

# FIRE AUSTRALIA

## Black Saturday Ten years on

**Record attendance  
at Fire Protection  
Industry Awards Gala**

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**Mental health  
highlighted**

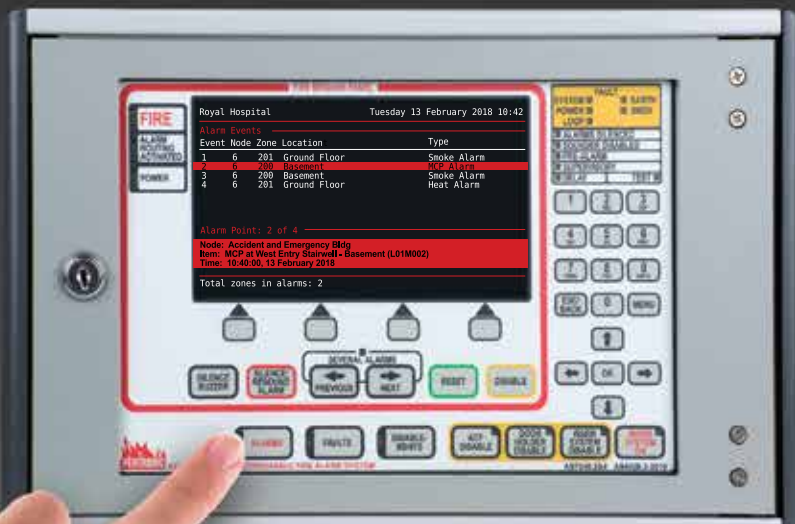
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**Changing climate  
for emergency  
management**

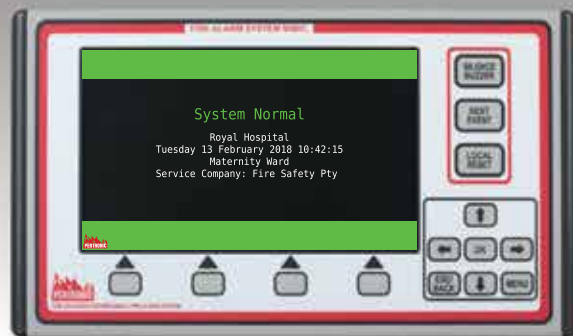
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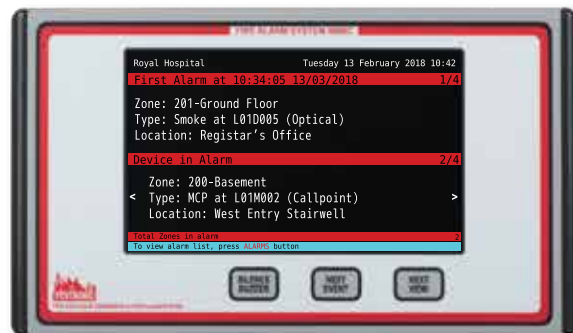
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# A CHANGING CLIMATE CALLS FOR MORE RESEARCH

## DR RICHARD THORNTON

Chief Executive Officer,  
Bushfire and Natural  
Hazards CRC



Planning for the future has never been so important. Last year alone we experienced bushfires in California, a drought and floods in NSW, bushfires in Queensland and unprecedented bushfires in the UK, Sweden, Finland and Greece. It was Australia's third hottest year on record and 2019 has begun hot as well, with heatwaves occurring across many parts of the country.

Events like these are beginning to occur outside of their normal weather seasons, with these conditions expected to increase in the coming years because of climate change. The research network and expertise of the Bushfire and Natural Hazards CRC is here

to face the challenge of understanding and making sense of these abnormal conditions, to help prepare communities for weather events that occur throughout the year.

It is important that we take stock of what we already know, though. Ten years on from the Black Saturday bushfires, it is vital to remember what we learned from our most devastating disaster. Pages 16–17 look back at the discoveries made in the aftermath of the bushfires.

Recognising advancements and reflecting on improvements is a key focus globally too, through the UN's International Day for Disaster Risk Reduction. Pages 42–43 cover an event hosted by the CRC in Adelaide to mark the day, where a panel of experts discussed the measures being taken to make Australia more disaster resilient, with a special focus on the 2016 South Australian power blackout.

The mental health of our people is another key area, and the CRC was proud to partner with Beyond Blue on a national survey on the mental health of police, fire and emergency services personnel. With more than 21,000 participants, this research gathers the data required to make real changes to the mental health of our police and emergency services volunteers and staff. Discover more on pages 24–25, and flick to page 40 to uncover how research is helping to inform diversity and inclusion within agencies.

On a sad note, the CRC lost its founding Chair, Dr Laurie Hammond, who passed away in November 2018 after a short illness. Laurie was integral to the growth and development of the centre. His leadership at the Board level and his strategic advice to management were always insightful, timely and welcomed. Laurie will be sadly missed by all of us here at the Bushfire and Natural Hazards CRC, and by his colleagues across the emergency services and management sector.

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# FIRE AUSTRALIA



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## OUR COVER

After the bushfire there was not a leaf left along the Kinglake–St Andrews Road in Victoria. People, property and the environment suffered dramatically during Black Saturday on 7 February 2009. PHOTO: DAVID BRUCE, BUSHFIRE AND NATURAL HAZARDS CRC

## ABOUT FIRE AUSTRALIA

*Fire Australia* is a joint publication of Fire Protection Association Australia, AFAC and the Bushfire and Natural Hazards CRC. We aim to bring the latest news, developments and technical information to the fire protection industry, emergency services and natural hazards research organisations. *Fire Australia* is produced quarterly and distributed throughout Australia and New Zealand. Editorial submissions are welcome and can be sent to: tom.bicknell@fpaa.com.au. For more details on submitting a contribution, please contact the editors.

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## FPA AUSTRALIA BOARD OF DIRECTORS FOR 2019

**F**ire Protection Association Australia (FPA Australia) is pleased to announce its new Board of Directors for 2018–19, which was confirmed at the annual general meeting (AGM) held on 9 November 2018.

Following the AGM, the first Board meeting was held for the 2018–19 year, where the President, Vice President, co-opted Directors and representative positions were confirmed.

The new FPA Australia Board of Directors and executive positions for 2018–19 are:

- ◆ Bill Lea—President
- ◆ Rhondel Johannessen—Vice President
- ◆ Alan Wilson—elected Director
- ◆ Chris Orr—elected Director.

The elected Directors have considered the requirements of the Board for the next 12 months, and are delighted to announce the following co-opted Directors for 2018–19:

- ◆ Hank Van Ravenstein
- ◆ Elissa Fazio
- ◆ David Blackett.

At the conclusion of the first Board meeting, Immediate Past President Trevor Voevodin announced he would retire as a Director. Mr Voevodin had served continuously on the FPA Australia Board since 2007, and had held the presidency role on two occasions, as well as the vice presidency role.

“Mr Voevodin has been an outstanding contributor to the Association over a long period of time, and his professional and personal guidance will be sincerely missed,” said FPA Australia CEO Scott Williams. “Trevor has been a significant contributor to the broader fire protection industry, and in particular his work involving Australian Standards and the implementation of occupational licensing in Queensland.”

Given the significant amount of nominations received this year in the Board elections, the Board is considering appointing new Directors to fill the casual vacancies that are available. ■

FPA Australia’s 2018–19 President Bill Lea



PHOTO: STEVEN RAM

## VICTORIAN WASTE MANAGEMENT GUIDELINE CITES FPAS

**T**he Environmental Protection Authority Victoria has produced a new guideline on the management of combustible waste and recycling materials, following a series of high-profile fires at facilities across Victoria.

Published in October last year, the *Management and storage of combustible recyclable and waste materials—guideline* (publication 1667.2) details advice on how to comply with the Victorian Government’s Waste Management Policy, published on 28 August 2018.

During the guideline’s development, Fire Protection Association Australia was invited to provide technical advice, which has subsequently been included in the final document. This advice included the following responsibilities



PHOTO: 123RF.COM

of occupiers of waste and resource recovery facilities.

As a responsibility to authorities, they must:

- ◆ sign-off on essential safety measures for buildings
- ◆ ensure fire protection service providers are recognised as competent individuals for the tasks they undertake.

As a responsibility to people on site, they must:

- ◆ provide adequate training and equipment for staff to respond to fire hazards; for example, training employees on the emergency management plan and how to safely use fire extinguishers.

The document also cites the Fire Protection Accreditation Scheme (FPAS) as an example for identifying competent individuals for routine service work. ■



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# MALE CHAMPIONS OF CHANGE PROGRESS REPORT



PHOTO: DAVID BROADWAY

**T**he Male Champions of Change (MCC) Fire and Emergency Group released its first progress report in December, providing a snapshot of gender equality and inclusion across the sector.

The report highlighted a significant under-representation of women in the fire and emergency services. Currently, women make up just seven percent of management roles in frontline service delivery and 22% of the sector overall.

Attracting more women is a major strategic workforce planning issue for the sector. The report points to several efforts underway that are targeting female recruitment and creating more inclusive, flexible workplaces.

MCC consultation sessions held with staff and volunteers in 2017–18 have guided the development of seven areas of priority: inclusive leadership,

flexible workplaces, talent development, communication, community, systems and reporting.

In a first for the sector, the report makes available baseline gender-representation data. The MCC Fire and Emergency Group will use this valuable resource to track and report their equality progress year on year.

AFAC supported the establishment of the MCC Fire and Emergency Group in April 2017 to better understand and address the barriers to gender equality within the sector. The group includes Chief Executives, Commissioners, Chief Fire Officers and Fire Managers responsible for fire, emergency and land management. ■

The full report is available at [tinyurl.com/MCCprogress](http://tinyurl.com/MCCprogress).

Tasmania Fire Service Chief Officer Chris Arnol (left), Victoria Equal Opportunity Commissioner Kristen Hilton (middle) and Fire and Rescue NSW Commissioner Paul Baxter (right) discuss MCC at AFAC18.

# FPA AUSTRALIA SECURES FIVE-YEAR OZONE PROTECTION AGREEMENT

**F**PA Australia signed an agreement in October 2018 with the Australian Government's Department of the Environment and Energy to continue to facilitate services for the Fire Protection Industry (Ozone Depleting Substances and Synthetic Greenhouse Gases) Board for the next five years.

FPA Australia CEO Scott Williams said the Association was looking forward to continuing its successful partnership with the department, while actively working to minimise emissions of scheduled extinguishing agents through industry best practice.

"We have a strong working relationship with the department, and together we will work to promote the responsible management of scheduled extinguishing agents so as to minimise their impact on the environment," he said.

The Board will be responsible for providing services required by the fire protection industry permit scheme (FPI scheme) consistent with the *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*, which includes the granting of fire protection industry permits to individuals and businesses.

The Board will be supported by an advisory body composed of industry professionals, which will provide advice and help to engage the broader industry in raising awareness of the FPI scheme.

The agreement commenced on 1 November 2018 with the option of extensions. ■

# VALE DR LAURIE HAMMOND

**I**t is with sadness that the Bushfire and Natural Hazards CRC received news of the death of their Chair, Dr Laurie Hammond. Dr Hammond passed away on 6 November after a short illness.

Dr Hammond was appointed independent Chairman of the CRC when it began in 2013 and was integral to the growth and development of the centre. His leadership at the Board level and his

strategic advice to management were always insightful, timely and welcomed.

"Laurie came to the CRC not knowing anything about the sector and quickly became a thought leader in the field: recognised by all the Commissioners, Chief Officers and our research community," said CRC CEO Dr Richard Thornton. "He always took a strong interest in the research and particularly the students in the CRC."

Dr Hammond will be sadly missed by all at the Bushfire and Natural Hazards CRC, and by his colleagues across the emergency services and management sector. ■



PHOTO: BUSHFIRE AND NATURAL HAZARDS CRC

Vale Dr Laurie Hammond

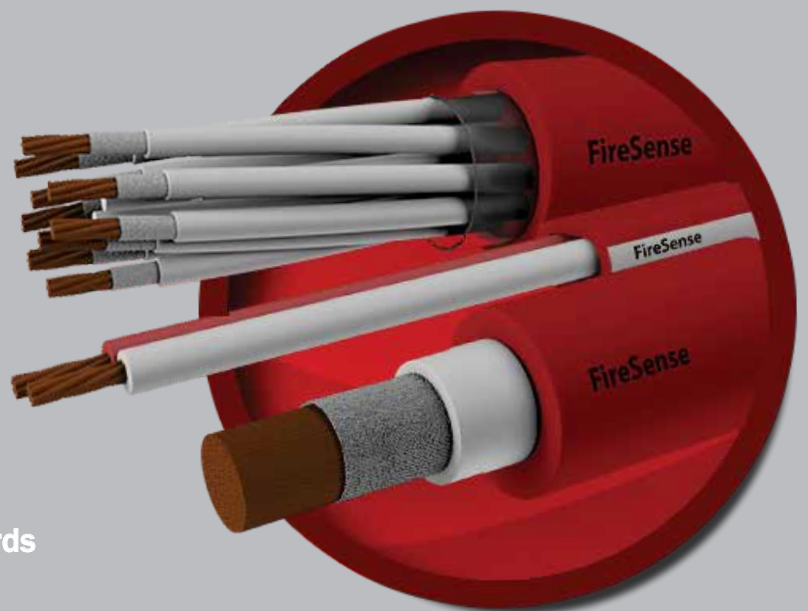
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## A NEW WAVE OF PhD COMPLETIONS



PHOTO: BUSHFIRE AND NATURAL HAZARDS CRC

Dr Kamarah Pooley's research was on the Youth Misuse of Fire program.

Several PhD students supported by the Bushfire and Natural Hazards CRC have had their theses accepted, and are now offering vital research impacts and benefits to the emergency management sector.

Dr Kamarah Pooley's PhD on the Youth Misuse of Fire program in NSW found that youth justice conferencing with firefighter involvement contributes to a reduced risk of general recidivism (the tendency of a convicted criminal to reoffend). This provides an avenue for delivering better fire safety education to at-risk groups across the community.

Dr Pooley aimed to fill knowledge gaps in measuring fire knowledge, fire behaviour, fire interest, perception of firefighters, and general behaviour in both youths and their primary care givers. She completed her PhD at Queensland University of Technology, where she is now working as a sessional academic and research assistant.

"I feel very fortunate to have been supported by the CRC during my PhD candidature," she said. "I attended and presented at research forums and conferences around Australia, met some incredible people, accessed some very useful contacts and made lifelong friends."

Dr Pooley is looking forward to contributing to evidence-based

knowledge and policy in the fields of criminology and child-centred disaster risk reduction.

Dr Ryan Hoult analysed both rectangular and C-shaped concrete walls in Australia, where he developed a secondary cracking model to predict the potential of cracks forming in these types of walls. He found that the direction of loading and the mode of bending were particularly important for the seismic performance of these sorts of walls.

Dr Hoult is now working as a postdoctoral researcher at the prestigious Ecole Polytechnique Federale de Lausanne in Switzerland, where he is using his PhD research to work collaboratively with several South American universities to mitigate earthquake risk.

Dr Ashley Wright completed his CRC PhD on flood forecasting at Monash University. He found that the combination of modelling choices and the physical

characteristics of soil moisture have a significant impact on the amount and quality of the estimated rainfall.

Dr Wright was awarded the Eric Laurenson Medal, which recognises his outstanding thesis, communication to industry and the potential research utilisation in water science, engineering or management.

"The award gives me confidence that my work is meaningful and of high quality," he said.

In October 2018, Dr Wright joined Bushfire and Natural Hazards CRC project leader Associate Professor Valentijn Pauwels' project, *Improving Flood Forecast Skill using Remote Sensing Data*.

The Bushfire and Natural Hazards CRC PhD program supports students to deliver a research base that enhances emergency services and agencies. The CRC congratulates all students on their achievements and is excited to learn of their new future ■

"I feel very fortunate to have been supported by the CRC during my PhD candidature."

— Dr Kamarah Pooley



# AFAC19 RIDES THE WAVE OF CHANGE IN MELBOURNE

**A**ustralasia's premier fire and emergency management conference returns in 2019, bringing the latest in research, technology and practice to Melbourne for the first time in six years.

AFAC19 powered by INTERSCHUTZ will take place 27–30 August 2019 and centre on the theme 'A shift to the new norm: riding the wave of change'.

The theme explores how the emergency management sector is transitioning to a new normality. The program will focus on how our communities, environments and systems are evolving and adapting to change, and challenges attendees to reflect, learn and evaluate on the adjustment to a new norm.

AFAC has put out a call for abstracts and invites career staff, volunteers, researchers, academics, industry, community and all levels of government to submit abstracts for the conference that speak to the theme.

The annual AFAC conference is a recognised opportunity for organisations and individuals to network within the industry and develop leads and awareness of their work. Over the four-

day conference, attendees can learn from industry leaders and discover the latest in technology and equipment from leading industry providers.

AFAC19 will once again be co-produced with the Bushfire and Natural Hazards CRC. Abstract submissions for the Research Forum, hosted on the first day of the conference, can also be submitted through the AFAC19 abstract portal.

In 2019, AFAC is excited to announce that the Institution of Fire Engineers (IFE) will hold their annual conference in conjunction with AFAC19 powered by INTERSCHUTZ and share in the conference theme. This partnership will provide IFE and AFAC19 delegates a broader networking opportunity with fire safety, fire protection, firefighting, fire trade and many other professionals related to the industry.

AFAC and Deutsche Messe are excited to host the largest exhibition to date, with 12,000 square metres of floorspace—a third bigger than the record-breaking Sydney event in 2017. Exhibition space and sponsorship packages are available and enable organisations to show their products to

a passionate and engaged emergency management audience.

After a successful first year, the Australian Disaster Resilience Conference (ADRC) is returning in 2019 to be held as a partner conference with AFAC19 powered by INTERSCHUTZ.

The ADRC theme is asking the disaster resilience community: 'Are we future ready?' This question recognises the importance of being disaster ready in the context of a changing climate, technology influences and shifting demographics.

The host agencies for AFAC19 powered by INTERSCHUTZ are the Country Fire Authority, Emergency Management Victoria, Forest Fire Management Victoria—Department of Environment, Land, Water and Planning, the Metropolitan Fire and Emergency Services Board, Parks Victoria and Victoria State Emergency Service. We thank them for their support in bringing this event to the sector. ■

**For more on the conference—including abstract submissions, key dates, exhibition details, networking and AFAC18 conference proceedings—visit [www.afacconference.com.au](http://www.afacconference.com.au).**

## RECOGNITION FOR ANIMAL RESEARCH

**B**ushfire and Natural Hazards CRC research on animals in emergency management helped a local community group receive a Highly Commended Community Award in the 2018 NSW Resilient Australia Awards.

The Blue Mountains Animal Ready Community (Blue ARC) group has been working closely with the *Managing Animals in Disasters* project to highlight the impact of animals on the behaviours of people in natural hazards, and reinforce the need to support communities to be prepared and to plan for animals.

Using a 'community to community' approach to enhancing awareness, preparedness and planning, Blue ARC has been increasing the preparedness of people within the Blue Mountains for a bushfire.



PHOTO: MEL TAYLOR

Dr Mel Taylor (middle) with Jenny Bigelow (left) and MaryLou Keating (right) from Blue ARC.

Project leader Dr Mel Taylor (Macquarie University) was on hand at the awards ceremony in Sydney on 16 October to accept the award with Jenny Bigelow and MaryLou

Keating from Blue ARC. This project has entered its utilisation stage, where communities like Blue ARC are using the research to promote emergency preparedness. ■

A/Prof Tina Bell collecting ash in Hornsby, NSW



## FIRE-FOCUSED WOMEN

PHOTO: THE UNIVERSITY OF SYDNEY

A fire ecologist and a remote sensing expert from the Bushfire and Natural Hazards CRC have been recognised as leading women in fire science internationally.

Associate Professor Tina Bell (The University of Sydney) was recognised in the journal *Fire* in August 2018 along with more than 60 other female scientists from around the world, including Australian researchers Dr Lynda Prior and Associate Professor Fay Johnston.

"I was truly surprised to be nominated as a member of such an eminent group of researchers," said A/Prof Bell.

The *Fire* journal commended A/Prof Bell for her research on the fire ecology of native plants from Western Australia.

She says she has seen the change and rise of women in the emergency and fire management sector, particularly since she became a researcher with the Bushfire CRC in 2003.

She is also a project leader on the *Optimisation of fuel reduction burning regimes* project, which is giving fire and land management agencies the confidence they need to better forecast the impact of their prescribed burns. More recently, she has completed research on the effects of smoke on plants and the impacts of low-intensity fire on carbon and water cycling.

The success of the initial list saw *Fire*

produce another list of 145 female leaders in fire science to promote diversity.

The November list also included fellow Bushfire and Natural Hazards CRC researcher Dr Marta Yebra (Australian National University), and former Bushfire CRC researcher Dr Christine Eriksen (University of Wollongong).

Dr Yebra has been instrumental in launching the Australian Flammability Monitoring System, which provides live updates on fuel moisture across the Australian landscape. The system was featured in *Fire Australia* Issue Three 2018. Dr Eriksen's research focuses on the social, cultural and political aspects of disasters, as well as the role of faith and gender in disaster management, resilience and vulnerability.

The Journal considered the number of papers that a researcher's work has been cited in, a metric known as the h-index. The Journal said female scientists have a pivotal role in understanding and reducing the gender disparities that exist in natural hazard disciplines.

"In fire science, there is a distinct and critical need to increase the recognition of women," the Journal said.

The women acknowledged represent a variety of perspectives and topics across fire research, including geology, carbon, Indigenous conservation, land management and environmental policy. ■

## SCHOLARSHIPS SUPPORT VOLUNTEERS IN THEIR PASSION



PHOTO: KYLIE LEDGER

Volunteer firefighter Kylie Ledger is undertaking a Masters of Disaster Resilience and Sustainable Development with support from the Emergency Management Volunteer Scholarship program.

The Australian Institute for Disaster Resilience is supporting emergency management volunteers looking to upgrade their skills through education courses relevant to their field.

Applications have just opened for the fifth and final round of the Australian Government-funded Emergency Management Volunteer Scholarship (EMVS) program. Volunteers may be eligible for financial support to access accredited vocational and higher education qualifications in emergency management and disaster resilience.

EMVS recipient Kylie Ledger is a volunteer firefighter and Senior Deputy Captain of Darlington Rural Fire Brigade in NSW. She is currently studying a Masters of Disaster Resilience and Sustainable Development through the University of Newcastle Graduate School and the United Nations Office for Disaster Risk Reduction.

"As a volunteer firefighter with the NSW Rural Fire Service I have seen how community resilience can carry people through tough times," said Ms Ledger. "The goal with my studies is to be able to continue to develop these pathways of resilience and sustainability now and into the future."

Don't miss out on the benefits of a volunteer scholarship. Applications will close 4 March 2019. ■

For more information, visit: [www.aidr.org.au/programs/scholarships-for-volunteers](http://www.aidr.org.au/programs/scholarships-for-volunteers).



## NEW SPRINKLER RULES WILL SAVE LIVES

All new residential apartment buildings above three storeys built in Australia will now be required to have automatic fire sprinklers installed. Announced by the Australian Building Codes Board (ABCB), the inclusion of sprinklers in medium-rise residential buildings is a new requirement in the upcoming National Construction Code (NCC) 2019. It's the most significant shift in fire safety policy since the introduction of mandatory smoke alarms in homes and shared accommodation more than ten years ago.

The change follows a 2012 fire in a Bankstown apartment block that was not required to have sprinklers installed. The fire resulted in the death of one woman and the serious injury of another. A subsequent coronial inquest found both women would probably have survived the fire without significant injury if the building had sprinklers installed.

The inquest set in motion a six-year collaborative project to develop and propose effective, safe, fit-for-purpose sprinkler systems for medium-rise residential buildings. The project's collaborators included AFAC, Fire and Rescue NSW (FRNSW), Fire Protection Association Australia (FPA Australia) and CSIRO.

Changes in the speed of fire spread have driven the new sprinkler requirements. Research both internationally and in Australia shows that

fires in modern apartments furnished with flammable, synthetic materials can reach the deadly 'flashover' stage in less than three minutes. That's eight times faster than 50 years ago, and too fast for occupants to evacuate.

Flashover occurs when the contents of a room spontaneously ignite due to radiant heat, and is considered unsurvivable. Fire testing in a near full-scale replica of the Bankstown apartment showed new sprinkler designs developed by the project prevented any room from reaching flashover, while an unsprinklered burn saw flashover reached in two minutes and 45 seconds.

AFAC President and FRNSW Commissioner Paul Baxter is pleased the ABCB is implementing the research findings into the NCC 2019.

"The research results indicate that automatic residential sprinklers significantly improve the safety of occupants in the event of fire," he said.

"They can prevent a fire from escalating, which may mean the difference between a minor incident and a major tragedy. The presence of automatic sprinklers also serves to reduce risks faced by crews when fighting fires in homes."

The new requirement follows a proposal submitted to the ABCB by FRNSW, FPA Australia and AFAC. It is one of several headline changes in NCC 2019, confirmed by the ABCB last week, which come into effect on 1 May 2019.

Under NCC 2019, newly built residential apartment buildings over three storeys and less than 25 metres in height will require sprinklers under the Deemed-to-Satisfy Provisions, going beyond the previous requirement for sprinklers only in residential buildings above 25 metres.



The new sprinkler designs being tested at the CSIRO facility in North Ryde.

NCC 2019 also references two innovative new sprinkler systems designed by FPA Australia and project partners.

With funding primarily provided by FRNSW, the collaboration tested the new sprinkler systems at CSIRO's North Ryde fire research facility in NSW. These world-leading sprinkler designs—now referenced in NCC 2019 as Technical Specifications FPAA101D and FPAA101H—use innovative features to deliver high levels of protection with reduced cost and complexity.

"Automatic sprinklers are one of the most effective life protection measures in a fire. This change to our national building rules will dramatically improve the safety of residents living in the 700-plus new medium-rise buildings of this type built each year," said FPA Australia CEO Scott Williams.

"This is truly a major milestone for all of those involved in this wonderful collaboration, but most importantly, the community will see the risk of fire in these types of building reduced significantly." ■



# How does Jack protect a small premise against fire?

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# CAMP SHOWS GIRLS A FUTURE IN FIRE AND EMERGENCY SERVICES

The inaugural Girls Fire and Emergency Services Camp has introduced a group of young women aged 15–17 to the variety of roles and opportunities available to them in the fire and emergency sector.

The camp took place from 2 to 8 December at YMCA Camp Yarramundi in NSW. The group participated in a full-on and fun timetable of theory and practical lessons, including fire science, storm and tempest class, trauma classes, simulated rescue and fire scenarios, abseiling, raft building and an overnight hike. The program was designed to build their confidence and resilience; encourage problem solving, teamwork and leadership; and test their physical limits.

The camp was hosted by Girls On Fire, a not-for-profit organisation founded in 2016 by Fire and Rescue NSW station officer Bronnie Mackintosh. As a Churchill Fellowship recipient, Ms Mackintosh travelled internationally in 2016 to observe how fire services were embracing diversity, inclusion and the evolving nature of the sector in different parts of the world. In the United States, she discovered that girls' fire camps were proving an excellent way to introduce and recruit young women to the fire and emergency services. When

Ms Mackintosh returned home, she adapted the initiative for Australia.

The Girls Fire and Emergency Services Camp is an active step towards increasing the number of both women and different ethnic groups in the fire service, with the aim of creating a more diverse, inclusive and effective workforce. Research has shown that firefighters serve their communities better if they look, speak and act like them.

Girls on Fire educates young women about the wide variety of jobs in the services and encourages them to consider a career or voluntary position in this field. "We actually save more lives through

prevention, preparedness and recovery than we do in the seven percent response phase of our role," Ms Mackintosh said. "You don't need to be an over six-foot white male to do any of that!"

The camp was a multi-agency collaborative effort between Girls On Fire, AFAC, Fire & Rescue NSW, the NSW Rural Fire Service, the NSW State Emergency Service, YMCA and major sponsor Firefighters Mutual Bank. The group has also formed a research partnership with Monash University to measure the professional and personal impacts and outcomes for both camp leaders and camp participants. ■

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**"We actually save more lives through prevention, preparedness and recovery than we do in the seven percent response phase of our role, you don't need to be an over six-foot white male to do any of that!"**

— Bronnie Mackintosh, Girls on Fire

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PHOTO: NSWFRS

The Girls Fire and Emergency Services Camp introduced young women to the fire and emergency services, with a view to recruiting a more diverse workforce.



## AFAC TO HOST 2019 NATIONAL EMERGENCY SERVICE MEMORIAL

**A** memorial service to honour the courage and sacrifice of those who have died in the line of duty will be held in Canberra on 1 May 2019.

A memorial medallion will be presented to families of those who have died in the line of duty, and the service will acknowledge additional names added to the Memorial Wall erected in 2017.

The National Emergency Service Memorial is located at Rond Terrace at the southern end of Anzac Parade in Canberra. The service is free and is open to AFAC members and the general public.

For more information, visit: [memorial.afac.com.au](http://memorial.afac.com.au).

PHOTO: RICHARD W FORSHAW



Memorial medallions will be presented at the 2019 National Emergency Service Memorial in Canberra in May.



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## UTILISATION HOT ON THE AGENDA IN BRISBANE

PhD and associate students at the research utilisation workshop held before the Research Advisory Forum in Brisbane.

Utilisation was the key focus at the latest Bushfire and Natural Hazards CRC Research Advisory Forum, which took place in Brisbane on 21–22 November 2018.

More than 80 researchers, end users and stakeholders gathered at the Queensland University of Technology to discuss the development and utilisation potential of projects in the physical sciences half of the CRC's core research program.

Researchers and end users from several projects involving fire management, fire behaviour, cyclone mitigation and resilience, flood management, severe weather and critical road infrastructure were present at the forum.

Deputy Commissioner Mike Wassing from Queensland Fire and Emergency Services opened the forum. Presentations and breakout sessions followed, where research was put into practice with end users from a range of CRC partner agencies.

PhD students Rahul Wadhvani and Mitchell Humphreys, alongside associate

student Nicolas Borchers Arriagada, were given the opportunity to showcase their research as part of a Three-Minute Thesis presentation.

These presentations built on the knowledge developed from a student workshop that focused on presentation skills and research impacts held the previous day. Ten CRC PhD and associate students attended the workshop, which discussed the benefits of applying research into practice and the key things that PhDs should look out for when writing their theses.

On day two of the forum, CRC Utilisation Manager Dr Matthew Hayne led a discussion about the importance of doing more than just research.

"There's more to research than just writing a PhD and leaving it in the corner of your bookshelf; it's about embedding those findings into practice," Dr Hayne said.

Dr Marta Yebra (Australian National University), Dr Stuart Matthews (NSW Rural Fire Service) and Dr Felipe Aires (Office of Environment and Heritage NSW) all spoke about the initiatives they

are taking to embed research findings at an agency level. Dr Yebra spoke about her work with the Australian Flammability Monitoring System and how the system was released almost a year before her research paper was accepted.

"It is important to get your research out even if it is unpublished," she said.

Dr Matthews discussed the stages of implementing fire research, particularly in a large organisation like NSW Rural Fire Service.

He said that the key aspects of research utilisation were: understanding the research; research engagement; implementation; supporting operational use; policy development; training and support; familiarisation; and maintenance and improvement of the final product.

The forum concluded with more breakout sessions, where collaboration and utilisation were again high on the agenda.

To better reflect the advanced stage of most of the research, the format of the Research Advisory Forums has been refreshed for 2019. More information is available at [bnhrc.com.au](http://bnhrc.com.au) ■





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Extra Low Voltage (40V)



Self-contained lithium back-up battery



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# TEN YEARS ON FROM BLACK SATURDAY:

## WHAT HAVE WE DISCOVERED?

It has been ten years since Australia's most deadly bushfire, in which 173 people lost their lives and thousands of houses were lost. Like Black Friday, Ash Wednesday and other catastrophic bushfires in Australia's history, the lessons from Black Saturday are still resonating today.

BY **COSTA HARITOS AND NATHAN MADDOCK**

Bushfire and Natural Hazards CRC

**O**n the back of a week-long heatwave, the mercury once again soared past 40 degrees Celsius on 7 February 2009, fanned by a furious north-westerly wind. Coupled with the low humidity, the fire danger for the day was off the charts, and emergency services had been warning about the conditions for several days in advance. Unfortunately, many fires did occur across southern Australia with the Black Saturday bushfires in Victoria, as they soon became known, ravaging over 75 communities between 7 February and 14 March 2009.

In the aftermath, the Bushfire CRC was put in charge of coordinating a group of researchers and fire agencies to look at the key issues involved in these bushfires.

With the fires still being battled away from the areas that had been devastated, and with tributes flowing in from around the world, researchers from across Australia, New Zealand and the US were hard at work. More than 21,000 photographs were taken and 1,300 homes examined as part of a taskforce that collected data and analysed the fires.

A report prepared by the Bushfire CRC covered the main issues raised by the fires, including lessons learned.

### Fire behaviour

Ember spotting—the distance that an ember can travel in the wind—was an influential factor in the progression of the fire. Some spotting was recorded as reaching more than 30 kilometres in front of the main fire, exacerbated by wind gusts that reached up to 100 km/h.

The fire behaviour models in place under-predicted the speed that the fires

spread, with a key recommendation suggesting that further work was required to understand the detailed progression of the fire across the landscape. Since 2009, much research has gone into fire-spread simulators, with researchers working alongside fire operations personnel to improve modelling accuracy. In turn, this leads to better emergency warnings and helps keep firefighters safe.

The research team also measured and compared the intensity of the Black Saturday bushfires with other similar fires, such as Black Friday in 1939 and Ash Wednesday in 1983, to determine the difference in vegetation, humidity and conditions.

### Human behaviour

Key human behaviour topics discussed in the report were: planning and preparedness; information and warnings;

Above: With some fires still burning and the world reacting, researchers quickly began looking into the factors that took the lives of 173 people.



intentions, actions and the emerging issues or themes. Many people were not prepared for the severity of the fires, as most only took last-minute measures on the day to try and combat the fire threat.

Several weak links resulted in a lack of planning and preparation and affected people's ability to implement their fire plan. Many residents waited to assess the severity of the bushfires before deciding whether to stay or go. Over the last ten years, fire agencies have adapted their community engagement approaches. They now advise that the safest place to be is away from the fire—and that under severe weather conditions, defending a house from a bushfire will be impossible.

Residents identified public buildings, ovals and facilities with emergency services as relatively safe places of refuge during the bushfires. Many residents who stayed back to defend their homes reported medical conditions, dehydration, exhaustion and breathing difficulties as influential factors for why they did not take any action.

### Building and planning

The level of detail in house design, building quality and the age of the property were all considered to be crucial factors that contributed to the likelihood of house loss during the fires.

In all, an estimated 2,029 houses were destroyed during the Black Saturday fires. This even included houses further than 380 metres away from continuous bush. Brick houses performed significantly better than mud brick and light-weight construction clad with timber or cellulose cement sheet.

People should not rely on mains water pressure and electricity during a bushfire. As water is a vital resource

for fighting fires and for mitigation and hydration, the design, location and degree of protection of water pumps and pipework were important factors in maintaining an effective water supply throughout a bushfire.

More than half of the surveyed properties were not in regions classified by a Bushfire Management Overlay, which identifies land that is at risk of a bushfire in Victoria.

### What have we learned?

The Bushfire CRC, and now the Bushfire and Natural Hazards CRC, plays an active role in bushfire research—particularly in preparedness, warnings and mitigation strategies for bushfire-prone communities. These post-event studies are highly valued by CRC partners, and are an effective way to gather important data after a major hazard.

The themes covered in the final Black Saturday research report are still points of interest and concern for fire agencies today. Since Black Saturday, several other studies have been undertaken, each building on previous research. This includes after major bushfires in WA in 2011 and 2014 (Department of Fire and Emergency Services), NSW in 2013, 2017 and 2018 (NSW Rural Fire Service), SA in 2014 and 2015 (Country Fire Service), and Tasmania in 2013 (Tasmania Fire Service).

Fire and Rescue NSW also received additional insights into the effectiveness of equipment and training provided to their community fire units during the Blue Mountains bushfires in 2013. Research after 2015's severe tropical cyclone *Marcia* investigated how the cyclone would impact vegetation for the following fire season and beyond, with

the Queensland Fire and Emergency Services benefitting.

Looking to the future, we know that climate change is causing more severe weather and that demographic changes are having an equal impact. Much can be done to reduce the impacts of natural hazards by better allocating resources and working out how to do things differently—doing things the same way is not the right way for the future.

Houses can be built better to withstand bushfire and cyclones, as can bridges and roads to cope with floods and storms. The complexities of communities can be better understood to improve preparation, response and recovery from the impacts of natural hazards. Warnings continue to be improved, with more targeted messages delivered over a range of channels, including online, phones and face-to-face. Emergency services are getting more tools and data to help them make better decisions under stressful conditions, considering the balance of social, environmental, legal and economic consequences. Governments can be supported to make better decisions on where people can live and under what circumstances, to mitigate the impacts of inevitable floods, fires, storms or other hazards.

We have learned much through science—but there is still more to do. We must continue to ask the difficult questions and be prepared for complex answers. We must continue to identify what we do not know. That is the role of research. ■

For the full Black Saturday bushfires research report, visit: [www.bushfirecrc.com/research/vicfires-taskforce/research-reports](http://www.bushfirecrc.com/research/vicfires-taskforce/research-reports)



The challenge for agencies is to begin using the advances in technology and knowledge to fight fires that are now occurring outside the traditional fire season. PHOTO: DAVID BRUCE

The Bunyip bushfire on Black Saturday.

PHOTO: COUNTRY FIRE AUTHORITY





PHOTOS: FPA AUSTRALIA

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# RECORD ATTENDANCE AT FIRE PROTECTION INDUSTRY AWARDS GALA



# CONGRATULATIONS TO OUR 2018 WINNERS

With 300 industry professionals and ten winners, the Fire Protection Industry Awards 2018 Gala was a landmark event.

BY **TOM BICKNELL**

Fire Protection Association Australia

Nearly 300 fire protection professionals came together on 9 November 2018 to celebrate the best of the best at the Fire Protection Industry Awards 2018 Gala. The Sydney event was the largest yet in the three-year history of the awards, which are continuing to build recognition in the Australian industry, attracting attendees and dignitaries from around the country and overseas. This year featured two brand new award categories: the Innovative Product and Technology Award, and the Ron Coffey Award for Excellence in Bushfire Protection. Ten fire protection professionals and companies were awarded for their excellent work and contributions—eight of them through judged award categories and two proudly presented by the Board of Directors of host Fire Protection Association Australia (FPA Australia).

The Awards Gala also recognised FPA Australia's Platinum members for the important contributions they make and the leadership role they take in the industry. This year's Platinum members are Wormald, Kidde, Flamestop, Chubb, Tyco, and from January 2019 FireMate Software.

"The Fire Protection Industry Awards are part of the Association's ongoing commitment to encourage and recognise excellence in the industry," said FPA Australia CEO Scott Williams.

"The large number of excellent nominations this year and the high attendance at the Awards Gala is a strong reflection that the industry shares the same commitment to excellence. We are very proud to work on behalf of an industry that is so clearly pushing itself to achieve high standards."



## AV Viscogliosi Award: Keith Nicolls

Keith Nicolls began his career in civil engineering in 1990 and has gone on to become one of Australia's leading experts in passive fire protection, fire safety engineering and product testing.

After moving on from roles as a structural design engineer, Mr Nicolls spent many years leading development and testing of building products at Mitek and CSR Gyprock before becoming the Manager of Product Testing and Assessments at Exova Warringtonfire for 12 years. In 2016 Mr Nicolls moved to CSIRO, where he focuses on fire testing, assessment and research projects that support industry.

Mr Nicolls has been a key contributor to FPA Australia and Standards Australia since 2004. His representation and service extends to more than 18 different groups and standards committees. The AV Viscogliosi Award recognises Mr Nicolls' commitment and major contributions to the greater good and ongoing development of the industry.



## Meritorious Service Award 2018: Russell Porteous

Russell Porteous began his career as an apprentice electrician with Wormald in 1988, going on to establish the new internal business unit to coordinate the delivery of preventative maintenance of fire systems and mechanical services to customers across Australia and New Zealand. In late 2001, he started his own fire protection company, Firewize, with a former colleague who shared the same vision of providing a high level of service.

In 2008 Mr Porteous took a key role in a research project that helped FPA Australia develop the Fire Protection Accreditation Scheme (FPAS). His contribution to the industry has been long and comprehensive, earning him a reputation as one of the leading experts on fire protection routine service in the country.



## Harry Marryatt Fire Protection Company of the Year Award (1–49 Employees): Delta Fire Australasia

Delta Fire (Australasia) Pty Ltd is an industry leader in fire protection services and equipment, with a particular focus on special hazards. Over the past 18 years, Delta Fire's staff have developed a solid industry reputation as commercial fire safety experts across Australia, New Zealand and the Pacific Islands. The company is committed to regular staff training, and requires all staff to hold FPAS accreditation and undergo first aid, OH&S and computer training. Delta Fire also subsidises their staff's higher education.



## Barry Lee Technical Excellence Award 2018: Brett Staines

Brett Staines has worked in fire protection related roles for 30 years since graduating with a mechanical engineering degree in 1988. For more than 20 years, he has been actively involved in the committees of both FPA Australia and Standards Australia, and in 2009 received the AV Viscogliosi Award for outstanding service to fire protection. Over the past 23 years, Mr Staines has served on eight FPA Australia

Technical Advisory Committees and Standards Australia Committees, and he has served on the Fire Protection Industry (ODS & SGG) Board. He continues to deliver numerous technical publications, articles and presentations to improve the technical knowledge of the fire protection industry. His contributions on the topic of firefighting foams in particular have been significant.



**Fire Protection Project of the Year (under \$1 million): DEM Fire & Essential Services Group**

DEM Fire & Essential Services Group was presented with this award for a technically challenging project in which they designed and installed a fire-detection system at a mushroom compost facility. The project had to overcome a very tight schedule and a corrosive operating environment to deliver a system with high immunity to false alarms, despite high levels of heat, ammonia and vapour generated by the composting process. The project made use of a broad range of fire-detection principles to produce a reliable system that overcame the challenging conditions.



**Harry Marryatt Fire Protection Company of the Year Award (50+ Employees): Walker Fire Protection**

Established in 1894, the Walker name is one of the oldest and most respected in the Australian fire protection industry. Walker Fire Protection provides high-quality, independent technical advice and support to help identify the best fire and life safety solutions. The company specialises in complex, high-risk and mission critical sites, and is known for reliable and cost-effective essential services maintenance and management to ensure statutory obligations are met.

“The Fire Protection Industry Awards are part of the Association’s ongoing commitment to encourage and recognise excellence in the industry.”

— Scott Williams, FPA Australia CEO



**Ron Coffey Award for Excellence in Bushfire Protection: Kathryn Kinnear**

Kathryn Kinnear has worked in environmental and bushfire management for 23 years, and has developed specialist skills from field operations, reporting and management experience. Ms Kinnear completed a Bachelor of Applied Science at Edith Cowan University in 1994 and worked with the Department of Environment and Conservation for ten years. She is the only Accredited Level 2 Bushfire Practitioner in the south coastal region. Ms Kinnear has made major contributions to the progression of bushfire legislation in WA, contributing significant time and expertise to industry and government working groups.



**Fire Protection Project of the Year (over \$1 million): Walker Fire Protection**

Walker Fire Protection was presented with this award for a large and technically complex project at a Royal Australian Air Force training facility

in East Sale, Victoria. The project involved \$5 M of fire protection systems, including one of the largest in-floor, aqueous-film-forming, foam fire-suppression systems installed in Australia. The project also included a particular focus on potential environmental effects, using biodegradable foam and involving detailed mitigation measures.



**Young Achiever of the Year Award: Matt Dalgety**

Matt Dalgety started his career in late 2009 at the age of 19 as a fire services designer cadet with Fire Technology Pty Ltd in Brisbane, after studying both building design and civil engineering. He spent close to seven years within this role, building himself up from a junior computer-aided dispatch (CAD) draftsman to a senior designer.

In early 2018, Mr Dalgety was offered the position of Fire Services Section Manager in the Norman Disney & Young Melbourne. He is currently completing a Graduate Certificate in Performance-Based Fire Codes at Melbourne University.



**Innovative Product and Technology Award: PVStop International**

Australian-designed PVStop is an innovative product that isolates the power produced by solar panels at the source. PVStop eliminates the risk of high-voltage, DC electrocution by acting as a ‘liquid tarpaulin’, shutting down the solar photovoltaic system in seconds. It is the only fast, effective and cost-efficient solution available that renders solar panels safe, and addresses a significant safety concern for fire and emergency services. The technology is being adopted by fire and emergency services, airports, government agencies and mine sites around Australia.



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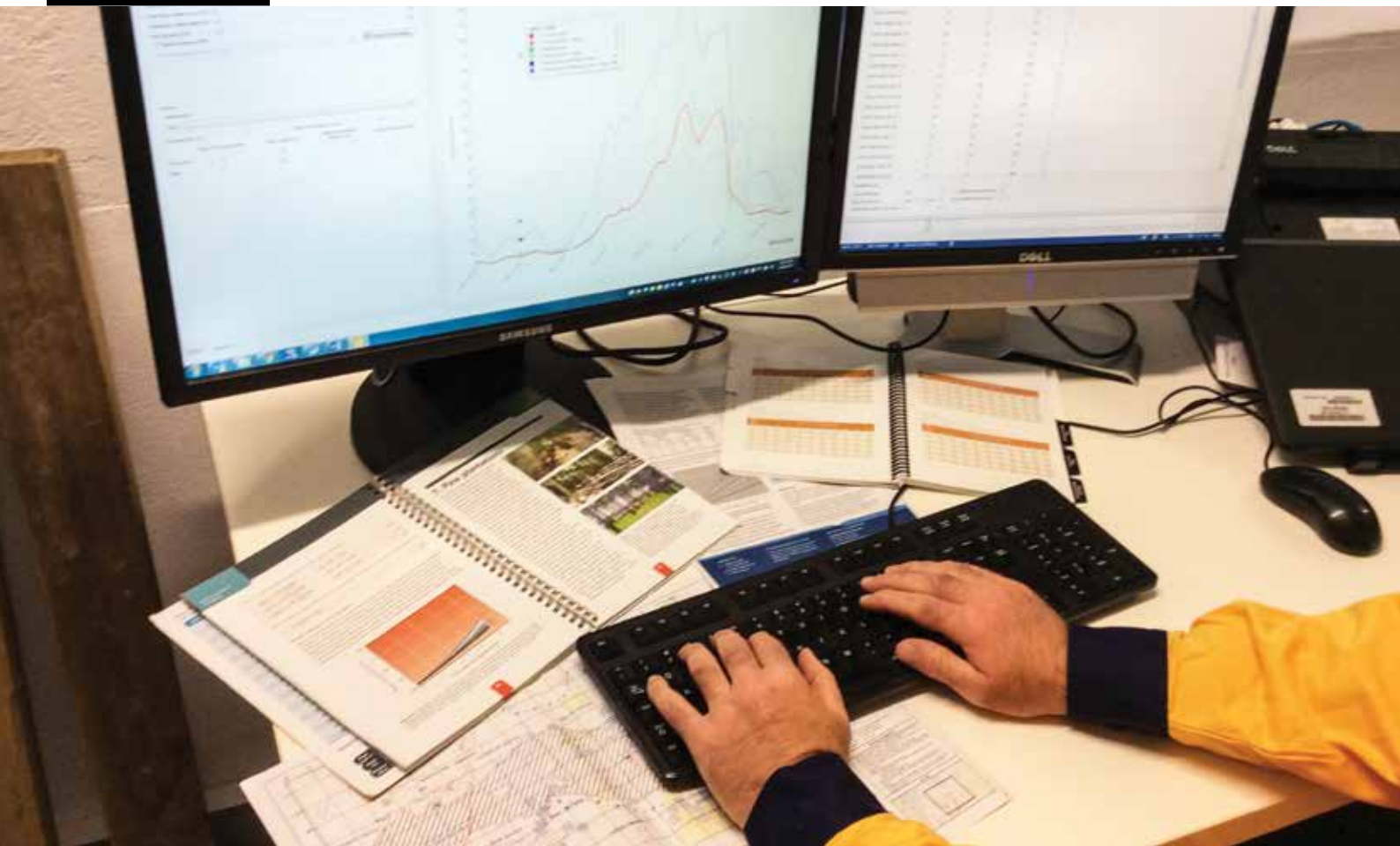


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Fire Protection Industry  
(ODS & SGG) Board  
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Many gaseous fire extinguishing agents, including halon, are controlled in Australia due to their environmental impact. The Fire Protection Industry (ODS & SGG) Board has been appointed by the Australian Government to manage a permit scheme that ensures these gases are only handled, traded, and stored by trained people and organisations. However, fire stations are able to accept surrendered gases, including halon, without needing a permit, to be passed on to the National Halon Bank. For more information, phone 03 8892 3132.



# AFAC RESEARCH UTILISATION CASE STUDY

# SUCCESS OF THE FIRE

# SPREAD MODELLING GUIDE

The latest AFAC case study examines the factors that drove the development, design and industry uptake of a science-based fire spread modelling guide.

BY **BRENDA LEAHY**

AFAC

**A** practical guide to fire spread modelling, developed jointly by CSIRO and AFAC, is contributing worldwide to fire behaviour training and research as well as fire planning and management, including hazard reduction burning.

*A guide to rate of fire spread models in Australian vegetation* consolidated knowledge from about 60 years of research into a useful handbook for users across fire and emergency services. Previously, this knowledge was spread across a range of sources in scientific journals, reports and research

papers that were largely inaccessible to fire behaviour practitioners.

The guide originated in a chapter of a 170-page scientific research synthesis conducted by CSIRO scientists for end users of the former Bushfire CRC. Today, the resource is available in both print and digital PDF format, made possible through a research utilisation project managed through AFAC and funded by the member agencies of the former CRC and CSIRO. It is now regularly cited in both Australian and international research papers.

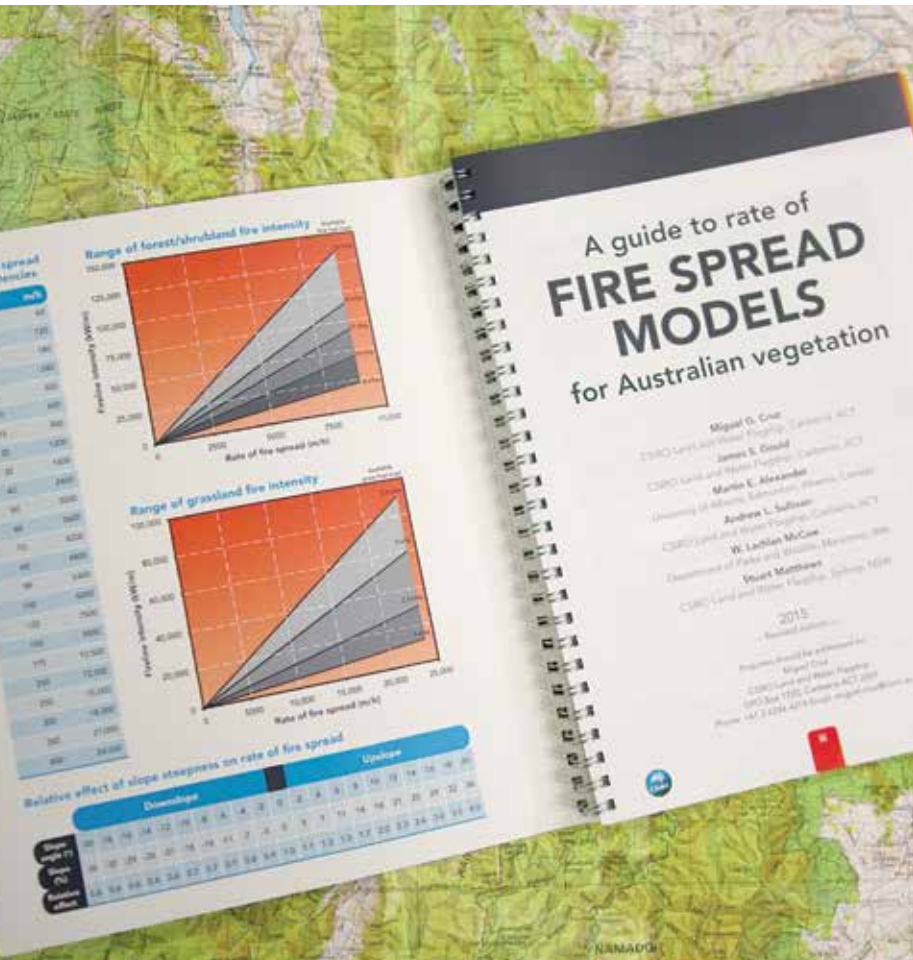
The innovative guide details every rate of fire spread model developed to predict the behaviour and spread of fire in Australian vegetation. It also highlights

the models' applicability for operational use in prescribed burning and wildfire prediction in grasslands, shrublands, dry and wet eucalypt forests and pine plantation fuel types.

More than 500 copies of the printed version (including a reprint) have been distributed by AFAC since the guide's launch in 2015. The digital PDF has been downloaded around 1,300 times since it went live on CSIRO's website in late 2017 as a free resource.

According to CSIRO, users from locations as diverse as Europe, North and South America and Asia have downloaded the PDF guide. Many of the international downloads have been from bushfire-prone countries with large





PHOTOS: CSIRO

areas of eucalypt vegetation, such as Portugal and Spain.

Among its many uses, the guide is a key input in fire behaviour training in Australia. It has been incorporated into the Bureau of Meteorology's national training programs for its forecasting operations and is used by agencies to plan and implement hazard reduction burning, as well as in response to bushfire emergencies.

The latest AFAC case study explains how the science-based guidance resource was made fit for purpose for end users, and points to the factors critical to the project's success. Foremost of these factors were:

- ◆ the researchers' understanding of the end users, their problem need and context
- ◆ the involvement of end users from the outset
- ◆ a commitment to convert complex scientific knowledge into a user-friendly format.

End user Andrew Sturgess, Manager of the Predictive Services Unit at Queensland Fire and Emergency Services, uses the guide for training and in conjunction with the Spark software system.

"Inputs are then applied to the relevant fire behaviour model with the formulas for rate of spread and fuel

moisture content taken directly from *A guide to rate of fire spread models in Australian vegetation*," Mr Sturgess said. "Users are able to select the fuel type, load and condition to create fire behaviour calculations that are relevant to their area using the latest tools, technologies and science."

Senior Fire Behaviour Analyst with NSW Rural Fire Service, Laurence McCoy, uses the guide for national training for fire behaviour analysts, to inform policy and practice, and to assist with operational decision-making.

"The guide also provides a useful and consistent basis for training and informs our policies and procedures, ensuring we are in line with best practice," Mr McCoy said. "Each jurisdiction makes adjustments in accordance with their needs. It's also useful for fire managers when deployed to other states."

**"Users are able to select the fuel type, load and condition to create fire behaviour calculations that are relevant to their area using the latest tools, technologies and science."**

Andrew Sturgess, Queensland Fire and Emergency Services.



*A guide to rate of fire spread models in Australian vegetation is regularly cited in research papers worldwide, and used across Australian agencies for training, to inform policy and practice, and to assist with operational decision-making.*

The goal of the research utilisation project team was to design a useful resource that was readable and functional. The CSIRO researchers translated the content from the fire knowledge synthesis report into a style suitable for a general readership, and a graphic designer was engaged to implement a design and production plan. The finished format had to be visually engaging, using a range of colours, graphics, tables, illustrations and images taken from the field to improve the overall readability of the content. The PDF version was repurposed from the printed version and adapted for online applications, such as the Bureau of Meteorology's internal training site. ■

**Download A guide to rate of fire spread models for Australian vegetation PDF at: [research.csiro.au/firemodelsguide](https://research.csiro.au/firemodelsguide).**

**For further information on the research utilisation project, contact Dr Noreen Krusel at [noreen.krusel@afac.com.au](mailto:noreen.krusel@afac.com.au).**

# ANSWERING THE CALL: MENTAL HEALTH NEEDS OF FIRST RESPONDERS HIGHLIGHTED

A national survey into the mental health and wellbeing of 21,000 police and emergency service personnel is informing how police and emergency services can take better action and offer greater support to those affected by mental health conditions.

BY **DR JOHN BATES**

Bushfire and Natural Hazards CRC

**P**ioneering Australian research into the mental health and wellbeing of police and emergency service staff and volunteers has been released as part of a collaboration between Beyond Blue and the Bushfire and Natural Hazards CRC.

Professor David Lawrence (University of Western Australia) led the research, titled *Answering the Call*, with the findings released at the Melbourne Convention and Exhibition Centre on 29 November 2018.

Extensive anecdotal evidence has shown that police and emergency services personnel are at a greater risk of experiencing a mental health condition than those in less stressful jobs. The lack of comprehensive, national data has created challenges in understanding the true extent of mental health issues in the sector, and in advocating for genuine reform and change.

This landmark research now provides a detailed and accurate picture of mental health issues across Australia. The results have established national baseline measures of wellbeing, mental health conditions and suicide risk among police and emergency services personnel. They also provide evidence about the issues affecting their health, and the best ways to provide support.

The survey, conducted from October 2017 to March 2018, involved current employees (operational and non-operational) and volunteers, as well as former and retired employees working

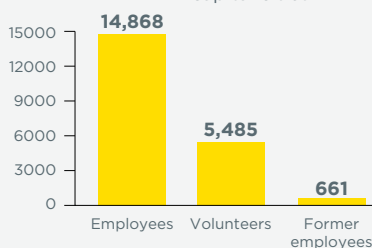
## WHO PARTICIPATED IN THIS RESEARCH?

**21,014**

total survey participants from 33 agencies

**38%** Employees worked outside major capital cities

**77%** Volunteers worked outside major capital cities



A range of participants from 33 agencies took part in the research.

in ambulance, fire, police, and state emergency service agencies in each Australian state and territory.

Of the 36 agencies in the sector, 33 participated in *Answering the Call*, with 14,868 employees and 5,485 volunteers surveyed. In addition, 661 former employees were recruited through associations of former employees and related groups. In total, the survey engaged with 21,014 respondents, measuring across nine survey themes:

- ◆ prevalence of mental health and wellbeing
- ◆ suicidal thoughts and behaviours

- ◆ individual risk and protective factors
- ◆ substance use
- ◆ risk and protective factors associated with the working environment
- ◆ stigma
- ◆ seeking support
- ◆ workers' compensation
- ◆ former employees.

The main results from the survey in each of these areas are summarised below.

## Prevalence of mental health and wellbeing

Ten percent of employees had probable post-traumatic stress disorder (PTSD). Rates of PTSD ranged from 6% in the state emergency services (SES) sector to 9% in fire agencies. In comparison, the prevalence of PTSD has been estimated at 4% in adults in Australia and 8% in the Australian Defence Force.

Twenty-one percent of employees had high psychological distress and 8% had very high psychological distress—much higher than the 9% and 4%, respectively, among all Australian adults. Volunteers showed lower levels of psychological distress and probable PTSD and higher levels of positive wellbeing, with 4% of ambulance volunteers, 5% of fire volunteers and 6% of SES volunteers having probable PTSD.

## Suicidal thoughts and behaviours

Suicidal thoughts and planning were twice as high than with the Australian population, while rates of suicide attempts were comparable. Employees with higher levels of social support and



resilience reported lower levels of suicidal thoughts and behaviours, even if they had experienced traumatic events that deeply affected them in their work or were likely to have PTSD.

### Individual risk and protective factors

Employees and volunteers that had started their career in the previous two years had high levels of mental wellbeing and very low levels of psychological distress, probable PTSD and suicidal thoughts. Higher rates of psychological distress and probable PTSD were associated with greater length of service, low levels of social support and more exposure to traumatic events that deeply affected individuals.

More than 80% of employees and 90% of volunteers reported providing high levels of social support to others, as well as receiving similar support.

### Substance use

Many police and emergency services employees reported high rates of alcohol consumption, which may indicate its use for coping with stress or other symptoms of poor mental health.

Almost 50% of employees' alcohol consumption exceeded National Health and Medical Research Council guidelines. Sixteen percent of employees drank five or more drinks in a single session at least weekly, and 17% consumed ten or more drinks in a single session during the past month.

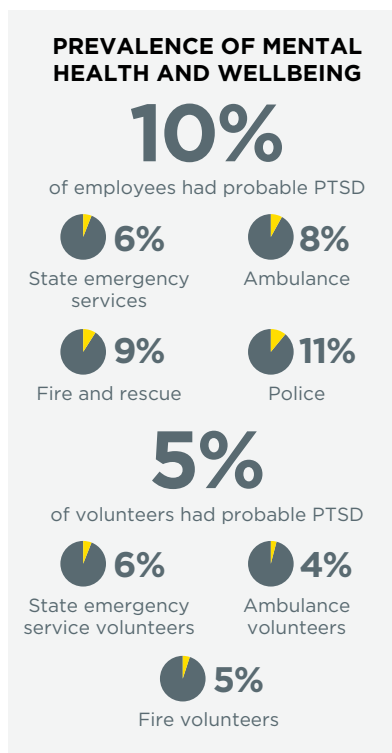
Rates of illicit drug use were comparatively low. About 5% of employees reported having used illicit drugs within the past year, although 13% of employees with probable PTSD reported having done so. In comparison, 16% of Australians aged 14 and over reported using illicit drugs over a 12-month period.

### Risk and protective factors associated with the working environment

The workplace environment, particularly poor team culture and workplace stress factors—such as inadequate resources and unpaid overtime—had significant impacts on employee mental health. In agencies with higher levels of resilience, more employees were able to take time off after experiencing a traumatic event at work, and employees more frequently had debriefings and reported that work did not drain too much energy that it affected their private life.

### Stigma

Employees and volunteers tended to believe that others in the workplace held negative beliefs towards those



The prevalence of post-traumatic stress disorder in employees was double that of volunteers.

with a mental health condition, or a low commitment to support those with mental health conditions.

Employees held notable levels of stigma surrounding their own mental health. Thirty-three percent of respondents felt shame about their mental health condition and 61% said they would avoid telling people about it. Despite these figures, most employees and volunteers reported they would support any colleague who experienced a mental health condition.

### Seeking support

Comparatively, more people in the police and emergency services sector seek support when they need it for a mental health condition than in the Australian population overall. Barriers to seeking support commonly cited, for employees and volunteers alike, included wanting to deal with it themselves, concerns about being treated differently, and being perceived as weak.

Nearly half of employees believed they had received sufficient support for their needs. While this may seem low, it is comparable with the general population.

### Workers' compensation

Most respondents making workers' compensation claims found the process to be unsupportive and stressful, and reported that it had a negative impact on their recovery. Among employees



with probable PTSD who made a claim, 75% felt it had a negative impact on their recovery, with only 8% reporting a positive impact. More than half (52%) felt that they were not supported at all during the claims experience, and 63% reported that they found the claims experience to be very or extremely stressful.

### Former employees

Twenty-eight percent of former employees had seriously thought about taking their own life. Of those, 66% felt this way while still working in the police and emergency services sector and 62% felt this way after leaving the sector.

Former employees had lower resilience and were much less likely to receive high levels of social support than current employees, particularly those former employees currently having probable PTSD or high rates of psychological distress.

### How the research is being used

A major recommendation of this research is that agencies review their existing health and wellbeing strategies. This will ensure that they have a comprehensive workplace mental health and wellbeing strategy that is a fully integrated element of their core business. The research is also being translated into action as part of the third phase of the project.

The research provides an opportunity for police and emergency service agencies to develop, refine and implement strategies and programs that can minimise the long-term mental health impacts for future employees and volunteers—the future workforce for providing essential emergency services to our communities. ■

To read the full report, visit [www.beyondblue.org.au/pesresearch](http://www.beyondblue.org.au/pesresearch).

The research will guide agencies to develop, refine and implement better and longer term mental health and wellbeing programs.

SOURCE FOR ALL INFOGRAPHICS: BUSHFIRE AND NATURAL HAZARDS CRC



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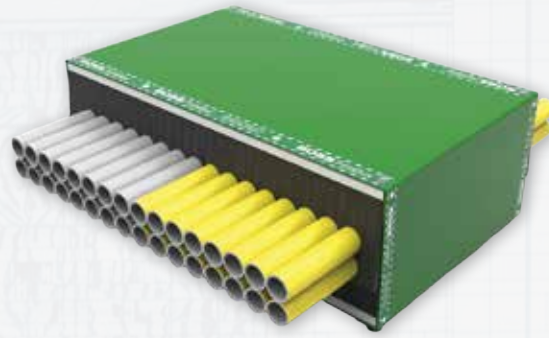
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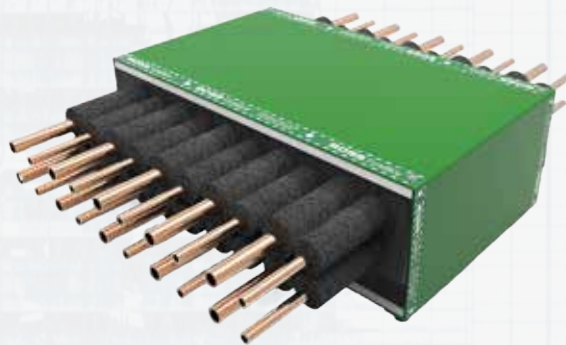




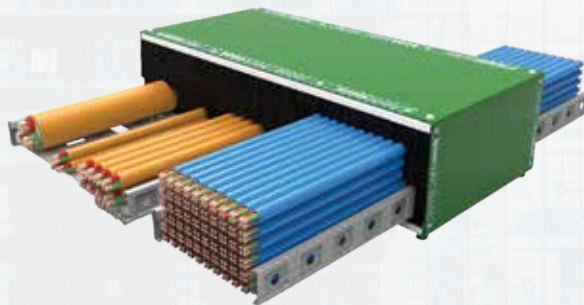
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# THE HALON HAZARD

Halon is still used in suppression systems in some critical equipment, such as the RAAF's FA-18F Super Hornet fighter plane.

Halon packs a powerful punch—but not in the way we would like.

BY **PAUL HODGSON**

Fire Protection Industry (ODS & SGG) Board Executive Officer

AND **BONNY REDMAN**

Fire Protection Industry (ODS & SGG) Board Communications Coordinator

**W**hen halon was introduced into Australia as a fighting agent in the early 1970s, people quickly realised it was perhaps too good to be true. Just 20 years later, in 1992, Australia banned the importation of halons into the country in line with its obligations under the Montreal Protocol—an international

treaty that mandates the phasing out of ozone-depleting substances.

The concern with halons is that, despite their efficiency, they have relatively long lifetimes in the atmosphere. And, when broken down in the stratosphere, they release reactive bromine—which is estimated to be responsible for 25% of the chemical destruction of ozone over Antarctica and 50% over the Arctic. To put this in perspective, just one kilogram of halon 1211 can destroy 50 tonnes of ozone.

Australia has made significant advances in phasing out and managing halons and other firefighting agents that contribute to the depletion of the ozone layer. The country's early 1990s

success with the halon phase-out meant that stocks of halon rapidly accumulated within government, business and the community from decommissioning of halon firefighting systems and portable equipment.

To cope with this supply, the Australian Government established the National Halon Bank (NHB) in 1993. The NHB's purpose was to store decommissioned halon for destruction or reclamation to meet essential uses until an alternative was found.

Today, a wide variety of alternatives—including halocarbon gases, inert gases and water mist systems—are available for the majority of traditional halon uses (see [tinyurl.com/halon-alternatives](https://tinyurl.com/halon-alternatives)).





PHOTO: STOCKPHOTO

PHOTO: FPIB

situations such as:

- ◆ commercial and private aviation
- ◆ ocean-going shipping, including foreign-flagged vessels operating in or through Australian waters
- ◆ defence applications.

The use of halon is managed by a national permit scheme, administered by the Fire Protection Industry (ODS & SGG) Board (FPIB). In Australia, any person or company possessing halon for use in fire protection equipment or systems must hold a halon special permit. This permit outlines strict requirements a company or individual must meet when using halon in fire protection.

The FPIB may grant a halon special permit where it is satisfied that:

- ◆ the applicant is appropriately experienced and the use of the halon is to protect human life or operate equipment that is critical to the community
- ◆ there is no practicable and safe alternative available at reasonable cost.

The FPIB can be contacted on 03 8892 3131 for any questions relating to halon use.

### Halon Collection Campaign

Despite the halon phase-out beginning more than 25 years ago, there are indications that some halon-containing fire extinguishers are still located in Australia.

In 2016, the NHB reported to the FPIB through the Department of the

Environment and Energy that they received approximately six tonnes of halon 1211.

With cylinders at risk of discharge if not stored correctly, the FPIB launched its Halon Collection Campaign in early 2017. The ongoing campaign asks the fire protection industry and the public to surrender any old halon stock to authorised collection points for safe destruction or reclamation in an attempt to reduce discharges.

### Identifying and disposing of halon extinguishers

Halon cylinders are easily identifiable by their bright yellow colouring. In cases where the agent has been imported directly from overseas, the cylinders can be green or red with a green band. Imported units are commonly found in aircraft and foreign shipping.

If you have a halon cylinder in your possession, drop it in to your local fire station—or contact the NHB directly to arrange collection.

The NHB operates a free-call service to advise on disposal of halon, as well as a free service for the general public and small businesses to dispose of halon. The criteria to qualify for free disposal are listed on the Halon Collection Point Deposit Form, which is available at [www.environment.gov.au/protection/ozone/halon/halon-disposal](http://www.environment.gov.au/protection/ozone/halon/halon-disposal). ■

Old halon extinguishers are regularly handed in to fire stations, after which they're delivered the National Halon Bank.

However, none of the current alternatives cover the broad spectrum of applications for which halon could be used. Until such time as they do, the government still allows the use of halon in specialised fire protection equipment and systems in areas where it will protect human life or operate equipment that is critical to the community.

### Current uses of halon

The two types of halon commonly found in Australia are:

- ◆ halon 1211, also known as BCF, used a streaming agent
  - ◆ halon 1301, also known as BTM, used as a total flooding agent.
- These halons are still used in

For all NHB enquiries, phone 1800 658 084.

# MODELLING SMOKE-TEMPERATURE DISTRIBUTION IN TUNNEL FIRES



Understanding how smoke and temperature spread in a tunnel and how they interact with different ventilation systems is important for designing effective fire protection in motor vehicle tunnels.

BY **ASSOCIATE PROFESSOR KHALID MOINUDDIN**

Centre for Environmental Safety and Risk Engineering, Victoria University

AND **ASSOCIATE PROFESSOR FUTOSHI TANAKA**

Department of Mechanical Engineering, University of Fukui, Japan

constructed within shallow underground spaces. Hence, NVSs with vertical shafts can be used as ventilation systems in road tunnels, as used in the Tsukiji-Toranomon Tunnel in Japan and the Xiamen Road Tunnel in China. However, the NVS has to provide sufficient exhaust performance to ensure safety in the tunnel.

## Plug-holing and boundary layer separation

The performance of a vertical shaft NVS is adversely affected by two phenomena: plug-holing (PH) and boundary layer separation (BLS). PH reduces NVS smoke exhaust performance because of its strong effect on the mixing of hot smoke and cold fresh air (Figure 1a). In contrast, BLS affects exhaust performance by constricting the smoke passage in the vertical shaft. BLS is caused by smoke movement and longitudinal smoke-temperature distribution below the tunnel ceiling (Figure 1b).

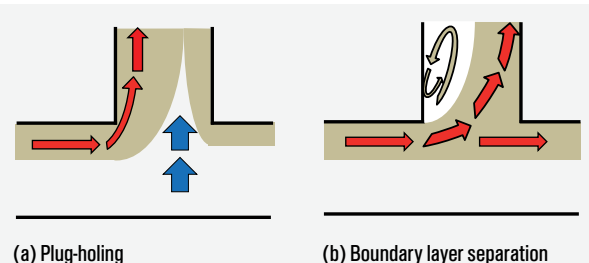
## Experimental study

To understand the PH and BLS phenomena, we conducted two sets of scaled experiments: first at 1:10 scale (Tunnel A) and second at 1:20 scale (Tunnel B). Tunnel A was 12 metres long, 0.5 metres wide and 0.5 metres high

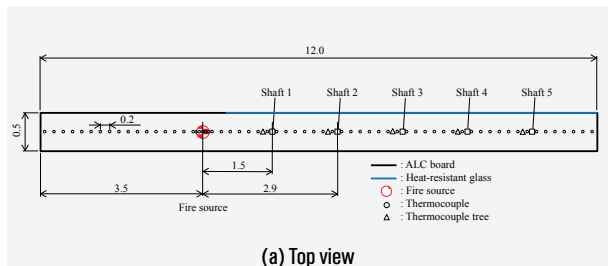
A fire in a tunnel can quickly turn into a major incident. For example, the 1999 fire in the Mont Blanc tunnel between France and Italy killed 39 people, and the 2014 Yanhou tunnel fire in China killed 31 people. Ventilation systems to control and exhaust smoke produced by tunnel fires are therefore of paramount importance for the safety of tunnel users.

Ventilation systems are classified into two types: mechanical ventilation systems (MVSs) and natural ventilation systems (NVSs). An MVS drives ventilation using mechanical equipment, such as a jet fan, whereas an NVS induces ventilation using natural forces, such as the stack effect and piston effect.

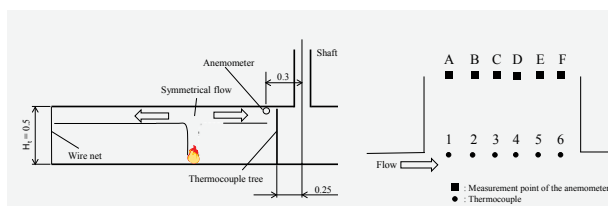
An NVS has some advantages over an MVS: electric power for operation is not necessary, maintenance is easy and the cost is low. In urban areas, most road tunnels are rectangular in shape and are



(a) Plug-holing (b) Boundary layer separation  
 FIGURE 1. The performance of a vertical shaft natural ventilation system is adversely affected by plug-holing and boundary layer separation.



(a) Top view



(b) Side view

(c) Measurement points

FIGURE 2. Schematic diagrams of Tunnel A (unit: m) and measurement points.





condition of the tunnel walls would reach a quasi-steady state.

**PH-BLS threshold**

Figure 3 shows the temperature-rise distributions at the inlet and outlet at Shaft 1 in Case 2 and Case 3, respectively. For Case 2, the rises in temperature at points A-C were lower than those at points D-F, indicating that this was a BLS situation. For Case 3, the rise in temperature at the inlet was high at points 1, 2 and 6, and was low at points 3-5, and the rise in temperature at the outlet (points A-F) was roughly uniform. This is a PH situation. We have analysed all cases based on the Richardson number, *Ri*, which is a dimensionless number defined as the ratio of buoyancy (vertical) and inertia (horizontal) force of the smoke. Mathematically, it can be presented as:

$$Ri = \frac{\Delta p g H_{sh} A_{sh}}{\rho_s u_s^2 d_s W_{sh}}$$

where  $\Delta p$  [kg/m<sup>3</sup>] is the density difference between the smoke and ambient air, *g* [m/s<sup>2</sup>] is gravitational acceleration, *H<sub>sh</sub>* [m] is the height of the shaft, *A<sub>sh</sub>* [m<sup>2</sup>] is the cross-sectional area of the shaft,  $\rho_s$  [kg/m<sup>3</sup>] is the smoke density, *u<sub>s</sub>* [m/s] is the smoke velocity, *d<sub>s</sub>* [m] is the thickness of the smoke layer, and *W<sub>sh</sub>* [m] is the width of the model tunnel. *d<sub>s</sub>* was calculated from the vertical temperature distribution of the thermocouple tree using the integral ratio method.<sup>1</sup>

From fire sources, smoke reached up to the 4<sup>th</sup> shafts in all cases, and in some cases reached the 5<sup>th</sup> shaft. In Cases 2, 5, 9 and 13, all shafts had BLS situations, whereas PH situations occurred in all shafts in Cases 3, 6, 7, 10, 11, 14 and 15. By analysing *Ri*, we found that the form of the smoke exhausted from the shaft became PH when *Ri* was greater than 1.4, and became BLS when *Ri* was less than 1.4. This is the critical Richardson number, *Ri<sub>cr</sub>*. This finding is similar to that of Ji et al.<sup>2</sup>

Ventilation systems are critical in a tunnel fire.

SOURCE: TAKEUCHI ET AL, 2017

Experimental conditions					
Case	Scale ratio	HRR (model) [kW]	HRR (full) [MW]	Shaft height H <sub>sh</sub> [m]	Preheating time [s]
1	1/10 (Aspect ratio = 1)	23.8 ± 0.3	7.5	NA	1800
2				0.12 (0.24 H <sub>t</sub> )	
3				0.50 (1.0 H <sub>t</sub> )	
4*	1/20 (Aspect ratio = 2)	1.4 ± 0.2	2.5	NA	4800
5*				0.06 (0.24 H <sub>t</sub> )	
6*				0.25 (1.0 H <sub>t</sub> )	
7*				0.40 (1.6 H <sub>t</sub> )	
8*	1/20 (Aspect ratio = 2)	2.9 ± 0.2	5.2	NA	4200
9*				0.06 (0.24 H <sub>t</sub> )	
10*				0.25 (1.0 H <sub>t</sub> )	
11*				0.40 (1.6 H <sub>t</sub> )	
12*	1/20 (Aspect ratio = 2)	4.2 ± 0.2	7.5	NA	3600
13*				0.06 (0.24 H <sub>t</sub> )	
14*				0.25 (1.0 H <sub>t</sub> )	
15*				0.40 (1.6 H <sub>t</sub> )	

\* Rows with an asterisk include data from our previous paper (Takeuchi et al., 2017).

H<sub>t</sub> represents tunnel height \* represents Tunnel B

(an aspect ratio of one) with five square-shaped vertical shafts (Figure 2). Tunnel B was 5 metres long, 0.5 metres wide and 0.25 metres high (aspect ratio unity) with six vertical shafts.

The tunnels were made of autoclaved, lightweight, aerated concrete (ALC) board, with part of one side wall made of heat-resistant glass to enable observation of smoke flow. The shafts were made of float glass plates to enable further observation. The tunnels were equipped with an anemometer and thermocouples to measure velocity and temperature. Experimental

conditions are given in the table above. Shaft heights varied, and tests were also conducted with no shaft (shown as NA in the table). The heat release rate (HRR) represents a quantitative measure of the fire size (in kW or MW). HRR (model) values refer to the tests conducted in scaled-down tunnels, which would be equivalent to the HRR (full) values in an actual size tunnel. Propane gas burners of 0.16 metres and 0.08 metres diameter were used as fire sources for tunnels A and B, respectively. We preheated the tunnel by running the fire source without measurement so that the heat-absorbing

**Smoke exhaust efficiency model development**

The first model we developed was on the efficiency of exhausting heat of the smoke, *E*. We defined *E* as the ratio of the convective heat flow rate of the smoke exhausted through the shafts, *Q<sub>es</sub>*, to that flowing under the ceiling, *Q<sub>cs</sub>* (i.e. *E* = *Q<sub>es</sub>* / *Q<sub>cs</sub>*). When the form of smoke exhaust was PH, the value of *E* was 0.30 for Tunnel A (unity aspect ratio) and 0.16 for Tunnel B (aspect ratio 2), regardless of the shaft's *Ri*. This means that *E* depends on the aspect ratio

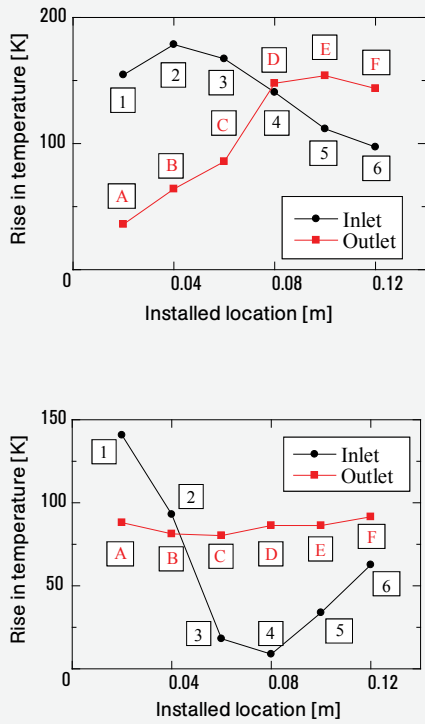
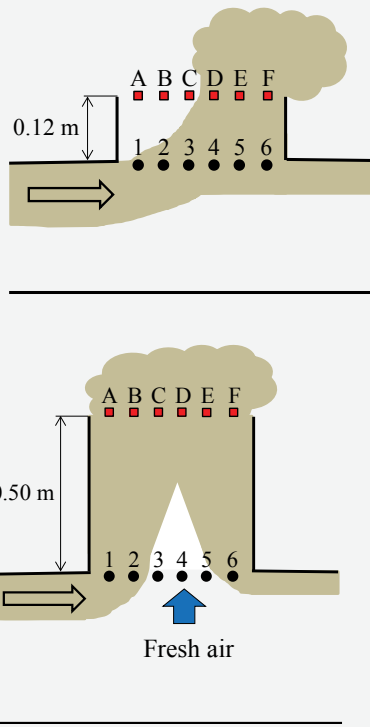


FIGURE 3. Distributions of rise in temperature and estimated smoke flow: top, Case 2 and bottom, Case 3.



ranged from  $x = 0$  to  $0.18 H_f$ , and Region 2 ranged from  $x = 0.18 H_f$  to  $0.50 W_f$ . In Figure 4b the temperature distribution from Case 1 is shown across four regions; those in red, blue and green are Region 1, Region 2 and Region 3, respectively. Based on the experimental data, we assumed that Region 4 in the 1:10 scale and 1:20 scale started at  $x = 0.6$  metres and  $0.5$  metres, respectively. In this study, we focused on the longitudinal smoke-temperature distribution in Region 4. The model of the smoke dynamics in Region 4 for predicting the smoke temperature under the ceiling is shown in Figure 4c. The smoke loses some of its convective heat due to heat transfer ( $h =$  convective heat transfer coefficient) from the smoke to the tunnel walls ( $Q_{wall}$ ). We ignored thermal radiation exchange between the smoke and surroundings in the model. When vertical shafts are installed on the tunnel ceiling, some of the convective heat of smoke is exhausted through the shafts, so the rise in temperature of the smoke behind the shafts ( $\Delta T'_{cs}$ ) drops rapidly. A model of smoke dynamics around a shaft is shown in Figure 4d.

(AR) when the form is PH. On the other hand, when the form of exhaust is BLS, then the lower the  $Ri$ , the lower the  $E$  in both tunnels. We considered that the relationship between  $E$  and  $Ri$  could be estimated from the geometries of the tunnel and shaft. After conducting a theoretical analysis, we considered that  $E$  can be estimated by the following piecewise function, where  $W_t$  [m] is the tunnel width:

$$E = 1.1 \times \frac{W_{sh}}{W_t} \quad \text{for } Ri > Ri_{cr} \text{ (PH)}$$

$$E = 1.1 \times \frac{Ri}{Ri_{cr}} \times \frac{W_{sh}}{W_t} \quad \text{for } Ri < Ri_{cr} \text{ (BLS)}$$

**Smoke-temperature distribution model development and validation**

The second model we developed predicted the longitudinal smoke-temperature distribution under conditions with and without shafts, regardless of the scale ratio of the model tunnel and the AR of the tunnel cross section. Figure 4a shows a schematic diagram of the smoke-diffusion process. First, the plume rises up until it hits the tunnel ceiling (free-rising plume stage, Region 1). Then, it becomes a ceiling jet and spreads radially until it reaches the side walls (radial-spread stage, Region 2). After that, the ceiling jet spreads horizontally (transition stage, Region 3). Finally, it becomes fully developed, one-dimensional smoke flow (one-dimensional smoke spreading stage, Region 4). According to Alpert<sup>3</sup>, Region 1

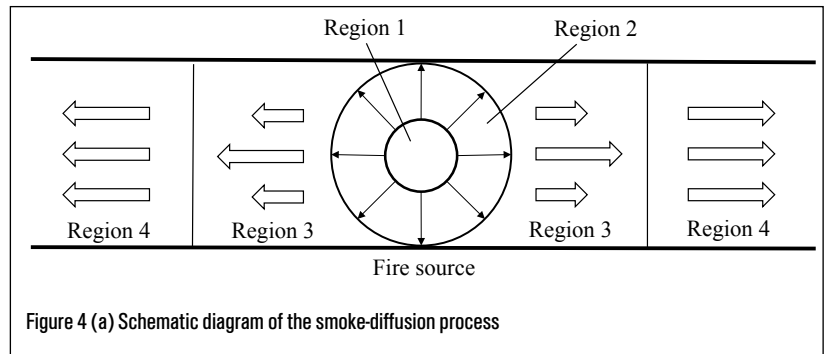


Figure 4 (a) Schematic diagram of the smoke-diffusion process

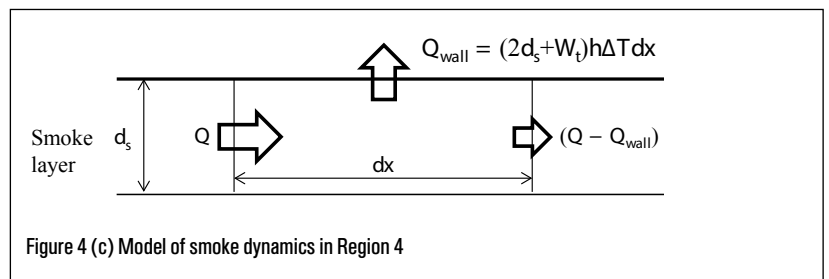


Figure 4 (c) Model of smoke dynamics in Region 4

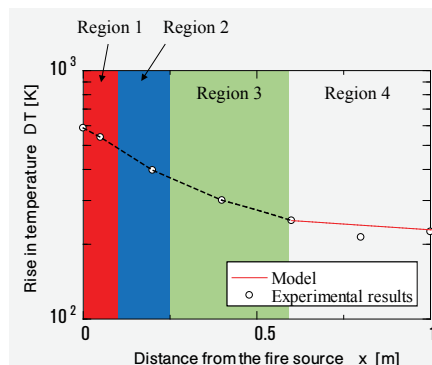


Figure 4 (b) Temperature distribution (Case 1)

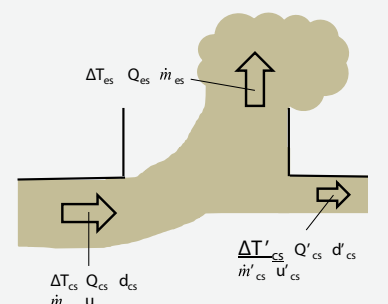


Figure 4 (d) Model of smoke dynamics around the shaft



We have developed the set of equations shown below.

$\frac{\partial}{\partial x}(\rho_s u_s W_i d_s C_p \Delta T_s) = -(2d_s + W_i)h \Delta T_s dx$	The rise in temperature of the smoke flowing under the tunnel ceiling in Region 4 when there is no exhaust shaft. $d_s$ , $u_s$ and $h$ can be calculated using equations 5–7 of Takeuchi et al. <sup>4</sup>
$\Delta T'_{cs} = \frac{T_{amb}}{1 - \frac{R(1-E)Q_{cs}}{u_{cs} d'_{cs} W_i C_p P}} - T_{amb}$	The rise in temperature of the smoke flowing behind a shaft. $d'_{cs}$ [m] is the smoke-layer thickness behind the shaft and can be calculated by equations 2, 11–13 of Takeuchi et al. <sup>4</sup>

Representative results from Tunnel A in terms of the longitudinal smoke-temperature distribution in Cases 1–3 (1:10 scale) are shown in Figure 5. A similar comparison was made for all other cases. We found that the temperature

distribution under the ceiling predicted by the model agreed reasonably well with that measured by the experiments in all cases. This is valid for all cases with and without vertical shafts in both 1:10 (AR unity) and 1:20 (AR 2) scale model tunnels.

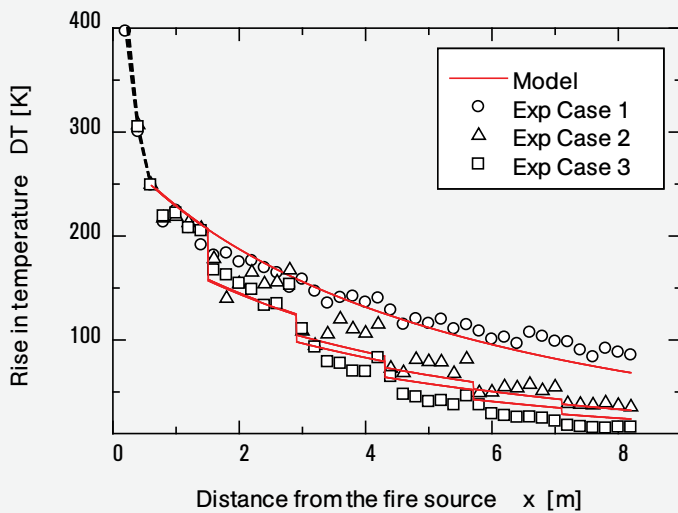


FIGURE 5. Temperature distribution (Cases 1–3 related to Tunnel A, i.e. 1:10 scale)

### Conclusion

Based on a set of experimental studies with scaled tunnels (varied in AR and scale ratio) with no and various heights of vertical shafts, we investigated the threshold conditions for PH and BLS phenomena, and calculated smoke exhaust efficiency,  $E$ , within shafts. We also developed a model for predicting longitudinal smoke-temperature distribution in the one-dimensional smoke-spreading stage in the region away from the fire source. Our model can predict longitudinal smoke-temperature distribution in the presence and absence of shafts regardless of the scale ratio or AR of the model tunnels. ■

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# CHANGING CLIMATE FOR EMERGENCY MANAGEMENT





Climate change is forcing agencies to reconsider traditional fire seasons, as the threat of bushfire evolves into a year-round hazard.

PHOTO: KEITH PAKENHAM, CFA

The recently published AFAC Climate Change and Emergency Management discussion paper explains how the sector can use its position on the frontline of climate change to influence action and lead by example.

BY **ALANA BEITZ**

AFAC

**F**ire and emergency services deal with extreme weather on a daily basis. While fires, floods, storms and heatwaves are all naturally occurring hazards, climate change increases their frequency, severity and complexity—putting additional stress on fire and emergency services.

The impacts and flow-on effects of climate change are of significant concern for AFAC. They are already being felt by AFAC's members and the communities they operate in.

Incidents at home and overseas have drawn attention to climate change, with fires burning outside traditional fire seasons and evolving into year-round threats. For instance, in 2018, the official bushfire danger period was brought forward by two months in some parts

of NSW as blazes broke out across the state during winter. Similar conditions were experienced in California, where the devastating Camp and Woolsey fires burnt through the last weeks of autumn.

These irregular conditions, alongside other changes to ecosystems and weather patterns, can disrupt the disaster mitigation activities the sector relies upon. While fire agencies widely use prescribed burning as an effective method of reducing fuel loads, rising temperatures, dry conditions and less predictable wind behaviour can significantly reduce safe planned-burning opportunities.

An increase in the intensity and frequency of hazards also has consequences for emergency management resourcing and staffing. Concurrent or prolonged events demand a larger workforce be engaged for longer periods, putting further strain on organisations that already rely heavily

on their volunteers. For example, the January 2016 bushfires in the Tasmanian Wilderness World Heritage Area occurred simultaneously with severe east coast flooding, stretching the sector's capacity to respond.

These issues and more are detailed in the Climate Change and Emergency Management discussion paper, published in November 2018 at the request of AFAC Council. Developed by the recently established AFAC Climate Change Group, the paper acknowledges climate change as a major challenge for the emergency management sector and recommends the development of a national implementation plan by AFAC Council.

The AFAC Climate Change Group comprises expert practitioners from emergency service agencies, the Bushfire and Natural Hazards CRC and other researchers. The group has recently updated the AFAC Position, Fire

**Left: Climate change increases the intensity and frequency of weather hazard events, putting further strain on emergency services and their workforces.**  
PHOTO: NSW SES



PHOTO: REX BOGGS (CC BY-ND 2.0)

Climate change and warming sea surface temperatures have been found to influence extreme rainfall events, such as the 2013 Rockhampton floods.

## Incidents at home and overseas have drawn attention to the issue, with fires burning outside the parameters of traditional fire seasons and evolving into year-round threats.

and Emergency Services and Climate Change to reflect current challenges, and continues to explore the evolving situation for fire and emergency services in Australia and New Zealand regarding climate change adaptation and mitigation.

Fire and emergency services can leverage their exposure and experience to support and contribute towards action on emission reduction and climate change action, both within the sector and beyond. As an established and trusted source of information to community, government and business, the emergency management sector can provide authoritative advice to the public about extreme weather events and climate change, drawing upon evidence-based information and intelligence to influence action.

The discussion paper recommends that these efforts should begin from within, with agencies integrating climate change adaptation and mitigation responses into their emergency management planning. The development of a national climate

change implementation plan for fire and emergency services is also recommended, as is greater investment in climate change research through AFAC, the Bushfire and Natural Hazards CRC and research partners.

Despite concerted effort from various agencies, more can be done within the sector to address climate change. This could begin by exploring low-emission technology options for the sector, as we transition to a low-carbon economy.

Such a step benefits both the sector and the environment it manages. An example can be found in the US Navy's 2009 objective to obtain half of its energy from alternative resources by 2020. Not only does this work towards reducing greenhouse gas emissions, it also reduces exposure to risk of fossil fuel supply disruptions and price volatility. A similar approach could be replicated by fire and emergency service agencies that also rely heavily upon fossil fuels across their range of vehicles and machinery.

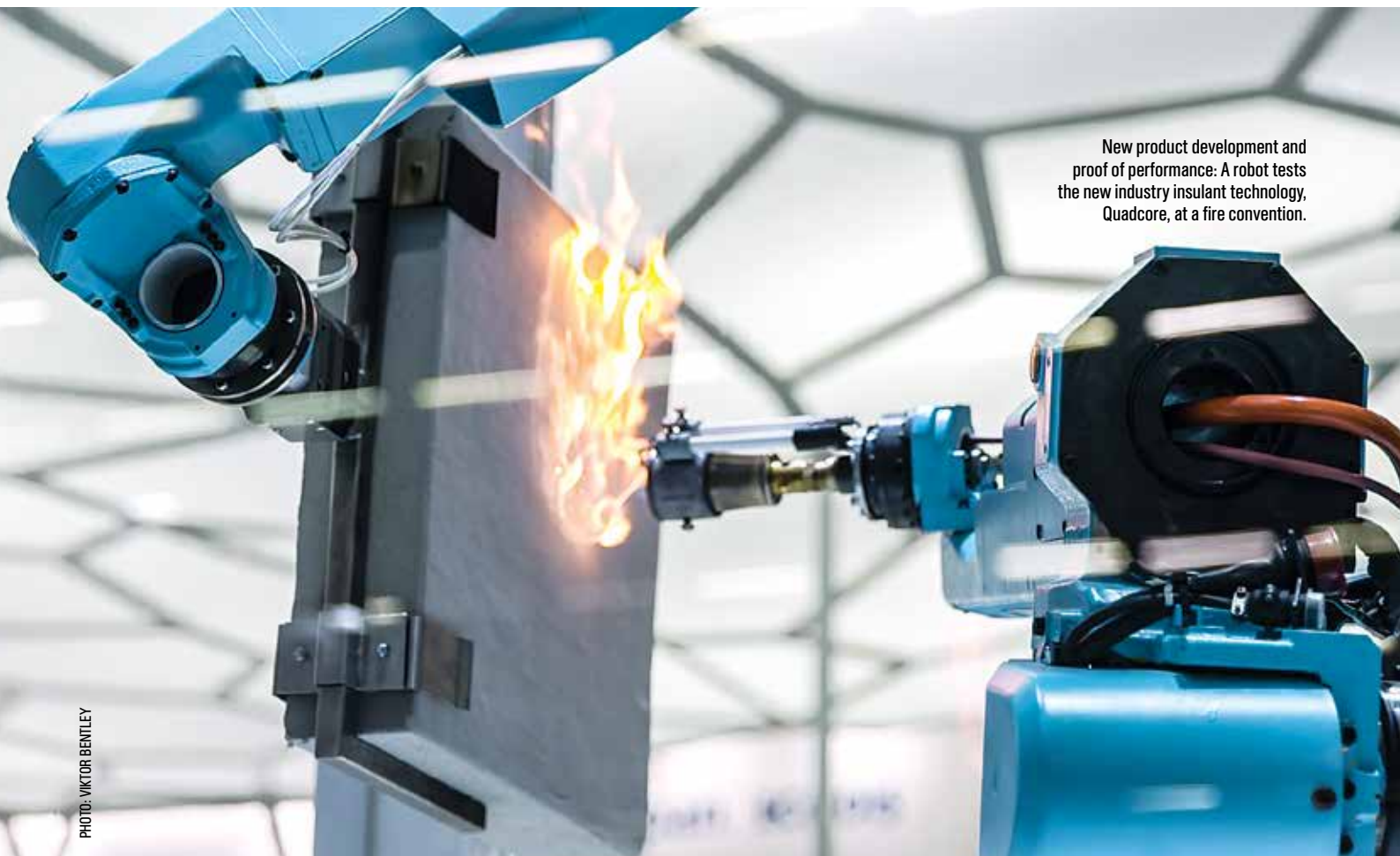
Another key focus of AFAC's national approach to climate change is to

integrate research findings into policy and practice. By supporting an evidence-based approach to adaptation planning, the emergency management sector can address current gaps and better develop research utilisation capability through its partnerships with the Bushfire and Natural Hazards CRC and other researchers. The AFAC Collaboration Model provides an established network for the sector to take part in inter-agency learning, enhance climate change adaptation initiatives and continually improve their adaptation practice.

It is critical that fire and emergency management agencies adopt a collaborative approach to properly address the scope and complexity of climate change. Working collectively to initiate change, both within the sector and beyond, ensures better outcomes for AFAC members, affiliates and the communities they serve. ■

**The Climate Change and Emergency Management discussion paper is available on the AFAC website:**  
[tinyurl.com/AFAC-climate-change](http://tinyurl.com/AFAC-climate-change)





New product development and proof of performance: A robot tests the new industry insulant technology, Quadcore, at a fire convention.

PHOTO: VIKTOR BENTLEY

# THE NEW AS 5113 STANDARD FROM A PRODUCT MANUFACTURER'S VIEWPOINT

From a holistic building risk perspective, the choice of cladding material on high-rise buildings is a critical issue.

BY **MARK TATAM**

Building Technology Director,  
Kingspan Insulated Panels Australia

**C**ladding material can, in some cases, be a dominant factor impacting life safety risks to occupants, fire services and the general public.

This brings into sharp focus the importance of using the right materials at the start of a build, and ensuring that you carefully consider the quality and type of materials used. Poor material specification can diminish the ability of fire services to manage and control fires in high-rise buildings.

## The changing landscape

Performance requirements for building products often span multiple areas. As a result, testing standards and regulatory requirements change as national building codes adapt to emerging technology and building practices, while also meeting community expectations.

Small-scale product testing to evaluate fire performance of single products (or parts of products) is no longer recognised as providing an accurate representation of system performance. The only way to



The large-scale test BS 8414 has been adopted in the new Australian standard (AS 5113) as a means of testing building facade systems.

PHOTO: KINGSPAN

### Large-scale fire testing is crucial

Essentially, all facade systems have some combustible components. So, small-scale, non-combustibility tests on parts of a system cannot always reliably predict the large-scale performance of the whole system.

Large-scale testing involves a significant area of material being subjected to the flames and heat of a substantial fire that is allowed to burn for a specific length of time. This permits a more realistic evaluation of the performance of cladding materials and their fixing and joint systems.

For product manufacturers, facade testing to AS 5113 provides market reassurance that external cladding systems have passed large-scale fire testing conditions, and can be used with confidence.

### Routes to compliance

To help architects, building designers and specifiers choose the right materials, the National Construction Code (NCC) has two different levels of certification: deemed-to-satisfy (DtS) and performance-based solutions, or a combination of both.

◆ **DtS** solutions follow a set recipe, using the solutions prescribed by the NCC. These include materials, components, design factors and construction methods which, if used, are deemed to meet the performance requirements. However, with shifting market demands, it becomes impractical to continually massage this prescriptive code to keep it current. Solutions do not always meet the requisite performance requirements of the NCC or can result in higher cost outcomes.

◆ **Performance-based** solutions do not need to follow prescriptive methods or use particular components or materials, as long as they can be shown to meet the performance requirements of the building code. This opens up a wide range of new possibilities, while still delivering a fire safety outcome that meets or exceeds that of a DtS solution.

While many in the building design and construction industry are yet to fully embrace the new pathways to compliance, performance-based solutions are likely to become increasingly popular as large-scale testing becomes the norm in Australia.

really understand how a material will react in a fire is to conduct larger scale, system testing.

### New Australian Standard (AS 5113)

The Australian Standard AS 5113-2016, which is referenced in the Verification Method CV3 for Type A and B buildings, was recently developed on the premise that large-scale facade fire testing can provide a good indication of the fire propagation performance for wall claddings and assemblies.

This is important news for all building design and construction industry professionals.

As industry knowledge regarding the fire performance of facades expands, it is now understood that combinations of often low-risk products and small-scale product testing do not necessarily lead to overall safe performance outcomes.

AS 5113 integrates international standard test methods and knowledge where practicable, such as the established BS 8414 large-scale facade test. The Standard sets out procedures for testing as well as classification criteria for external wall systems, according to their tendency to limit the spread of fire across their surface.

While many in the building design and construction industry are yet to fully embrace the new pathways to compliance, performance-based solutions are likely to become increasingly popular as large-scale testing becomes the norm in Australia.

A performance-based solution is both more manageable and has well-known advantages over DtS, including:

◆ greater flexibility in selection of building products and system design



- ◆ more functional and attractive buildings
- ◆ potential cost savings through greater efficiencies in design and construction.

**The challenge for manufacturers**

Performance-based solutions require greater industry knowledge of the routes to compliance and the systems available to help all professionals achieve their required outcomes. While this can create challenges for manufacturers in terms of product development, a changing marketplace can help to stimulate new and innovative product designs.

Education about products, regulations and how to find pathways to compliance is a key component of a market that increasingly needs to work with performance-based solutions. Such solutions are building specific, and manufacturers need to demonstrate how they can meet performance requirements in individual cases.

It is therefore up to manufacturers and building professionals to identify innovative ways to solve design and construction issues. To ensure that the right products are used in the right application, manufacturers must provide

clear credentials for compliance. Evidence that products will perform as stated is also essential.

In a global marketplace with more products coming from overseas, manufacturers also need to adapt products to meet Australian building codes and standards. This is because internationally developed products may not meet localised testing and compliance credentials, and performance and product identification can be difficult to ascertain.

**Conclusion**

It is essential for those in the building and construction industry—including fire brigades and regulatory authorities—to ensure they have an up-to-date understanding of the different materials available for external cladding. This includes knowing which materials deliver the best fire safety performance.

Experience tells us that product manufacturers need to embrace a wider view of the building and construction process, and ensure market education is seen not just as a responsibility of the Australian Building Codes Board, but also of manufacturers.

When it comes to creating a safer built environment, all partners in the

building design and construction industry would benefit from the following:

- ◆ large-scale testing for all types of facade systems to determine the fire spread performance of any facade design
- ◆ supporting industry education on how performance solutions can meet compliance. It should be appreciated that the building industry does not have the resources to test every single product or system, and that all fire tests never exactly replicate all the details of a building design
- ◆ mandatory training of façade installers to help reduce the risk of good designs translating into poorly performing solutions
- ◆ commitment to fire safety practices throughout the design and construction process to ensure that the original design is constructed with greater transparency from all parties, including product manufacturers. This may include greater levels of site inspections and project interaction
- ◆ identification of products through labelling to assist with on-site tracking, and third-party certification or product validation increasing confidence in product proof of performance. ■



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# UNDERSTANDING THE DIVERSITY OF THOSE IN NEED

Understanding the diversity of people that fire and emergency personnel serve—and being inclusive of their needs—is changing the way some agencies are thinking about their operational requirements.

BY **COSTA HARITOS**

Bushfire and Natural Hazards CRC

Australia is often praised as one of the most multicultural countries on the planet. However, that diversity is not always reflected in the workplace.

Bushfire and Natural Hazards CRC researchers are working to better integrate Australia's diverse population and how diversity can be better managed and measured in agencies to help address this gap. The aim is to help create an inclusive workplace culture that will enhance decision-making and strategic thinking.

Celeste Young (Victoria University) leads the *Diversity and inclusion: building strength and capability* project, which began in July 2017.

"There's no one way to do diversity

and inclusion, but if you want it to be effective, you have to create an inclusive culture," Ms Young said.

The project has focused on the following three areas of interest:

- ◆ economics—the case for investment and the changing capabilities of emergency services
- ◆ community thinking—investigating community values and their attitudes and understandings of agencies by communities
- ◆ organisational change and culture—looking at barriers and enablers to diversity at an agency level.

One of the key challenges currently facing emergency services is the need to build resilience in communities. This fundamentally shifts the focus of organisations to working with communities, instead of for them.

Ms Young said that while the notion

of diversity is not new to the emergency services, effective diversity outcomes have been elusive.

"The services themselves are changing, their communities are changing, technology is changing, and the hazard is changing," she said. "This means that people are actually your greatest resource, so learning how to use the diversity of the people around you and being inclusive of them is now becoming a central part of the organisational agenda."

She said organisations felt the diversity discourse had become stuck and needed to be reframed so that it was not just counting heads, but more about effective practice and the longer term benefits.

## Diversity survey

Dr Craig Cormick (Out of the Box Consulting) conducted a survey that assessed the values of 539 randomly selected participants from Victoria, Queensland, South Australia and New South Wales. Dr Joanne Pyke (Victoria University) also undertook interviews with residents in Bordertown, South Australia; Parramatta, NSW; and Bendigo in Victoria as part of the community stream of the research.

Residents were prompted to answer questions on ten different values and attitudes towards topics such as gender, lifestyle, ethnicity and perceptions of emergency services. The survey design considered the participants':

- ◆ openness to change—attitudes towards equality and civic action
- ◆ self-transcendence values—attitudes towards diversity and concern for equality and rights
- ◆ conservation values—attitudes towards difference, change and diversity
- ◆ self-enhancement values—levels of prejudice and discrimination.

Agencies need to understand the diversity of people that they serve and become inclusive of their needs.



PHOTO: NSW STATE EMERGENCY SERVICE





The study found some strongly ingrained gender stereotypes among both men and women.

Twenty-seven percent of the total respondents agreed that men were more suited to frontline emergency response than women, and 50% agreed that when there is job insecurity, priority should be given to Australian-born people first. Respondents also commonly defined emergency management organisations as heroic, and primarily dominated by white males.

They also wanted to be more involved but felt what they had to offer was not always well understood.

"There is lot more work to do in this area to better understand who these diverse communities really are and the capabilities they can bring to the table, which is really important for communication and working partnerships," Ms Young said.

### Assessing agency diversity and inclusion

The organisational stream of the project examined and identified barriers, needs, opportunities and benefits in relation to diversity and inclusion across Queensland Fire and Emergency Services (QFES), Fire and Rescue NSW and SA State Emergency Service (SES).

Ms Young and her Victoria University colleague Professor Roger Jones have worked with the three organisations to determine how they respond to operational requirements, and how their diversity and inclusion is shaped by their current context, purpose and history.

Evidence from all three organisations suggests that while women and people from non-English speaking backgrounds are under-represented in most organisational areas, this is slowly improving.

QFES reported that, as of June 2017, 11.1% of senior officers were women. However, figures like these are expected to increase, with several policies and strategies underpinning the development of a more inclusive culture.

One of the policies enacted since the appointment of Commissioner Katarina Carroll in 2015 is the 'One QFES' vision, which aspires to create a culture which is inclusive of all forms of diversity. The organisation has also implemented a new human resources management system to recruit and retain a diverse workforce by tailoring to individual needs in a safe, secure and inclusive working environment. Part of this initiative is the QFES Transforms Through Leadership initiative, which places the organisation in a position for change by developing thought leaders and thinking about the future.

Fire and Rescue NSW is one of the world's largest urban fire and rescue services, with more than 13,000 employees and volunteers. To reflect the diverse population of Australia, the organisation has changed its recruitment process and has developed a program to support Indigenous firefighters. It has also created an adaptive leadership program for middle management and developed a policy to manage pregnant firefighters.

SA SES is primarily involved in volunteering, where diversity and inclusion has been more of an organic process because of the nature of existing informal structures. Policies and practices are currently in development, so a formal approach can be created that includes flexible volunteering models and a new recruitment campaign to target women.

**Understanding and measuring effective diversity and inclusion is a key focus for researchers.**

### Economic benefits

When it comes to the economic benefits of diversity and inclusion, the project is looking to see how diversity and inclusion can be better measured at an agency level.

Professor Bruce Rasmussen (Victoria University) has analysed the three organisations' changing capabilities over the last ten years. He found that organisations had diversified their services and had become more focused on their communities.

### End user benefits

Ms Young said the team's research aims to develop a framework to support management and measurement of diversity and inclusion so that service delivery is enhanced and organisational objectives are supported.

"We're undertaking end user-based research to generate this knowledge, with our stakeholders being very much a part of our research team," Ms Young said.

Heather Stuart from the NSW State Emergency Service is an end user for the project, and is pleased with the direction of the research.

"The project is addressing an area that presents significant challenges for the emergency management sector," Ms Stuart said.

End users affiliated with the project concluded that cultural change is the first step before changing any operational strategies.

Ms Young agrees with this sentiment and said that while the research is part of a huge area of organisational behaviour, it is important that it takes an integrated approach.

"The challenge for those working in emergency management is how to build skills and capability to transition their organisations in effective diversity and inclusion," she said.

Despite the challenges, end users like Heather Stuart think that end user engagement has been a key supporting factor on the project.

"With the release of the first of the findings from the research, I believe that the contributions this project will make to the sector will soon become evident," Ms Stuart said.

The project team hopes to develop a body of knowledge that can be used in decision-making systems across the emergency services. With the first phase complete, the researchers will continue to build the knowledge base with their stakeholders. ■

Find out more about this research at [www.bnhcrc.com.au/research/diversityinclusion](http://www.bnhcrc.com.au/research/diversityinclusion).





# REDUCING THE COSTS OF HAZARDS

The rising cost of natural hazards highlights the continuing need for collaboration across often siloed sectors.

BY **AMY MULDER**

Bushfire and Natural Hazards CRC

**W**ith natural hazards expected to increase in severity and frequency in coming years, the likelihood of disasters causing major economic damage increases too. The United Nations has disaster risk reduction firmly in its sight, which is why it designated 13 October as the International Day for Disaster Reduction (IDDR) in 1989 to celebrate progress made across the globe.

An Australian event hosted by the Bushfire and Natural Hazards CRC has been held on that date each year since 2014. 2018's public forum, held in Adelaide, was run in partnership with the South Australian Fire and Emergency Services Commission and the Australian Institute for Disaster Resilience, with support from the Commonwealth

Department of Home Affairs and SA Water. A diverse panel came together, speaking from academic, government and agency perspectives, to explore disaster risk reduction in relation to economic loss.

Chief Executive of the SA Fire and Emergency Services Commission Malcolm Jackman said that a significant number of small businesses close after the occurrence of a natural hazard and never re-open.

"One of the things that we have done as part of our disaster resilience strategy is really engage with business, particularly through South Australia, to try and get a shift in that," Mr Jackman explained. "Almost no small businesses have business continuity plans."

Mr Jackman said small business closures also have broader impacts, as the loss affects employees and their families, along with the community served.

Peta O'Donohue, Project Manager Partners in Bushfire Safety at the SA Country Fire Service, shared her experience business culture around natural hazards in South Australia. She stated that while a sense of togetherness was witnessed during local bushfires, a large winemaker had refused grapes from the region, even though they were grown outside the smoke taint area.

"There is a lack of shared responsibility for emergencies. And that means investment and ownership of risk," Ms O'Donohue said.

The economic losses from natural hazards reach far beyond small business. As the attention in the room was drawn to the 2016 SA statewide power outage, audience member Michael Arman further illustrated the costs of disaster. Mr Arman explained that while it may be easy for some to





PHOTO: CHRIS BASTIAN, COUNTRY FIRE SERVICE

dismiss losing a fridge full of food, it is not the case for particularly vulnerable members of the community.

"By virtue of illness or income, losing a fridge full of food for some people in the community will actually set them back for months at a time," Mr Arman said.

Elaborating further on the blackout was Frank Crisci, Manager of Emergency Management at SA Power Networks.

"It was a watershed event. Clearly the ingredients that went into the loss of power were something that may not have been contemplated," Mr Crisci said. "As a result of that, a lot of soul searching went in at the national level, in terms of the way the electricity grid is managed. A number of steps have been taken to make the grid more robust, and therefore avoid a similar event."

Mr Crisci explained that a lot had

PHOTO: AMY MULDER, BUSHFIRE AND NATURAL HAZARDS CRC



Natural hazards in SA were a key focus for the panel as they shared their insights on events such as the Sampson Flat fire in 2015.

been learned from that experience.

"Certainly, [much was learned] at a local level, especially in terms of keeping customers informed and restoration priorities. And at the national level we configure the network differently now for possibilities of weather being as extreme as they were on that day.

"The emergency brings our thinking together," he added, noting that without an imperative to change, the difficulty is to bring diverse views together when an emergency is not occurring.

Better integration is a key factor, and there has been a shift towards this, explained Jillian Edwards, Director of the National Resilience Taskforce at the Department of Home Affairs.

"Essentially, the responsibilities for mitigating risk step way outside the emergency management sector," Ms Edwards said. "So, we are introducing other sectors to this complex world that we have been occupying and inhabiting."

Urban planning is one aspect where collaborative progress has been made, explained Bushfire and Natural Hazards CRC research leader, Professor Alan March (University of Melbourne). However, challenges are faced around both existing settlements, and creating new areas for people to live in the future.

"We really have learnt a lot," Prof March said. "But at the same time, once we build a city or invest in a road or pipeline, you name it—there is a high level of permanence in these things. And that is why we really need to be careful about what we do.

"I think we have now a really progressive joining together of science,

practice and research, and indeed—the challenging bit—the regulatory components of that as well. But we have to deal with existing settlements as well as new settlements," Prof March said.

### Bringing it all together

While the focus of the forum was on the economic impacts of natural hazards, it is broader than just dollars and cents, explained CRC CEO Dr Richard Thornton.

"Disasters have a significant impact on people's lives and wellbeing," Dr Thornton said. "We are not immune to this in Australia, and as our population expands, more and more people are living, working and playing in areas that are at higher risk.

"We are in the bush with an increased risk of bushfire, we are by the coast and more exposed to storm surge, and we are on the floodplains susceptible to rising rivers. With climate change leading to more extreme weather conditions, this risk is only going to grow.

"Discussions like these are essential to realising the underestimated interconnectedness of our systems. We need to do more. We must do more."

The essence of the discussions was captured by facilitator Dr John Bates, Research Director at the CRC. When summing up the forum, he asked panellists and audience members: "When the emergency is over, what happens when we all go home?" ■

Watch a short video summing up the forum, as well as the full session, at <https://www.bnhcrc.com.au/news/hazard-channel>.

# PERSPECTIVES ON THE SECTOR WITH RHYS JONES

**STUART ELLIS AM**

Chief Executive Officer, AFAC



In this regular series, AFAC CEO Stuart Ellis interviews a senior AFAC leader for each issue of *Fire Australia*. This issue he caught up with Rhys Jones, CEO of Fire and Emergency New Zealand.

**You came into your appointment as CEO of Fire and Emergency New Zealand (FENZ) from Chief of the NZ Defence Force, from one strong culture to another. Was this advantageous, a problem, or irrelevant?**

Defence forces and fire and emergency organisations have a lot in common. However, the ultimate similarity is that they are both people-focused organisations. They get things done by having the right people in the right roles, and by building strong trust and understanding between all layers of leadership. My understanding of those cultural drivers made it easier for me to take over FENZ, and helped the organisation to accept me.

However, my credibility within FENZ was always going to hinge on being a credible leader in this new environment.

Getting out to meet, talk with, listen to and understand your people is essential in any organisation, but particularly in one with units as dispersed as fire brigades are.

**Why is FENZ a member of AFAC?**

Being a member of AFAC gives FENZ access to the collective knowledge of around 40 emergency response agencies. Shared lessons learned, research and procurement programs, access to project information and joint operational and training standards are immeasurable benefits to a small country like New Zealand.

There are also intangible benefits from benchmarking our capabilities with other organisations. Joining competitions, such as road rescue, ensures our skills remain world class. Attending courses with other AFAC students allows us to form effective, multinational teams quickly with people we know when we deploy to assist other countries.

In my 18 months in the role, I have found all AFAC member organisations willing to provide any assistance that is requested. I am glad that FENZ is part of this great network.

**FENZ has commenced an ambitious reform program bringing together fire services in New Zealand. How is this progressing and what are the key outcomes?**

FENZ was formed to create a stronger emergency response organisation that can be a more influential player in all emergencies, large or small. Our first task is merging the rural and urban organisations into one, while retaining the specific and valued skills of our career and volunteer staff, our civilians, our partner agencies and the helpers from our communities.

This is a big change, and it's a people-change process as much as a structural change. Because of that, we have used a co-design approach involving all layers of the organisation.

Rhys Jones says meeting, talking and listening to his people is an important part of his role as CEO of Fire and Emergency New Zealand.



PHOTO: FIRE AND EMERGENCY NEW ZEALAND

“Being a member of AFAC gives FENZ access to the collective knowledge of around 40 emergency response agencies.”

— Rhys Jones



Fire and  
Emergency  
New Zealand  
CEO Rhys  
Jones.



PHOTO: FIRE AND EMERGENCY NEW ZEALAND

While slower, this process ensures our people can own the solution. We are progressing well and have learned many lessons along the way.

### **You were recently appointed to the AFAC Board. What do you see as the role of AFAC in assisting individual agencies?**

Few AFAC members are capable of coping alone with the challenge of maintaining effectiveness, and all benefit from having access to the wider group of members. Core roles of the Board and Council include ensuring agencies have access to research about developing risks, technologies and social issues; can seek support from experts outside their organisations; and have individual agency issues recognised and supported by the wider AFAC community.

Therefore, important Board members' duties are to ensure AFAC is investing in relevant research, putting training and processes in place that allow support to be given and taken, and creating a respectful forum where issues from all parties can be raised and resolved.

### **What are your interests outside FENZ?**

I have a strong interest in history, particularly military history. I also enjoy travelling, both to visit historical places of interest and because of my additional love of geography. I love flying and

driving, so that I can see the landscape and understand how the land was formed by volcanic or tectonic activity and shaped by wind and water. My children are well beyond listening to me giving narratives of either the history or the geography of places that we are travelling through.

### **What do you see as the greatest challenges for the fire and emergency sector overall?**

In Australasia, I think that we face two big challenges: the increasing range of responsibilities we face, and reflecting our changing communities.

We are no longer just fire specialists that do other things. We are now

emergency responders who specialise in fire plus a much wider range of emergencies. From an extending wildfire season to increased numbers of bad weather events and responsibility for medical and motor vehicle accident responses, our agencies must be proficient in an ever-widening set of skills.

Secondly, we all need to ensure that we remain reflective of the changing ethnicities of our communities and bring greater diversity into our organisations. Different experiences, technical and social skills, and perspectives all contribute to our challenge of solving the wider range of problems we face—a challenge we must take. ■

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**“We are no longer just fire specialists that do other things. We are now emergency responders who specialise in fire plus a much wider range of emergencies. From an extending wildfire season to increased numbers of bad weather events and responsibility for medical and motor vehicle accident responses, our agencies must be proficient in an ever-widening set of skills.”**

— Rhys Jones



Left: The L'Innovation fire is the biggest department store fire on record worldwide.



A shopper jumps to escape the inferno, with many others forced to jump to their deaths before emergency teams arrived.



The destructive fire spread quickly through the store's decorative displays and flammable partitions.

According to the FPA Australia publication *Fire: a century of automatic sprinkler protection in Australia and New Zealand 1886–1986*, 531 fires were recorded in department stores during this period in the two countries. Of those, 527 (99%) were controlled by sprinklers, with the average number of sprinklers operated being 2.75. There was no recorded loss of life.

## L'INNOVATION DEPARTMENT STORE FIRE, BRUSSELS—1967

BY **BARRY LEE OAM**

A 1967 fire in the L'Innovation department store, located on the fashionable Rue Neuve in Brussels, became Belgium's greatest catastrophe since a coal mine tragedy in Marcinelle.

The L'Innovation store was a five-storey Art Nouveau structure. It incorporated an atrium open to all floors, and topped with a glass dome skylight. The fire remains the deadliest in Belgian history—and the biggest department store fire on record.

It all began on Monday 22 May 1967, with more than 1,000 people in the building. The store was having a special 'American Week' and a great deal of highly flammable display and decoration materials filled the huge unenclosed expanse of the sales area under the glass dome of the central light well.

Around 1.30 pm, a small fire was detected on the first floor. The nearest fire station received an alarm call at

1.34 pm, and by 1.36 pm the first appliance's crew were on their way, less than 1.5 kilometres from the store, when they saw a large pall of smoke and called for further response.

When the first appliances reached the store at 1.38 pm, about a hundred people were hanging in bunches on the facade of four floors, or balancing on the narrow cornice near the top. At least another hundred kept appearing and disappearing at windows screaming for help, and the street below was littered with the bodies of those who had lost their balance or had been forced by the flames to jump.

This was just four minutes after the fire brigade had been alerted, and only ten minutes or so before the massacre and threat of even bigger disaster were already accomplished facts.

At 1.45 pm, the glass dome shattered. At 1.50 pm, the building was engulfed by fire—and nobody still inside had a chance to survive. Two hours later, unprotected steel columns failed on the

ground floor and the massive concrete and steel structure collapsed. The entire one hectare of L'Innovation was burning. Flames jumped across Rue du Damier, the crammed street at the back, and caused a large secondary fire in the building opposite.

The fire cost 350 people their lives. Another 166 were seriously injured, with a further 50 suffering minor injuries.

The cause of the fire is unknown, but it is clear that, apart from the significant delay in calling the fire service, confusion and unpreparedness, the main factor in the holocaust was the extraordinarily swift progress of the flames. Decorative displays, false ceilings, flammable partitions and numerous storage cubicles all contributed to the rapid flame spread. Large quantities of synthetic materials produced vast volumes of dense, black, toxic smoke and flammable gases. There were no automatic sprinklers to hold the fire in check.

None of the lessons cited after the fire were new in any way. ■



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BY **IAN FINDLAY**

Technical Coordinator, FPA Australia

## STANDARDS AUSTRALIA

### **CE-030 Maritime structures**

Work on AS 3962 (Marinas) is progressing towards a final draft to go to public comment.

### **FP-002 Fire detection and alarm systems**

As noted previously, publication of the AS 1670.1, AS 1670.3 and AS 1670.4 revisions were approved but delayed to December 2018 to allow time for adoption of updated direct text and modified adoptions of ISO standards and other referenced standards, including AS 7240.6, AS ISO 7240.17 and those standards listed below.

Public comment has now closed on the adoptions of updated ISO 7240 parts 1, 5, 8, 10, 11, 18 and 24; modified adoptions of updated ISO 7240 parts 2, 4, 7, 12, 15, 22 and 27; and revisions of AS 1603.11, AS 1603.13 and AS 4428.16.

Amendment 2 to AS 3786 was published on 30 October.

### **FP-003 Fire extinguishers**

Work continues on project proposals for priorities AS 2444 and AS/NZS 1850.

### **FP-004 Automatic fire sprinkler installations**

Work on Amendment 2 to AS 2118.1:2017 is progressing towards a final draft to go to public comment. The FPA Australia project proposal for revision of AS 2118.6 has been approved, with the project to kick off in 2019.

### **FP-008 Fire pumps and tanks**

AS 2304 (Tanks) has gone to ballot for publication.

### **FP-009 Fire hydrant installations**

The project kick-off meeting for AS 2419.4 (new standard for STORZ connections, to standardise requirements across Australia) was held in late November.

### **FP-018 Fire safety**

AS 1530.8.1:2018 was published on 30 October and AS 1530.8.2:2018 was published on 8 November.

### **FP-020 Construction in bushfire-prone areas**

AS 3959:2018 was published on 13 November.

### **LG-007 Emergency lighting in buildings**

AS/NZS 2293.2 is now at pre-publication stage.

## TECHNICAL ADVISORY COMMITTEES

The most recent round of Technical Advisory Committee (TAC) meetings was held in November.

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

The draft technical documents on replacement of detection devices, fire doors and exit doors, and external barriers to evacuation were reviewed, with the fire doors document to be expanded.

### **TAC/2 Fire detection and alarm systems**

Discussion was held on a possible technical document to address confusion regarding fire detection and alarm systems for carparks. A technical document on alarm-signalling equipment connection requirements (Victoria) was published 22 October.

### **TAC/3/7 Portable and mobile equipment**

The TAC discussed, among other items, the disposal and recycling of dry chemical powder extinguishers.

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

The TAC discussed the ongoing impact from changes to Regulation 164B of the NSW Environmental Planning &

Assessment Regulation as part of the NSW reforms. Pathways into sprinkler system and hydrant system design and certification (as well as FPAS accreditation for these) were also discussed. NCC 2019, Standards Australia (FP-004, FP-008, FP-009) projects and standards interpretation issues were discussed. Technical queries submitted to FPA Australia were raised, with improvements suggested, and conflicts were considered, highlighting areas where further improvement may be possible with associated actions from the committee. Various technical documents (including pumpset checklists and hydrant commissioning and service) are progressing.

### **TAC/11/22 Special hazards fire protection systems**

Discussions on current versions of AS 3772 and AS 5062 resulted in actions to prepare associated project proposals. Work on updating IB-06 was discussed to reflect current developments in firefighting foams (e.g. new testing, remediation, international developments). Work has begun on a possible Technical Advisory Note on foam cleanout (i.e. cleaning out stores/systems so that new foam can be used in the system).

### **TAC/17 Emergency planning**

TAC/17 reviewed outstanding technical documents as well as Standards Australia and industry developments.

### **TAC/18/19 Passive fire protection**

TAC/18/19 reviewed outstanding actions and technical documents, as well as Standards Australia, National Construction Code and industry developments; particularly certification of passive fire protection installations.

### **TAC/20 Bushfire safety**

The TAC reviewed outstanding technical documents, as well as Standards Australia and industry developments.



## EMERGENCY PLANNING SEMINAR SERIES

**March and April 2019, all state and territory capitals**

Following the two amendments to the AS 3745, which were published in July 2018, FPA Australia is running a new national seminar series on emergency planning.

This important seminar will provide detailed information on the AS 3745 amendments, as well as addressing how competent development of emergency plans and emergency and/or evacuation procedures help protect all occupants and visitors in facilities.

For more information, visit:  
[fpaaust.eventsair.com/as3745-2018](http://fpaaust.eventsair.com/as3745-2018).

PHOTO: FPA AUSTRALIA



## FIRE AND FUELS CONFERENCE 2019

**29 April – 3 May 2019, International Convention Centre Sydney, and Albuquerque, US, and Marseille, France**

The International Association of Wildland Fire, with support from the Bushfire and Natural Hazards CRC, NSW Rural Fire Service and the Bureau of Meteorology will host the 6<sup>th</sup> International Fire Behaviour and Fuels Conference, held concurrently in Albuquerque, Marseille and Sydney from 19 April to 3 May 2019. Keynotes will be live streamed between locations. Sydney's keynotes are Prof Jeremy Russell-Smith on fire ecology and community resilience across the northern savannas, Dr Neil Burrows on prescribed burning lessons from Western Australia and Anne Leadbeater on community recovery.

For more information, visit:  
[www.bnhcrc.com.au/events/2019-fireandfuels](http://www.bnhcrc.com.au/events/2019-fireandfuels).

## NATIONAL MEMORIAL SERVICE

**1 May 2019, Canberra**

AFAC will hold a National Memorial Service for fire and emergency service personnel, honouring the courage and sacrifice of those who have died in the line of duty.

For more information, visit:  
[memorial.afac.com.au](http://memorial.afac.com.au).

## FIRE AUSTRALIA CONFERENCE & TRADESHOW 2019

**14–16 May 2019, Melbourne Convention and Exhibition Centre**  
 Fire Australia is the largest dedicated fire protection industry event in Australasia. It provides a platform for information exchange, showcasing new services and technology and providing solutions to the challenges facing the industry.

For more information, visit:  
[www.fireaustralia.com.au](http://www.fireaustralia.com.au).

## 12<sup>TH</sup> AUSTRALASIAN NATURAL HAZARDS MANAGEMENT CONFERENCE

**17–19 June 2019, Canberra**

The 12<sup>th</sup> Australasian Natural Hazards Management Conference will stretch your thinking on what is possible and what needs to be done in natural hazards management. Delegates will help develop a strategic view on whether research and formal reviews of natural hazards from around Australia, New Zealand and across the globe are providing the best knowledge to deal with the extreme hazards of our future. The program will explore the many and varied impacts of major natural hazards. This conference is hosted by the Bushfire and Natural Hazards CRC.

For more information, visit:  
[www.bnhcrc.com.au/events/2019-anhmc](http://www.bnhcrc.com.au/events/2019-anhmc).

The Fire Australia Tradeshow is a must-see for conference goers.

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## David Willing

David Willing has been appointed Executive Director of the Northern Territory Fire, Rescue and Emergency Services (NTFRS). Mr Willing was the NT Emergency Recovery Coordinator following tropical cyclone *Carlos* and has represented the territory on numerous national committees, including the National Crisis Committee and the Australian and New Zealand Emergency Management Committee. Mr Willing previously served in the Royal Australian Navy and the Australian Public Service in Alice Springs.



## Mark Spain

Before Mr Willing's appointment, Mark Spain filled the role as Acting Executive Director during this period of transition for NTFRS. Mr Spain brought more than 30 years of firefighting experience to the role and has now returned to his position of Chief Fire Officer/Director, NTFRS.



## Rhys Jones

Chief Executive Officer, Fire and Emergency New Zealand, Rhys Jones has been appointed to the AFAC Board following the AFAC National Council meeting in October 2018. Mr Jones has headed the recently amalgamated Fire and Emergency New Zealand since May 2017 and was appointed to oversee the integration of the country's urban and rural fire services. Previously, Mr Jones was the New Zealand Defence Force Chief; he has more than 35 years of army experience.



## Jason Foster

Jason Foster is a member of the AFAC National Council representing the Parks and Wildlife Service, Department of Biodiversity, Conservation and Attractions, WA. Mr Foster has stepped into the position of Acting Executive Director Regional and Fire Management Services.



## Chris Arnol

Chief Officer, Tasmania Fire Service  
Chris Arnol has been appointed to the AFAC Board following the October AFAC National Council meeting. Mr Arnol has been the Chief Officer of the Tasmania Fire Service since March 2016 and is an emergency management specialist with more than 30 years of experience. Mr Arnol is passionate about climate change mitigation and adaptation and is a talented portraiture artist.



## Paul Smith

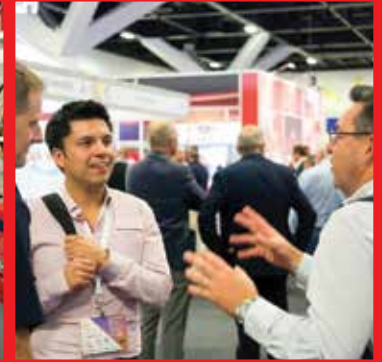
Dr Paul Smith has been appointed to the Board of the Bushfire and Natural Hazards CRC. Dr Smith has been the Chief Executive Officer of CFA Victoria since February 2018 and has previously held high level positions within the Victorian Government. Dr Smith replaces Craig Lapsley, who left the CRC Board in August 2018.



# FIRE AUSTRALIA

## CONFERENCE & TRADESHOW 2019

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14 - 16 MAY 2019



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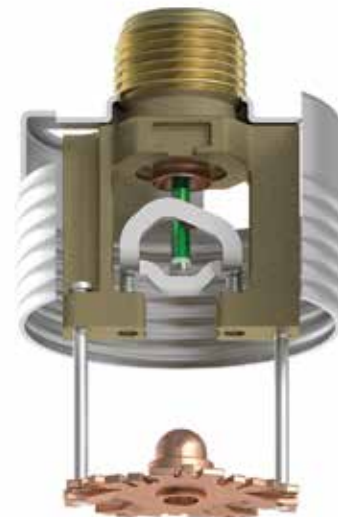
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## Residential | Freedom® VK494 Flat Plate Concealed Pendent Sprinkler

The new Freedom® Model VK494 is Viking's next generation residential concealed pendent sprinkler, featuring "ultra-fast" glass bulb technology. The 4.9 K-factor sprinkler is the first residential concealed sprinkler with the same cULus Listed flow rates for both ordinary and intermediate temperature ratings. As a result, you can now standardize on an intermediate temperature-rated sprinkler without sacrificing either performance or aesthetics.

Rated for ambient temperatures up to 150°F, the intermediate temperature VK494 model offers greater flexibility when positioning sprinklers around potential heat sources.

- Flat plate concealed design with a nearly unlimited variety of custom color finishes, for a smooth ceiling look that doesn't compromise aesthetics.
- Available in both ordinary (155°F) and intermediate (200°F) temperature ratings.
- Minimum achievable flow rates for 16' x 16', 18' x 18', and 20' x 20' coverage areas at both temperature ratings (0.05 gpm/sq. ft. density requirements).
- Because VK494 ordinary and intermediate temperature flow rates are identical, you can standardize on the intermediate temperature models, simplifying inventory and reducing job site confusion.

**Model Number:** VK494

**Base Part Number:** 20759

**Listings/Approvals:** cULus

**K-factor:** 4.9 (70.6)

**Connection:** 1/2" NPT

**Temperature:** 155°F (68°C)  
200°F (93°C)

**Operating Element:** Glass bulb

**Finish:** Brass

**Technical Datasheet:** F\_012116

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