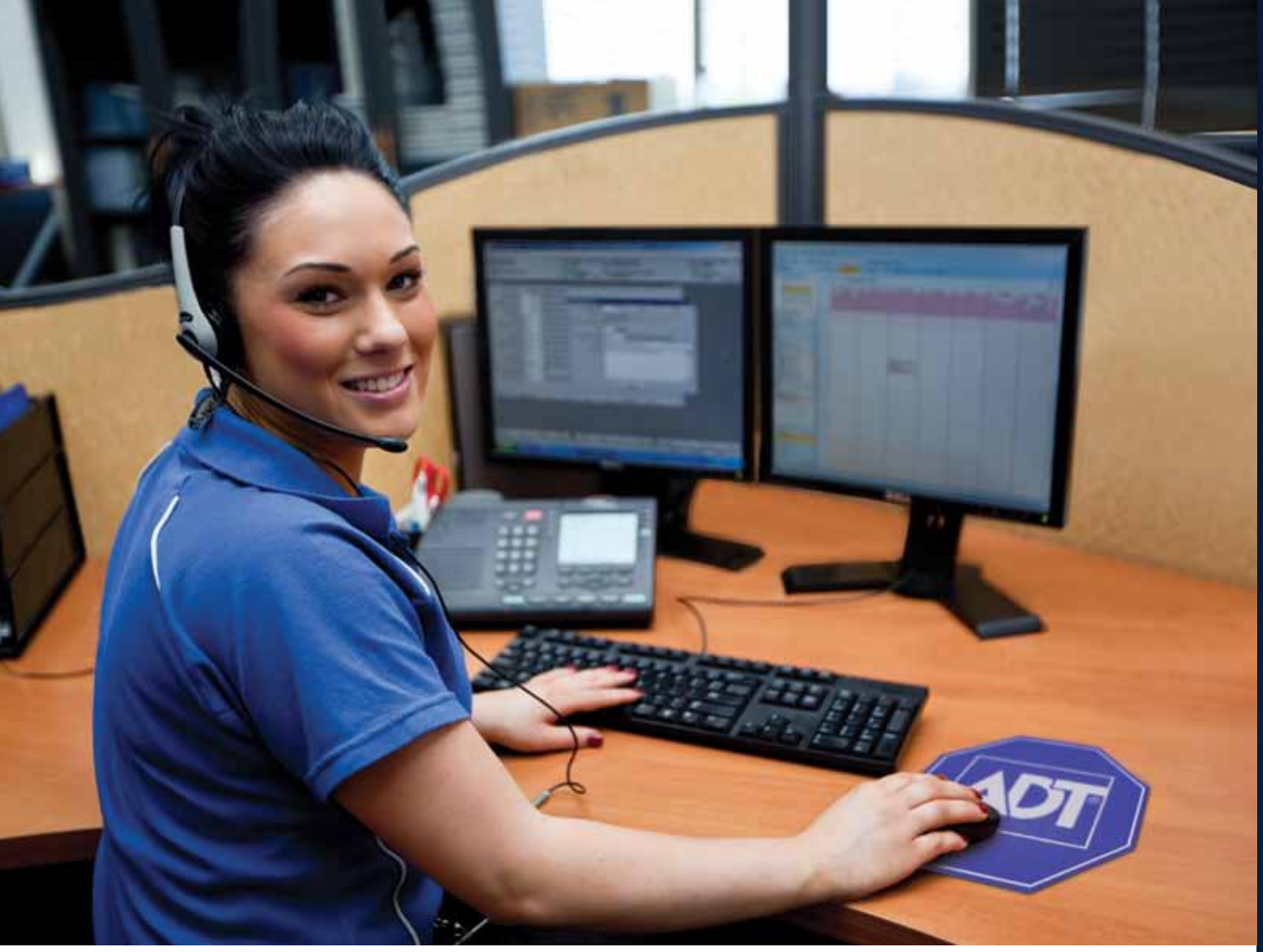

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Water—The Essential Extinguishant, part three

WATER ADDITIVES

By Barry Lee, OAM,
Past National President,
FPA Australia

Much effort has been directed towards the development of additives to modify the physical properties of water and to improve firefighting characteristics.

Wetting agents are a good example of additives that modify the properties of water. Such agents typically reduce the surface tension of water from 72 dynes cm to, say, 30 dynes cm. This means the water can soak into (penetrate) porous fuels and spread over hydrophobic surfaces, rather than drip from those surfaces. However, 'wet water', as it is known, tends to break into smaller than normal droplets when discharged through nozzles. This can be a disadvantage for fighting bushfires, for example, since any increase in total liquid surface leads to additional loss of water by evaporation without significantly cooling the fuel.

Another group of additives is designed to yield 'thick water'. By increasing the residence time of water at the locus of the fire, the gross potential heat absorption of the water can be increased, in contrast to the condition where a large fraction of the water rapidly runs off surfaces to which it is applied. Bentonite clay (oil well drilling mud) has been used for this purpose in forest fire operations. Whichever viscosity agent is used, it should:

- be low in cost
- be non-toxic to flora and fauna
- cling to fuel surfaces and build up a protective layer of water
- have good air drop and flow characteristics
- mix easily with a liquid
- provide a gel quickly when a small quantity is combined with a large quantity of water
- remain stable under prolonged storage in both the dry powder form before mixing and the liquid form after mixing.

Much of the pioneering work with viscous water and water gels was undertaken in the bush and forest firefighting contexts. Bentonite clay (montmorillonite) slurry was an early candidate, as were algin (sodium alginate) and CMC (sodium carboxymethylcellulose). Since the early 1960s, however, considerable emphasis has been placed on the use of particulate gel polymer thickening agents. These have an affinity for water and produce fibres or threads of water, which tend to unite. Relatively low concentrations of particulate gel polymer are required to achieve effective viscosity (e.g. 0.7 kg per 397 L of

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water), and the viscous water so formed is not subject to bacterial action.

Ablative water

Ablation may be regarded as 'the action of taking away' and ablative water is concerned with the taking away of heat. Ablative water is essentially a form of viscous water. It is a gel consisting of water and ionised polymer chains that can build up ablative coatings on exposed solid fuel surfaces. It is sufficiently fluid to permit its application to burning fuel surfaces.

Stratta and Livingston (1969)[1] outlined the mechanism of ablative protection of exposed fuel elements in fire environments, the rheology of gels and three configurations of fuels and fire extinguishing agent interaction (horizontal fuel–fire interface, vertical fuel–fire interface and fuel and fire extinguishant only). Ablative water fire protection systems were studied by Factory Mutual Research Corporation, US, in collaboration with equipment manufacturers during the late 1960s.

These systems were physically similar to conventional automatic sprinkler systems, inasmuch as they involved a water supply, a distribution piping system at or near ceiling or roof level, and automatic discharge nozzles. The nozzles were, however, fed with water thickened or gelled by the injection of slightly less than 0.2% by weight of particulate gel polymer. The gelling agent was stored as a slurry and injected into the water supply at the time of system operation by means of an automatic variable-flow proportioning system. The system was therefore 'fail-safe' because malfunction or failure of the proportioning equipment resulted, at worst, in conversion from ablative water to plain water application.

The stimulus for development of ablative water fire protection systems arose from such high-challenge fire problems as the high-bay warehouse. One of the many difficulties associated with the protection of high-piled storage risks of this type concerns the inability of discharge from conventional roof-mounted sprinkler systems to penetrate the severe thermal updraughts generated under fire conditions. Here it should be noted that testing has confirmed that the problem is not, as generally believed, evaporation as drops attempt to pass through the intense fire. Water drops, if they can enter the fire zone at good velocity, will survive. Drops must first be heated to 100°C before they evaporate, and this takes longer than it takes to pass through the fire. Rather, the problem is that the drops are buffeted and deflected by the furious updraughts. Small, light drops are so severely treated that they are deflected away from the flames. The fuel (target) becomes so hot that the few random drops surviving evaporate immediately on arrival.

Where intermediate-level sprinkler protection ('multi-layer' protection) cannot be provided, as in the case of certain free-standing or palletised, solid pile storage arrangements exceeding nine metres in height, conventional overhead sprinkler discharge may not be able to reach the seat of the fire. Sprinkler discharge can only, therefore, function to pre-wet surrounding fuel. Fire in high-piled storage may generate sufficiently high temperatures to effectively negate peripheral pre-wetting of fire-exposed stock.

The aim of ablative water systems was to attempt a partial solution for these problems both by providing greater survivability of the discharged water down through the rising fire column and by providing improved protection for peripheral fire-exposed fuel. This latter objective was achieved because the gelled (ablative) water tended to adhere relatively thickly to exposed fuel surfaces. Ablative water systems were never commercialised, and later decades have seen the performance capability of automatic sprinkler systems considerably improved with the introduction of a series of 'quick response' large-orifice sprinklers.

Slippery water

Another interesting modification is popularly known as 'slippery water'. It has been demonstrated that friction in turbulent water can be reduced by adding to the water small quantities of long chain, high molecular weight polymers; one of these is polyethylene oxide. Water treated with this additive at a concentration of approximately 0.003% is termed 'slippery water'. Viewed simply on the basis of improved friction loss characteristics, slippery water cannot be regarded as an improved fire extinguishant; nevertheless, reduced frictional losses are clearly of considerable importance to the fire protection engineer and the fire service. The Fire Department of New York (FDNY, undated), after experimenting with a polyethylene oxide concentration of 0.005% in water, concluded that hose line reach and pressure were increased 100%. Nozzle reaction increased 75–100%, flow increased 50–60% and engine (pump delivery) pressure decreased 20%.

Work conducted by the Fire Research Station, UK, was equally encouraging. Technically speaking, the friction factor for flow in a given pipe depends on the Reynolds number (Re, a measure of the flow turbulence). At Re less than 2,000, flow is streamline or laminar. A transition region exists between Re 2,000 and 3,000, and as Re is increased, flow becomes increasingly turbulent. The friction factor is high for laminar flow, and for very turbulent flow (i.e. Re >105) in rough pipes such as fire hoses, Re tends to become constant. For very turbulent flow in smooth pipes, on the other hand, the friction factor continues to decrease.

The UK Manual of Firemanship quotes a friction factor of 0.005 for plain water flowing through non-percolating hose, which factor has been confirmed by Fire Research Station measurement. Similar measurements with water containing 20–50 ppm polyethylene oxide indicate friction factors in the range of 0.002 to 0.003 for 70-mm hose, and slight higher for 19-mm hose reel hose. Theoretically, subject to the use of more sophisticated injection technologies, friction factors as low as 0.0017 should be attainable. As pointed out by the FDNY report[2], polyethylene oxide is know to be non-toxic, is approved by the US Food and Drug Administration, and is widely used in pills, dental adhesives and hair preparations in concentrations considerably higher than those of interest to the firefighter.

In essence, all of this means that friction-reducing agents such as a water-soluble polymer of ethylene oxide can substantially reduce the turbulent frictional drag of firefighting streams in which they are dissolved. With a molecular weight of approximately 7 × 106, polyethylene oxide is a non-corrosive, white, free-flowing powder, but for practical applications, it is usually supplied as concentrated water-soluble slurry. It acts to curtail frictional drag by hindering the onset of turbulence and by damping turbulence when it does occur. Thus smooth or laminar flow can be maintained to very high Re. ■

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This concludes *Water – The Essential Extinguishant, Part Three – Water Additives and Modifications*. Look out for Part Four in the Summer edition of *Fire Australia*.

Value engineering passive fire protection with sustainability impacts

Value engineering or optimised design in the form of structural fire engineering can bring many advantages to a project, including reduced fire resistance ratings and rationalised fire protection requirements. These can result in large savings in passive fire protection material; however, understanding associated benefits in relation to sustainability impacts is important.

By Dr Allan Jowsey MEng AIFireE MSPFE, Fire Engineering Manager, International Paint

Within all construction markets, including commercial infrastructure, the concept of a sustainable built environment is becoming more and more important for the industry in terms of growth and future prosperity. Amid the global financial crisis and the increasing demand for ever-depleting resources, the commercial infrastructure industry is being forced to look closely at the way things are done.

'Green Building' initiatives aim to reduce the environmental impacts of buildings. Green Building refers to a design and implementation process that is environmentally responsible and resource-efficient throughout a building's life cycle from planning to design, construction, operation, maintenance, renovation and through to demolition.

This requires close cooperation of the design team, architects, engineers and clients at all project stages. The Green Building initiative expands and complements the classical building design concerns of economy, utility, durability and comfort.

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that Green Buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- protecting occupant health and improving employee productivity
- reducing waste, pollution and environmental degradation
- using energy, water and other resources efficiently.

Codes and guidance documents around the world cover the design of steel structures from a load and serviceability viewpoint but also in relation to calculating expected performance when steel structures are subjected to fire. These codes provide an opportunity to exploit the properties of structural steel to its maximum capacity in the fire limit state. When used effectively, such codes can demonstrate that the use of steel structures can deliver significant benefits to a project, including robust and safe designs, quantified structural performance and cost savings. They can result in significant material volume savings in the passive fire protection requirements for a building.

While a reduction in the volume of construction material is likely to have a positive impact in relation to sustainability, it is important to consider the sustainability of all aspects in construction to put this into the correct context.

With respect to fire protection materials, sustainability can play an important role accounting for costs and impacts of the materials being specified, from sourcing to their end-of-life. This isn't new thinking and is recapturing the attitude of waste-not, want-not that has been around for a very long time. True sustainable design processes also need to consider the selection of fire protection materials as part of a holistic review that also takes into account the performance of active fire safety measures that are expected to be installed. If the building burns down, it wasn't sustainable.

However, this article focuses on the sustainability advantages of structural steelwork in isolation of other aspects of the design. The article considers what techniques are available to extend the use of structural steelwork and achieve required fire performance.

Structural steelwork and fire protection

The issue of sustainability is very prominent within the built environment when it comes to materials for construction. There are frequent debates regarding the sustainability merits when using steel, concrete and timber.

Steel is used in many iconic buildings around the globe as the basis of the structural frame or to define certain features. It is an extremely versatile and durable material that allows expression of structural form and can provide optimised structural layout where the developer can maximise return on the investment in terms of increased usable floor space. For example, it allows the use of long spans, which can reduce the number of columns required in the floor plan of a building.

Passive fire protection to steelwork is a very important safety element of a building. If not correctly specified and applied, expected performance under fire conditions may not be achieved. This may result in serious consequences for life safety and property protection.

An increased understanding of how the performance of steel structures behave at elevated temperatures can help to provide safer solutions.

Steel in fire

Structural steel starts to lose its yield strength around 400°C and at 600°C it will have lost approximately 50% of its yield strength, as shown in the graph on the following page. In order to maintain stability, it is critical to ensure that structural members are appropriately protected against the high temperatures often generated in fires.

There is an increasing paradigm shift in the way of thinking by passive fire protection suppliers towards recognition of structural fire design approaches. Many structural engineers and fabricators are starting to collaborate closely with manufacturers to demonstrate savings and benefits in terms of product performance knowledge.

Many structural design codes and

guidance documents include 'fire resistant' design. In the UK the relevant standard is BS 5950 Part 8:2003. In Europe the relevant codes are EN 1993–1-2:2005 for steel and EN 1994–1-2:2005 for composite steel and concrete design, while in Australia the relevant standard is AS 4100. The Australian Standard has recently been amended but the amended version is yet to be included in the Building Code of Australia (BCA).

These documents provide methods for determining the thermal and mechanical responses of a structure and evaluating the fire protection required, if any, to achieve the required performance. An important feature of the standards is that they use the concept of a variable steel temperature, which is the limiting steel temperature before critical failure temperature is reached.

While structural fire engineering approaches have typically been the responsibility of a fire safety engineer, there is nothing stopping a structural engineer from considering this aspect within the structural design by considering fire as another load-case. However, where deviation from the deemed-to-satisfy requirements is proposed, good practice would be to ensure there is collaboration between the fire safety engineer and the structural engineer in relation to the assumed design fire scenarios considered for a project. The engineers should also consider how the natural properties of steel and any applied passive protection respond to such scenarios as part of the overall design.

Definition a fire resistance level

Typically an architect stipulates a fire resistance period in accordance with the building codes or regulations that prevail in the country or region where the building is to be constructed. In Australia all jurisdictions adopt the fire resistance level (FRL) description and definition included in the BCA. Building surveyors or building certifiers advise architects and designers of the FRL requirements that need to be included and confirmed in design documentation to obtain construction approval.

The BCA defines an FRL as the grading period in minutes determined in accordance with Specification A2.3 for the following criteria:

(a) Structural adequacy—the ability to maintain stability and adequate loadbearing capacity as determined by AS 1530.4.

(b) Integrity—the ability to resist the passage of flames and hot gases specified in AS 1530.4.

(c) Insulation—the ability to maintain a temperature on the surface not exposed to the furnace below the limits specified in AS 1530.4.

It is important to note here that while the grading period is in minutes, it relates to the time of exposure to the Standard Fire Test or assessment. This is not a guarantee of performance time for every real fire scenario but rather a prescriptive benchmark for comparison.

FRL requirements are typically determined based on the height of the building, the occupancy use and the potential provision of a suppression system. The BCA specifies three minimum types of fire-resisting construction based on fire risk: types A, B and C. Within these types, different FRLs are prescribed for different building elements. Typical FRL durations are between 30 minutes and 2 hours, although depending on the associated risk, the fire resistance period can be up to 4 hours.

The stability of the structure acts primarily to protect life safety of both people to evacuate safely and the attending firefighters. To a lesser extent it may also have the requirement to play a role in terms of property or asset protection including preventing collapse onto adjoining properties. The BCA recognises these roles.

Role of passive fire protection

To realise the many benefits of the structural steel frame and to achieve required FRLs, it is often necessary to provide passive fire protection to some, or all, of the individual members that make up the steel frame. Unprotected steel can perform poorly in fully developed post-flashover compartment fires, which can lead to full or partial collapse. Careful consideration needs to be given to the design and its protection from fire.

Passive fire protection acts to reduce the heat of the steelwork in the event of a fire and keep it relatively cool. Typical systems include boarding, cementitious sprays, insulation blankets, intumescent coatings, concrete encasement, concrete filling and water cooling.

Performance-based design approaches

Despite the prescriptive FRL requirements of the BCA, including the prescribed methods

Figure 1 Thermal responses of protected and unprotected steel

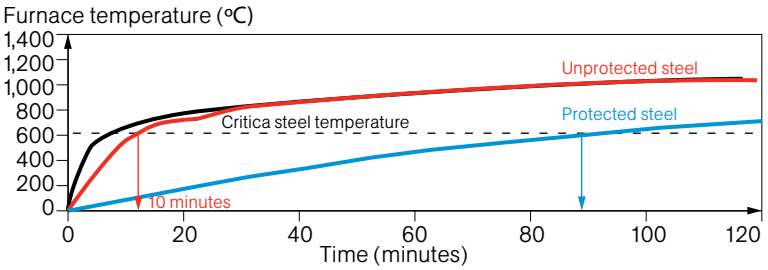
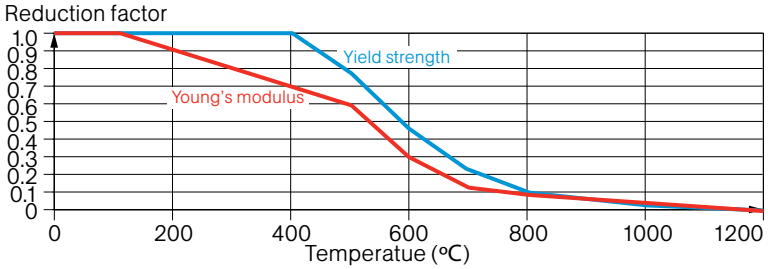


Figure 2 Strength of structural steel with temperature —reproduced from EN 1993–1-2:2005



to demonstrate compliance outlined in Specification A2.3, there are a number of approaches available to a designer to establish a limiting steel temperature. These can be used to develop and justify an alternative solution to meet the performance requirements of the BCA instead of the prescriptive deemed-to-satisfy methods.

Such approaches can range from an assessment of the load ratio and simple lookup temperature, to single-element checks, through to whole frame assessments including advanced finite-element methods to account for restrained thermal expansion and load paths within the structure. Often, the greater the level of complexity and interaction consideration, the greater the potential to increase the limiting temperature and make reductions in the passive fire protection costs.

A common method of assessment is to assess the degree of utilisation of a structural member in the fire limit state through a single-element analysis. This approach considers beams or columns in isolation with conservative boundary support conditions, and effectively reproduces the loadbearing scenario of a Standard Fire Test as close as possible by calculation.

Sustainability impacts

Sustainability is often referred to as a triple-bottom-line issue. In simple terms this means that for something to be sustainable it must have economic, environmental and social dimensions. Governments across the globe have their own sustainability policies and strategies for their country or region. In many cases, the focus of these policies is to reduce carbon emissions.

It is important to understand the differences between typical terminologies used in the sustainability industry.

- Operational carbon emissions—these are emissions due to the operation of a building over its lifetime, and include electricity usage, heating and air conditioning systems.
- Embodied carbon emissions—also known as 'carbon footprint', these are emissions due to the manufacture of components used in the construction of buildings, and include structural steel members, concrete, glazing and passive fire protection.

For most buildings, the operational carbon emissions far exceed the embodied carbon emissions. The exact ratio varies depending on the building type. A modern office building has an operating emissions to embodied carbon emissions ratio of about 5:1 over a 60-year life. However, with the introduction of stricter building regulations tied to reductions in carbon dioxide emissions, the embodied carbon of the building materials is coming under increased scrutiny.

Carbon footprint is now a big strategic issue for many construction material suppliers as the industry increasingly sees projects where carbon footprinting is a major issue in material specification.

In the context of passive fire protection, it is important to look beyond material volumes and realise that the purpose of the protection is primarily to save lives, while it has a secondary effect of preserving value in terms of asset protection. Fire protection can therefore be seen as preserving economic and social value and this is extremely important in the context of sustainability.

As an example, further sustainability arguments can be demonstrated in the case of intumescent coatings for fire protection. Importantly, as a protective coatings option, these can offer long-term corrosion protection to steelwork to further highlight how they can protect the value of an asset. The following comments about the triple-bottom-line for sustainability apply.

- Economic—Correct coating specification will provide long-term asset protection and significantly reduce maintenance costs to the owner or operator of the asset, not to mention the reduction in operational emissions that are created as a byproduct of carrying out maintenance and repair works.
- Social—Intumescent coatings protect the structural steelwork in the event of a fire. The consequences of not letting a building collapse and evacuating people safely have a large social impact. Off-site application can be undertaken at ground level and associated application procedures can be controlled with respect to health and safety benefits.
- Environmental—Reduced volatile organic compound (VOC) emissions for intumescent coatings can contribute to an increased commitment to environmental sustainability issues. An appropriate choice of coating material can ensure the reduction or elimination of harmful emissions into the atmosphere. A high degree of quality control during application can result in significant reductions in terms of potential overspray and material waste.

Summary

The use of structural fire engineering techniques to calculate a structural member's limiting steel temperature can result in savings of the required volume for fire protection material for a given project. In the intumescent coating industry this can have further benefits by reducing the dry film thickness required on each steel member, which in turn requires fewer coating applications. This can bring significant time savings to construction schedules and labour costs.

Given that methodologies exist in the design codes to undertake structural fire engineering assessments, qualified engineers within the contract chain should be encouraged to evaluate steel temperatures and work closely with passive fire protection manufacturers to realise the benefits it can bring. Rather than assuming performance criteria, setting steelwork specifications for fire protection in this way can assist to inform robust design based on quantified structural assessment.

In relation to typical construction materials such as concrete, steel and glazing, the embodied carbon emissions associated with fire protection will be almost negligible, regardless of whether a structural fire engineering assessment has been undertaken or not.

From a sustainability point of view, fire protection should certainly not be 'sustainability-engineered' out. The process of undertaking a structural fire engineering assessment should concentrate on determining a robust, safe and quantified structural response in the event of a fire. Any positive sustainability impact should focus on the fact that the assessment, which may result in reduced or eliminated need for passive fire protection, has demonstrated that the design will prevent the effects of high temperature and prevent collapse. This is a very important social, economic and environmental issue, albeit not one that is easy to quantify.

Economic cost savings can be quantified to demonstrate the value added; however, savings in embodied carbon emissions as a result of saving passive fire protection material will give a false impression of benefit without direct comparison with embodied carbon emissions of other construction materials used on a project.

From an economic, social and environmental perspective, focus on what might happen if the structure was not adequately protected in the event of a fire.

Dr Allan Jowsey MEng AIFireE MSPFE, Fire Engineering Manager for International Paint, allan.jowsey@akzonobel.com.

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Young leaders in emergency management

By Judy Gouldbourn, Manager Human Resources, AFAC

Generation Y is often stereotyped as lazy, self-centred and disengaged. At a recent forum for young emergency management volunteers, this stereotype could not have been further from the truth. On 11–12 August 2012, 50 volunteers from across the country converged to collaborate on a strategy to attract, engage and retain volunteers in the emergency management sector.

The community is ageing, and so are the volunteers in emergency management volunteer organisations. Across the sector, it is acknowledged that in order to ensure the sustainability of emergency management volunteering well into the future, it is important to attract and engage younger volunteers. Volunteers are the backbone of emergency management response in Australia, with over 500,000 volunteers who willingly provide their time and services to the emergency management sector (National Emergency Management Volunteer Action Plan, 2012). The capacity and capability provided by volunteers is immense.

In 2011, the Attorney-General's Department hosted an Emergency Management Volunteers summit. A key theme of the summit was engaging young people in emergency management volunteering in order to ensure success and sustainability into the future (National Emergency Management Volunteers Summit Report, 2011).

Many agencies, both government and non-government, have implemented successful strategies to attract and engage young people. Cadet programs, youth councils and schools programs are all positive initiatives; however, in most cases these are isolated examples that have not been captured by the broader industry.

Young leader volunteers at the forum.

In August 2012, the Attorney-General's Department invited 50 young volunteers (nominated by their agencies) to participate in a forum in Sydney to discuss recruitment and retention of volunteers in the sector. Participants learnt more about these initiatives, shared knowledge across the sector, built on the themes discussed at the Emergency Management Volunteers Summit in 2011, and developed an action plan to support the engagement of young volunteers. The Attorney-General's Department acts as secretariat of the Australian Emergency Management Volunteer Forum (AEMVF), with the support of AFAC.

Agencies were asked to nominate young people who:

- could actively participate in discussion at a national level
- had enough knowledge to accurately portray the organisation
- had been identified as a future leader (or already held a leadership position)
- had the ability and capacity to represent the organisation professionally and speak with knowledge on issues for their agency.

Agencies represented at the forum included State Emergency Services from across the country, state-based fire agencies, St John Ambulance, Surf Life Saving, Australian Red Cross and the Adventist Disaster Recovery Agency. Young leaders from these agencies were given the responsibility of identifying how emergency management volunteering organisations can recruit, engage and develop young people.

Senior representatives from the sector, including the Australian Red Cross, AFAC, Surf Life Saving, NSW Rural Fire Service and various State Emergency Services, spoke with young members at the forum. Participants felt privileged to be given direct access to discuss, question and challenge the presenters on issues such as: Does the emergency management sector have strategies or plans in place to cope with the ever-expanding population growth and seemingly more common natural disasters? And are there enough professional development programs being offered to young volunteers to progress from volunteering to a career in emergency management?

Having been provided with some context on

Left: Workshops provided opportunities to learn and develop strategies.

the broader emergency management sector, forum participants spent two days listening to presentations and participating in workshops. Workshops focused on sharing information and developing ideas to address the goals—attraction, engagement and retention of younger volunteers.

The common message to the participants can be captured in the phrase of one presenter: "Young people are not the leaders of tomorrow, they are the leaders of today". Encouragement was given and 'lessons learnt' provided to empower participants to make a difference.

Key outcomes

Strategies developed to attract young volunteers were:

- targeted media campaigns
- pathways to volunteering
- introduction in schools
- partnerships with key groups
- community engagement
- highlight the unique experiences of emergency management volunteering
- job skills—market the skills development component of volunteering.

Strategies developed for the retention of young volunteers were:

- Establish youth committees or youth development officers to participate in organisational development on priorities.
- Increase youth development and support.
- Establish mentoring programs and buddy systems. Encourage professional relationships between more mature, experienced members and young members.
- Establish employment pathways that may provide job opportunities and security.
- Ensure there are different volunteering roles available to suit changes in personal circumstance, which can allow volunteers to scale up or down their commitment, rather than leave.
- Remove barriers that are inflexible and discourage ongoing participation in volunteering. Attendance at meetings and training should be for purpose, not for meeting quotas.
- Recognise and acknowledge contribution—even in the smallest way.
- Train for a purpose, not just for the sake of training. Deliver accredited training that is transferable.
- Remove the barriers to leadership roles. Criteria for leadership should be based on competence and ability, not years of service.
- Develop a program for leaders to work with volunteers on identification of goals (for volunteering) and support them in meeting these goals. Review and applaud successes—based on goals achieved, not hours volunteered.

Attracting young people to emergency management volunteering not only develops capacity and capability of the volunteering sector. If engaged at a young age, it is clear that many young people choose professions aligned with emergency management—from forestry to paramedics when thinking about potential career options. This can only be a good thing for our industry. Participants gave a clear message that they want to be included and involved, and to participate in discussions on key issues. They would like to be respected and acknowledged for their ideas and the contributions they make.

About AEMVF

The AEMVF was formed in 2001 following an Emergency Management Volunteers Summit. It was initiated by the desire to have an avenue to discuss and share issues and challenges facing the emergency management volunteering sector, for both response and recovery agencies. Sponsored by the Attorney-General's Department, AEMVF members have met quarterly since 2001 to discuss issues such as the National Emergency Management Volunteer Action Plan, volunteering strategy, training, occupational health and safety, and much more.
Visit www.aemvf.org.au.

REFERENCES

National Emergency Management Volunteer Action Plan, 2012 at www.em.gov.au/Volunteers/Pages/default.aspx

2011 National Emergency Management Volunteers Summit Report at www.em.gov.au/Volunteers/Pages/2011NationalEmergencyManagementVolunteersSummit.aspx

Keynote speaker Andrew Coghlan of the Australian Red Cross.

CALENDAR

VIC Annual Golf Day 2102

Friday 2 November

Ivanhoe Golf Course

Once again the Victorian State Divisional Committee will host their ever-popular annual golf day. Player registration will be available soon, so please put the date in your diary and check the Fire Australia website for updates.

WA Dinner Dance 2012

Friday 2 November

Parmelia Hilton Perth

Join your industry colleagues in an evening of fine food, drink and entertainment. The WA State Divisional Committee is once again hosting this social night for local members and their guests.

For more events information: visit www.fpaa.com.au/events or register via the FPA Australia CONNECT platform.

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14–16 November 2012

Melbourne Convention and Exhibition Centre

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With speakers from across Australia and overseas, the organisers aim to ensure all presentations are topical and current, affording everyone in attendance additional knowledge and information.

Based on feedback from the 2011 conference, the program will expand its inclusion of interactive workshops and incorporate a provocative debate session that saw success in Hobart in 2009.

The exhibition in 2012 is anticipated to be the largest to date and will draw many attendees from different industries.

The program will incorporate two-and-a-half days of presentations, workshops and social activities, including a cocktail reception, conference dinner and farewell lunch, ensuring plenty of networking opportunities.

Benefits of attending

- extensive social program
- great networking opportunities with many affiliated industries
- huge range of exhibitors
- industry debate session
- industry-leading presentations and concurrent workshops
- international keynote speakers.

Who should attend

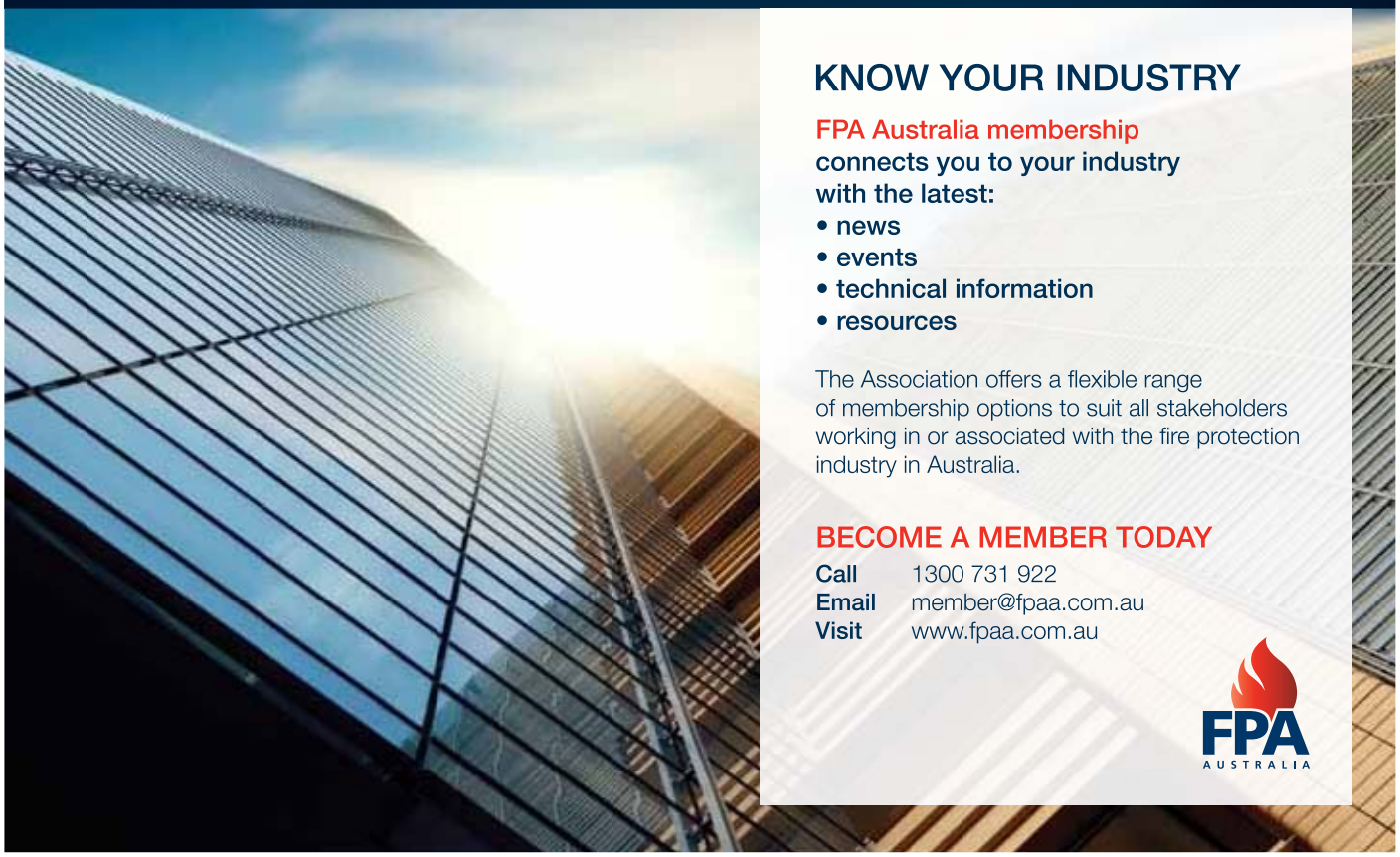
Fire Australia 2012 will draw delegates from all states and territories of Australia, and from New Zealand and the Asia-Pacific region. The conference format will ensure industry issues are professionally presented. The organisers expect a strong attendance from industry professionals including:

- architects, building designers and specifiers
- building surveyors
- environmental engineers and sustainability managers
- facility managers, property developers and building owners
- fire consultants and engineers
- fire equipment manufacturers, distributors and installers
- fire service personnel
- insurance professionals
- regulatory authorities and legislators.

For more information, visit www.fireaustralia.com.au.

For more events information: visit www.fpaa.com.au/events or register via the FPA Australia CONNECT platform.

Fire Protection Association Australia Life Property Environment



HARTFORD CIRCUS DISASTER 1944

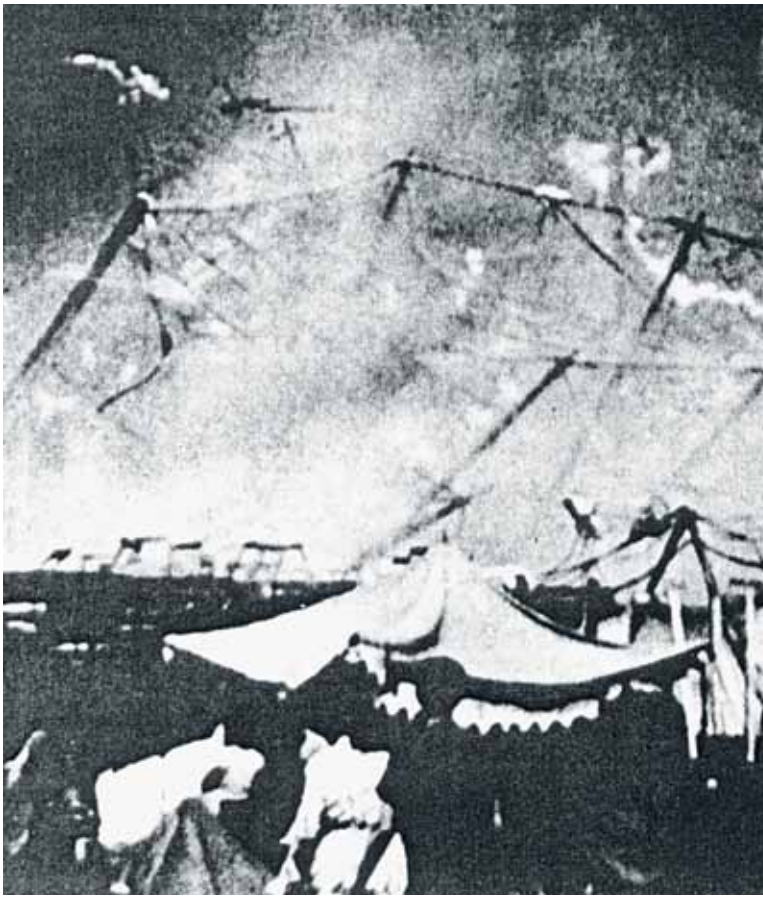
By Barry Lee, OAM,
Past National President,
FPA Australia

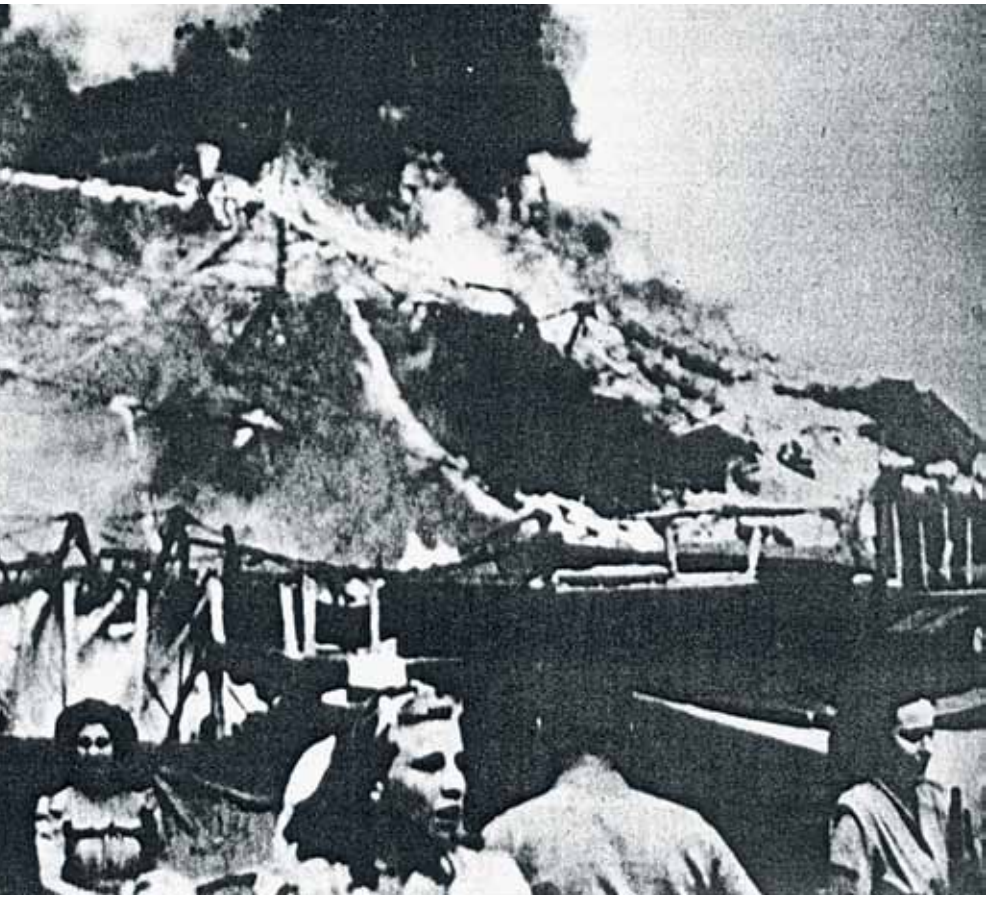
The worst disaster in the history of Hartford, Connecticut, occurred on 6 July 1944 during an afternoon performance of the Ringling Bros. and Barnum & Bailey Circus at the city's north end. Twenty minutes after the matinee began, a fast-spreading fire caused the flaming big top to collapse on the panic-stricken audience. An estimated 169 people died, many of them children, and over 700 people were injured.

Most of the victims were found near an exit that was blocked by animal cages. Because the big top tent had been coated in paraffin wax dissolved in gasoline, a common waterproofing technique of the time, the flames spread rapidly.

Panic proved as deadly as the flames. The crowd stampeded to escape the tent and many were trampled. Others were blocked by obstacles like steel railings along the front of the bleachers (the temporary stands of seating) and an animal chute that impeded a main exit. Because it was a circus performance, and because it occurred on a Thursday afternoon during World War II when many adults worked long hours at war production plants, children accounted for many of the casualties: only 100 of the dead were older than 15. Investigators at the time attributed the cause to a discarded cigarette, but others suspected arson.

Firefighters arrived at the scene quickly, but found there were no hydrants on the grounds and so had to couple their hoses to hydrants some 300m away.

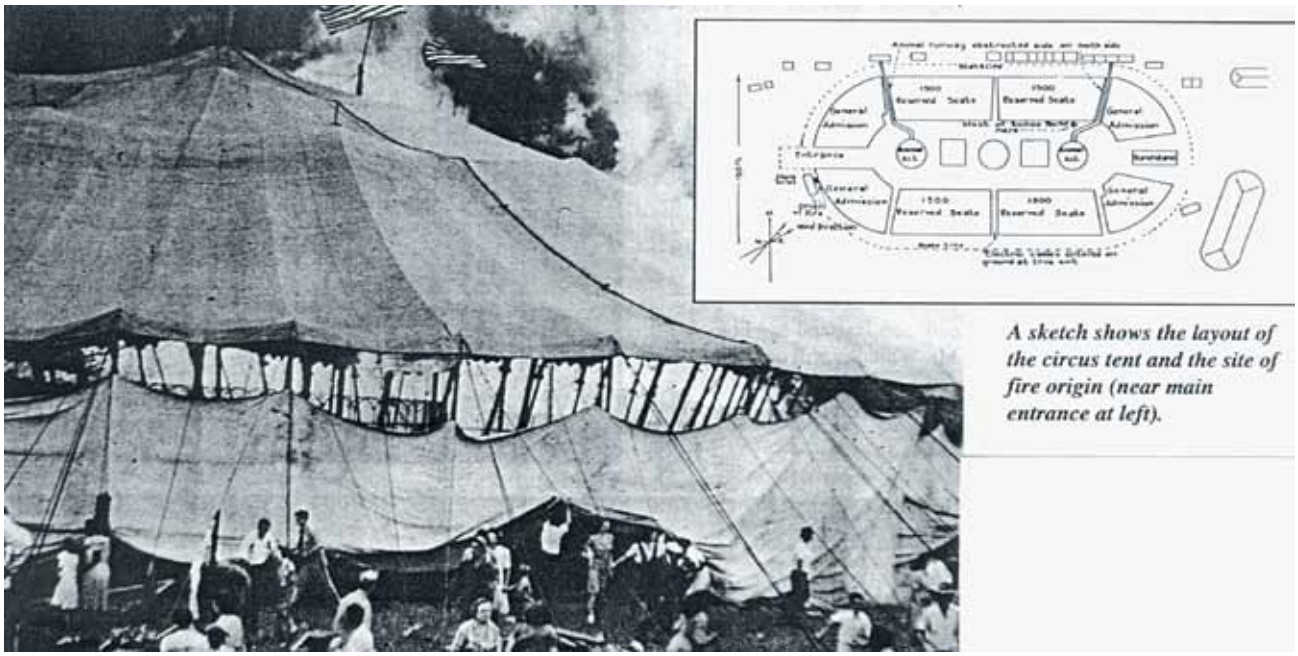




“Many people were badly burned by the melting paraffin, which rained down like napalm from the roof. The fiery tent collapsed in about eight minutes, trapping hundreds of spectators beneath it ...”
(eyewitness survivor account)

***NFPA 102 Standards for Grandstands, Folding and Telescopic Seating, Tents and Membrane Structures*, 2011 Edition, is the current version of a committee project undertaken as a direct result of the Hartford circus fire.**

The first edition was published in 1946.



A sketch shows the layout of the circus tent and the site of fire origin (near main entrance at left).

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FPA Australia TAC and SIG update

The Rules for the operation of Technical Advisory Committees and Special Interest Groups governs the Technical Advisory Committees (TACs) and Special Interest Group (SIGs). Part of these Rules is that the TAC Chairs have a two-year term of appointment. As this term concluded in July 2012, nominations were called for and ballots held (as needed) to determine the TAC Chairs. Following this process, most current TAC Chairs were reappointed with the following new Chairs appointed:

- Ralph Garbutt (TAC/2)
- Rhondel Johannessen (TAC/17)
- Grahame Douglas (TAC/20).

On behalf of the TACs and the Association, FPA Australia would like to thank the outgoing Chairs—Kjell Jawerth (TAC/2), Norm Winn (TAC/17) and John Nicholson (TAC/20)—for their outstanding contribution to the TACs and the fire protection industry.

Following the TAC Chair appointment process, the appointment process has commenced for the Deputy TAC Chairs and for the FPA Australia representatives on Standards Australia Fire Protection (FP) committees.

TAC/1 *Maintenance of fire protection systems and equipment*

The FP-001 committee ballot on the AS 1851 draft revision has closed. As such, TAC/1 is continuing to develop documentation to support our members and industry when this revision is released. TAC/1 is also assisting the NSW State Committee and FPA Australia Technical Department as they begin development of a Good Practice Guide on NSW Annual Fire Safety Statements, an area of much confusion in NSW.

TAC/2 *Fire detection and alarm systems*

The committee continues to contribute to FP-002's revision of AS 1670.1 and the adoption of ISO standards for sound system control and indicating equipment, aspirating smoke detectors and smoke alarms.

TAC/3/7 *Portable and mobile equipment*

The committee has received confirmation from the Australian Competition and Consumer Commission (ACCC) that they will revise the mandatory standard but other projects need to be completed first. As such, TAC/3/7 is looking at a number of other matters including a review of the current extinguisher standards (AS 2444, AS/NZS 1851 and AS/NZS 1850), as they are now, in some cases, more than five years old.

TAC/4/8/9 *Fire sprinkler and hydrant systems, tanks and fixed fire pumps*

The committee continues to contribute to the revisions of AS 2118.1, AS 2941 and AS 2419.1. The draft Good Practice Guide on sprinkler system monitoring requirements has been revised to be an Information Bulletin and is currently being finalised.

TAC/11/22 *Special hazard fire protection systems*

The committee continues to contribute to the revision of the aerosol systems standard (AS 4487) and the gaseous systems standard (AS 14520). Following the publication of the cylinder safety (transport) cap Reference Document, TAC/11/22 is beginning a long-term project to develop a similar document on actuators.

TAC/17 *Emergency planning*

Work is continuing on the draft Information Bulletins on evacuation diagrams and the inclusion of emergency planning in alternative (fire engineered) solutions. Future projects have been identified to provide advice on indemnity for wardens and on standardising symbols for evacuation diagrams.

TAC/18 *Fire safety and* TAC/19 *Passive fire protection*

Work continues on the draft Good Practice Guide for the specification and application of intumescent coating systems. The committees are also contributing to FP-018's work on revising AS 1530.4 and its work with FP-020 to look at AS 1530.8.1 and AS 1530.8.2.

TAC/20 *Bushfire safety*

The committee is contributing to FP-020's work to define the scope for a new edition (Edition 4) of AS 3959. Among other items, the committee raised the need to review the appropriateness of the assessment method for grassland fuel loads and the test method for sarking. TAC/20 is also contributing to the work by FP-020 and FP-018 to review AS 1530.8.1 and AS 1530.8.2

TAC/T Training

TAC/T continues to keep up-to-date with the Regulatory Impact Statements (RIS) on national licensing and other developments that affect training in the fire protection industry.

STANDARDS AUSTRALIA UPDATE

FP-001 *Maintenance of fire protection equipment*

The committee ballot on the draft AS 1851 revision has closed and concerns raised by some stakeholders resolved. As such, it is now with Standards Australia to edit and format it for publication. This is a significant task and there has been no announcement, as yet, of the publication date. It is anticipated that it will be published in late October at earliest.

FP-002 *Fire detection, warning, control and intercom systems*

The project to move the detection and control elements of AS 1668.1, AS 6183, AS 4487 and AS 14520 to AS 1670.1 continues, with the kick-off meetings of the relevant committees held.

Work continues on adopting ISO standard ISO 7240-16 *Sound system control and indicating equipment* and revising AS 3786 based on ISO 12239 *Smoke alarms using scattered light, transmitted light or ionization*, with these documents nearing public comment stage.

The full adoption of ISO 7240-20 *Aspirating smoke detectors* went to public comment, which closed on 9 August.

FP-004 *Automatic fire sprinkler installations*

Work continues on the revision of AS 2118.1 *Automatic fire sprinkler systems—general systems* with the working groups close to finalising the revisions of their relevant sections, which will then go to the full FP-004 committee for review.

FP-008 *Fire pumps and tanks*

Work continues on the revision of AS 2941 *Fixed fire protection installations—pumpset systems*.

FP-009 *Fire hydrant installations*

Work continues on the revision of AS 2419 *Fire hydrants—system design and installations*. FP-009 is currently discussing with Standards Australia and the Australian Building Codes Board (ABCB) the submission of the ABCB Preliminary Impact Assessment (PIA) and the release of this revision for public comment.

FP-011 *Special hazard fire protection systems*

The revision of AS/NZS 4487 is continuing. The revision of AS 14520—to move the detection and control elements to AS 1670.1 and to address known issues—has begun.

FP-018 *Fire safety*

Amendment 1 to AS/NZS 3837 *Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter* has now been published. An FP-018 working group has been revising AS 1530.4 to address known issues and this has gone to the full FP-018 committee to approve to go to public comment.

FP-018 and FP-020 are working together to review AS 1530.8.1 and AS 1530.8.2.

FP-020 *Construction of buildings in bushfire-prone areas*

FP-020 is in the preliminary stages of defining the scope for a new edition (Edition 4) of AS 3959. The committee is also working with FP-018 on the review of the bushfire test standards (AS 1530.8.1 and AS 1530.8.2).

FP-024 *Bushfire water spray systems*

The committee ballot on the draft standard AS 5414 has concluded. While concerns were raised, these have now been resolved and the standard is with Standards Australia to prepare it for publication.

FIRE AUSTRALIA

For more details on submitting a contribution or to advertise in *Fire Australia*, please contact the editor.

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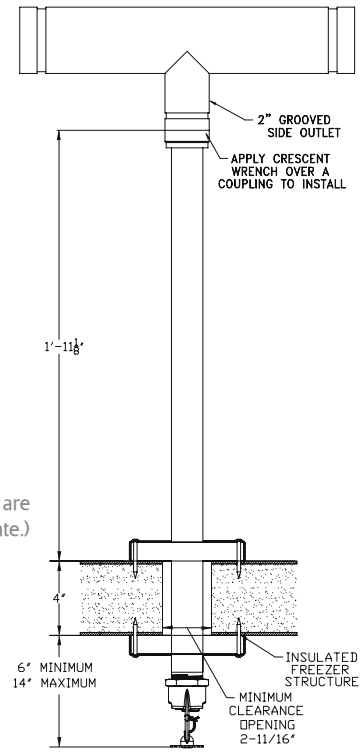

(Dimensions are approximate.)

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