ISSUE FOUR 2019

FIRE AUSTRALIA

Bushfire modelling boost

New research on spot fires will lead to better bushfire predictions

Fire hazard properties of internal wall and ceiling linings

AFAC19 rides the wave of change

Women thriving in fire

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Pertronic Industries congratulate WestConnex on the successful completion of the M4 East motorway.

One of the Pertronic 28U weatherproof F220 fire indicator panels supplied for Sydney's M4 East motorway tunnels.

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IMPACTS OF RESEARCH

DR RICHARD THORNTON
Chief Executive Officer, Bushfire and Natural Hazards CRC

"Utilisation is everything"—this was the catchcry of the Bushfire and Natural Hazards CRC former Chair, the late Dr Laurie Hammond. Dr Hammond said this from day one of the CRC, and he was spot on. His words resonate now, more than ever, with only two years left of our current funding period.

Many CRCs, particularly in the public benefit arena, only start to see the impacts of their research many years after they began. Indeed, the original economic model for this CRC did not anticipate usage at any scale until the end of our funding period. However, it is now clear that most of our projects have already seen extensive adoption and use. Utilisation is the focus, and clearly, we are having an impact.

At this point it is worth reiterating that the Bushfire and Natural Hazards CRC—like all CRCs—is a collaboration between researchers and end users. Ours is a network of people working towards a common goal of increasing the disaster resilience of Australia and New Zealand, and reducing the economic, social and environmental impacts of hazard events. When we talk about the success of the CRC, we are not just referring to the researchers—we mean the whole CRC, researchers and end users alike, as neither could manage this without the other.

So, where are we having an impact? The CRC was recently given a major national innovation award for its work on emergency warnings, which you can read about on page 4. We also won three awards at this year's Emergency Media and Public Affairs conference for our research on communications. The *Australian Seasonal Bushfire Outlook* is covered on page 12, while on page 30 you'll find the latest fire behaviour research, which highlights the role pyroconvective interactions and spot fires play in the spread of bushfires.

If use of research is the main game for us, the scoreboard is looking good as we enter the final quarter.

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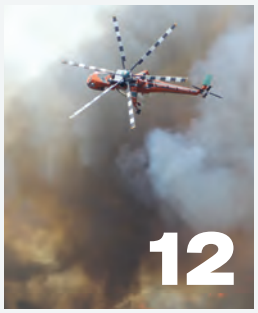

IN THIS ISSUE

REGULAR FEATURES

OUR COVER

A helicopter drops water on the Peregian Springs fire on Queensland's Sunshine Coast in September 2019. PHOTO: QUEENSLAND FIRE AND EMERGENCY SERVICES

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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NATIONAL AWARD FOR WARNINGS RESEARCH

Australian lives are being saved by Bushfire and Natural Hazards CRC research—and this has been recognised with the CRC receiving multiple awards for science impact, innovation and communication.

The insights from researchers at the Queensland University of Technology and Macquarie University were nationally recognised with the Cooperative Research Centres Association's premier award, the Excellence in Innovation award, presented in May at the CRC Association's annual conference in Adelaide.

Led by Professor Vivienne Tippett (Queensland University of Technology) and Dr Katharine Haynes (Macquarie University and the University of Wollongong), the collaborative research groups have combined to equip emergency service agencies around Australia with better-targeted long-term public safety campaigns, as well as evidence-based warning messages delivered to at-risk populations in the face of imminent natural hazard threats.

CRC research has also been awarded at the Emergency Media and Public Affairs conference in June, with Dr Josh Whittaker from the University of Wollongong receiving the Excellence in Research award for CRC research into community preparedness and responses by affected communities following the 2017 fires in NSW, conducted at the request of the New South Wales Rural Fire Service.

At the same conference, research on conflicting cues and how they impact emergency warnings won the highly commended award. Led by Dr Paula Dootson from Queensland University of Technology, this research is the first to offer empirical evidence of how environmental, social and media cues can affect how people respond to emergency warnings.

PHOTO: CRC ASSOCIATION

L to R — Professor Vivienne Tippett; Bushfire and Natural Hazards CRC Chair Dr Katherine Woodthorpe; Dr Katharine Haynes; AFAC CEO Stuart Ellis; and Chair of the CRC Advisory Committee Kylie Sproston at the Cooperative Research Centres Association conference.

A collaborative article between Liam Mannix, science journalist with *The Age*, and CRC researchers Dr Whittaker and Dr Haynes, was also recognised with the judges' choice award. The article looked at research into bushfire warnings, highlighting that while the message may have changed since Black Saturday, people are still choosing to stay even when they are advised to leave.

CEO of the Bushfire and Natural Hazards CRC, Dr Richard Thornton, said the acknowledgment from both the CRC Association and the Emergency Media and Public Affairs conference showed that the value of research was recognised by the emergency management sector.

"The strength of the Bushfire and Natural Hazards CRC is in our collaboration—and these research projects are excellent examples of why this works. Having emergency services engaged every step of the way with our research teams ensures that the research is shaped and directed at important stages, and ultimately, put to use at the end," Dr Thornton said. ■

WA ANNOUNCES BUSHFIRE REFORMS

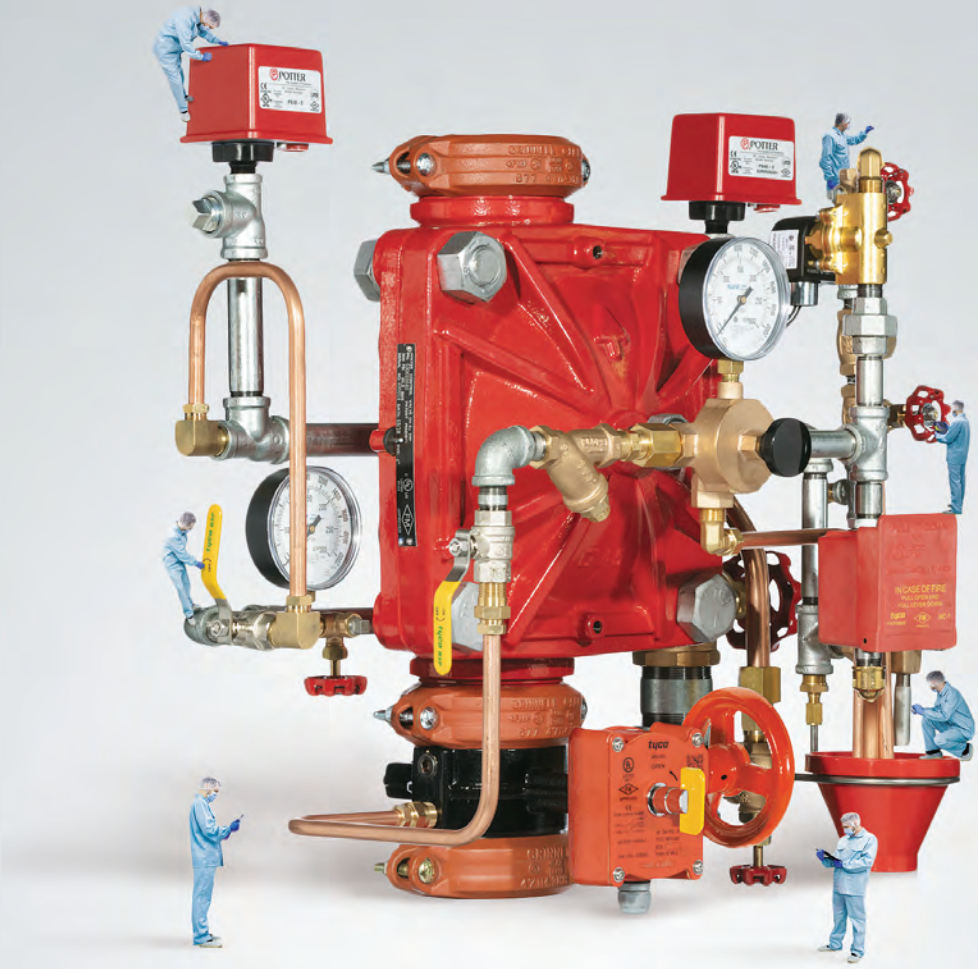
The Western Australian Government has announced a three-stage plan to improve the state's bushfire policy framework, including the 'Map of Bush Fire Prone Areas'.

Fire Protection Association Australia (FPA Australia) made a detailed submission to the WA Government on bushfire reforms in 2017, and the announcements made in July are aligned with some of the submission, however the Association believes further reform is still required.

FPA Australia continues to work closely with the Department of Planning, Lands and Heritage to identify areas that require reforms and provide guidance on their implementation. This is done via the Association's Bushfire Working Group and through regular meetings with the Department.

The Association will continue to work closely with all stakeholders to take advantage of any reforms to bushfire policies to help remove bottlenecks and improve the application of the policy.

This includes advocating for a mandatory requirement to engage the services of a Bushfire Planning and Design-accredited practitioner to prepare a Bushfire Attack Level Assessment or a Bushfire Management Plan. FPA Australia has raised this issue with the Minister, who has advised the Association that they will consider doing so as part of the package of reforms. ■



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MALE CHAMPIONS OF CHANGE TACKLE THE TOUGH ISSUES

The Male Champions of Change Fire and Emergency Group met in Melbourne in July to discuss two very different, but important, topics—sexual harassment and women's inclusion and talent development within the fire and emergency services sector.

The meeting was led by Group Chair and Victorian Equal Opportunity and Human Rights Commissioner Kristen Hilton, and there was considered conversation around workplace sexual harassment. The group agreed to support a public statement about its collective desire to shift workplace systems around the issue of sexual harassment and its management. A special guest at the meeting shared thoughts about addressing the issue, including a prevention approach using early intervention. The meeting's second topic of conversation centred on talent development, and the group focused on pursuing gender balance by identifying and developing talent within, and available to, the sector.

AFAC offered several talent development opportunities, including membership on its collaboration groups.

The meeting agreed to commit to 40% female participation across several areas including AFAC collaboration groups, the Senior Officer Cohort, the Strategic Command Program and the Executive Forum. The group acknowledged the changes that are required to ensure the commitment is met.

The group also supported developing and trialling a 'Sponsorship for Talent' program. AFAC and the Male Champions of Change team will facilitate the development of the program, working with the implementation leaders to launch it in 2020 as a flagship initiative of the group. ■

PHOTO: AFAC

The Male Champions of Change met in Melbourne to continue their conversation around the inclusion and development of women in the fire and emergency services sector.

CRC PhD student Avianto Amri.

PHOTO: AVIANTO AMRI

WINNING AT DISASTER PREPAREDNESS

Vital disaster education for children is primarily designed for delivery in schools, but Bushfire and Natural Hazards CRC PhD student Avianto Amri's research has produced a new board game, PREDIKT, to empower children at home.

"PREDIKT provides the ammunition for teachers and parents to play and learn about disaster preparedness with children, in a fun and interactive way. It's not just the children learning: we've found that parents and teachers are challenged by the children, as their curiosity drives them to ask more questions related to disaster preparedness," said Avianto, who recently submitted his PhD with Macquarie University.

Initial results have shown that the education intervention is successful in motivating parents to discuss householder preparedness with their children. The resource, which is cheap and scalable, is currently being used by agencies and practitioners across Australia, Indonesia, Malaysia and Thailand.

The game forms part of a broader toolkit, which includes worksheets, templates, tips and preparedness items for multiple hazard types, to further strengthen disaster preparedness through interactive learning. ■

Collaboration between governments and agencies explored in new handbook

A reviewed handbook detailling Australia's emergency management arrangements is available on the Australian Disaster Resilience Knowledge Hub.

The handbook draws on Australia's contemporary emergency management arrangements to complement and build upon the capability and knowledge of organisations and individuals across the emergency management sector in Australia.

Recovery Coordinator and Former Chief Officer of Victoria's Country Fire Authority Euan Ferguson AFSM was engaged as the content writer for the handbook. It provides multidisciplinary references from a range of experts.

Under Australia's current constitutional arrangements, state and territory governments have primary responsibility for emergency management within their jurisdiction. However, all levels of government acknowledge the severe and widespread nature of some emergencies, which could exceed the capability of a single state or territory. *Australian Emergency Management Arrangements Handbook* brings together the efforts of governments at all levels, and private and volunteer agencies to deliver a joint approach to emergency management across all natural hazards. ■

To download *Australian Emergency Management Arrangements Handbook* please visit www.bit.ly/2MCJ0Az.

SAFETY AND RESILIENCE IN THE PACIFIC

PHOTO: AFAC

Assistant Chief Officer MFB Barry Gray presenting to PIFESA delegates.

In Nadi, Fiji, The Pacific Community (SPC) hosted the annual general meetings for the Building Safety and Resilience in the Pacific (BSRP), the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), and the Pacific Islands Emergency Management Alliance (PIEMA) projects in July.

As a strategic partner of PIEMA, AFAC, along with member Pacific Island Liaison Officer delegates, were invited to participate.

The Pacific Islands Fire and Emergency Services Association (PIFESA) discussed its future development and establishment as a 'community of practice' to support sharing ideas, to collaborate and to provide a collective voice to contribute to the PIEMA Program.

The PIEMA Program's 2019 priority is to develop Emergency Management Roadmaps (EMRs) for Pacific Island Countries and Territories (PICTs). These were formerly known as Strategic Roadmaps for Emergency Management (SREMs), and the Whitelum Group has been engaged by the Department of Foreign Affairs and Trade (DFAT) to support the PIEMA Program Management Team to conduct in-country needs analysis and deliver the new EMRs, beginning with the Solomon Islands, Vanuatu and Tonga. The PIEMA team is taking a critical view of how relevant the EMRs will be, and how they sit within and alongside national disaster and emergency management policy and legislation. An integral part of the development of these roadmaps is to ensure AFAC member agencies with existing partnerships in the Pacific are supporting their partner agencies to participate in the process and to identify national emergency management priorities within the roadmaps.

PIEMA is taking a formalised training framework approach to establish professional development pathways for National Disaster Management Offices, police and fire and emergency services, and for working through registered training organisations and training architecture in the Pacific. It was noted the three to five-year training framework, developed by the South Australian Country Fire Service for Kiribati's fire and emergency services, is an example of a good practice approach.

There was the opportunity to hear from keynote speaker, Mileta Seniroqa, who is the acting CEO for the National Fire Authority in Fiji. She provided a positive insight into her own personal journey and the work being done through the PIEMA Program to improve gender equality in fire and emergency services in the Pacific.

Overall, AFAC can be optimistic that through the PIEMA Program, there will be frameworks established with long-term identified priorities in the national EMRs for PICTs, which AFAC member agencies can utilise to prioritise capability development programs for their twin partners in the Pacific. These roadmaps offer substantiation for future activity, and the opportunity to enhance and strengthen a strategic partnership approach for AFAC and AFAC member engagement in the Pacific. ■

DISASTER RISK REDUCTION COLLECTION ONLINE

A new collection on the Australian Disaster Resilience Knowledge Hub is housing key resources from the National Resilience Taskforce to support policy and practice across Australia.

Natural hazards only lead to a 'disaster' if they intersect with an exposed and vulnerable society, which exceeds that society's capacity to cope. Therefore, investing in disaster risk reduction is a national, and global, priority to secure a safe, healthy and prosperous future for all.

These concepts have informed the Disaster Risk Reduction Collection, which is available online. The collection hosts key guidance material on disaster risk reduction, developed by the National Resilience Taskforce in the Department of Home Affairs.

Disaster risk reduction intends to prevent new, and reduce existing disaster risk, by strengthening the resilience of people, systems and approaches.

The dedicated collection includes resources including the *National Disaster Risk Reduction Framework; Profiling Australia's Vulnerability* and *Guidance for Strategic Decisions on Climate and Disaster Risk*. It also includes information to support Australia's commitment to the *Sendai Framework for Disaster Risk Reduction*, an initiative devised by the United Nations and endorsed by the General Assembly.

These documents outline the vision and goals for reducing Australia's disaster risk into the future. They include reflecting on the decision-making process across a range of sectors and the collective action required to enhance Australia's resilience towards natural hazards.

A visual representation of disaster resilience is also available through *The Disaster Mapper*, which showcases the vast natural hazards that Australia and its surrounding states have experienced since 1869. The interactive map contains event information on tsunamis, earthquakes, landslides, floods, cyclones and bushfires, as well as biosecurity and criminal and industrial disasters and events. ■

The collection is available through the Knowledge Hub, through the Australian Institute for Disaster Resilience. Visit www.bit.ly/2P4UkYr.

FORUM SHOWCASES REAL-LIFE BENEFITS OF SIMULATION

PHOTO: AFAC

The AFAC Simulation Forum was well attended by those eager to explore the new frontier of technological possibilities available to the fire and emergency services.

The AFAC Simulation Forum held in Melbourne combined leading thought and practice from the field of simulation in the public and private sector within Australia and the international sphere.

The event, which took place on 19 June, saw organisations showcase how they have embraced simulation, their rationale for its adoption, the lessons they have learned, and how new approaches have added value to their organisations.

Some presentations illustrated how companies have integrated predictive models and other technologies into simulation to meet multiple business and capability requirements. Others explained how simulation can be used to test medical systems and processes and to capture data, and for skills acquisition and maintenance.

The forum attracted many users of simulation, developers, trainers and assessors, as well as managers considering the adoption of simulation for aviation, incident management and other operational capability. Participants at the forum were able to challenge their thinking, share their own experiences and engage in discussions with both forum speakers and users of simulation.

A significant lesson that came out of the forum was the importance of terminology. Achieving a common understanding of the different categories of simulation is fundamental to building a simulation capability that is fit for purpose.

The forum facilitated collaboration and the exchange of ideas, and raised questions for consideration and further discussion. It showed examples of good industry practice both within Australia and internationally, and how simulation can be used to develop, build, maintain and exercise capability.

The National Aerial Firefighting Centre also held the Fire and Emergency Aviation Simulations Summit on the day following the AFAC event. The summit was part of an ongoing project examining the potential for greater use of simulation to support and enhance aviation training and skills maintenance.

The responses from participants who attended the AFAC forum demonstrated the value in this type of collaboration and sharing of professional expertise. ■

Fire spreads across Queensland.

PHOTO: QUEENSLAND FIRE AND EMERGENCY SERVICES

SCIENCE CENTRAL TO BUSHFIRE REVIEW

Heatwave and fire research from the Bushfire and Natural Hazards CRC has been central to the Queensland Government's recent review of the devastating 2018 bushfires.

In November and December last year, Queensland was subjected to some of the worst fire conditions the state had ever seen. During this time, almost 1,000 individual fires were burning.

As a result of these unparalleled conditions, Queensland Minister for Fire and Emergency Services Craig Crawford initiated a formal review into the bushfires, with the Office of the Inspector-General Emergency Management (IGEM) Queensland, seeking leading and independent research from the CRC to inform the review. The CRC was asked to highlight key points of research, knowledge and other evidence to inform the review, with the studies forming a suite of reports launched in July by the Queensland Premier Annastacia Palaszczuk.

Two reports were produced by the CRC as part of IGEM's review.

The first, headed by Dr Graham Mills, examined the science behind the fires and provided research into the conditions leading up to 24 November.

The second report, by Dr Neil Burrows, looked at similar fire and heatwave events that have occurred both nationally and internationally, comparing them to the ones that occurred in Queensland.

These two reports have been cited extensively in the Inspector-General's overall 2018 Queensland Bushfires Review. The series of reports will be used to assess the future of the state's disaster management system. ■

To access the reports, visit www.igem.qld.gov.au.

BUILDING MINISTERS ANNOUNCE NATIONAL APPROACH TO REFORMS

An agreement by the Building Ministers Forum (BMF) to implement a national approach to reforms is a major step forward in addressing poor building outcomes and restoring community confidence.

At a BMF meeting on 18 July, state, territory and Commonwealth ministers announced a unanimous decision to establish a national approach to implementing recommendations made by the landmark Shergold-Weir report, Building confidence.

PHOTO: BMF

FPA Australia CEO Scott Williams (centre left) attended the Building Ministers Forum meeting on 18 July 2019 in Sydney.

The new national approach will see an expanded role for the Australian Building Codes Board (ABCB), and establishment of a dedicated implementation team under the aegis of the ABCB. The implementation team will include both government and industry representatives, and will drive implementation of the Shergold-Weir report's recommendations, including potential changes to the National Construction Code (NCC). As part of the change, the ABCB's strategic plan will be recast, and the organisation's capabilities further strengthened to meet its expanded role and responsibilities.

"The announcement is a significant step forward for both the building sector, including fire protection, and the community, and it paves the way to deliver an important program of reforms," said Scott Williams, CEO of Fire Protection Association Australia, who attended the BMF meeting in Sydney.

"Building compliance is a national problem, and we congratulate the BMF on coming together to agree to a national response. The ABCB is absolutely the correct vehicle to drive that response, and its coordination will provide the leadership and stability needed to implement the major reforms required.

"The community's trust in the building sector has been eroded, and there is a lot of work to be done to restore that by both industry and government. There is no more important time for us to be united and work together to rebuild that trust," Mr Williams said. ■

FIRST ALL-FEMALE HAZARD REDUCTION BURN TAKES PLACE

It was business as usual for NSW National Parks and Wildlife Service (NPWS) firefighting staff during a hazard reduction burn in Scheyville National Park recently. However, there was also cause for celebration, as the operation marked the first hazard reduction burn conducted by an all-female crew.

NPWS acting Executive Director of Park Operations Naomi Stephens congratulated NPWS for providing equal employment opportunities and a supportive working environment for women.

"Firefighting is just one of the many vital services provided by NPWS to protect local communities and wildlife," she said. "It is fantastic to see women thriving in a male-dominated field."

In 2017, NPWS joined the Male Champions of Change Fire and Emergency group alongside a number of other AFAC member agencies. The initiative aims to achieve gender equality, and to promote diverse and inclusive workplaces, through changes in workplace culture.

Ms Stephens said even though it was the first time a crew consisting entirely of women had led a hazard reduction burn, women are playing an increasingly vital role in daily NPWS firefighting.

"Having an all-female managed burn highlights the growing number of women at NPWS taking on roles in the firefighting field," she said.

"Any NPWS staff member is eligible two undertake training to become a firefighter and work with the teams on the ground conducting hazard reduction burns or fighting wildfires. It can be a lot of hard work in sometimes very difficult conditions, but it is great experience and very rewarding work."

At NPWS, 20% of firefighters are women, and 23% are incident management specialists, which is significantly above the average for the fire and emergency sector. Women from NSW Rural Fire Service and Fire and Rescue NSW also joined the NPWS during the burn.

"Although we have women in just about every different role when it comes to firefighting, we've never conducted an all-female burn before. It's one thing to say that women are every bit as capable as men, but actions speak louder than words, so we decided to prove it," Ms Stephens said. ■

> "Having an all-female managed burn highlights the growing number of women at NPWS taking on roles in the firefighting field."
>
> Naomi Stephens, NPWS acting Executive Director of Park Operations

GRANT TO BUILD DECISION-MAKING CAPACITY IN WESTERN AUSTRALIA

PHOTO: AMY MULDER, BUSHFIRE AND NATURAL HAZARDS CRC

A breakout group at a Bushfire and Natural Hazards CRC workshop.

The decision-making capacities of local government during natural hazard emergencies is set to improve with a grant awarded to fund new research into the topic.

The Bushfire and Natural Hazards CRC was awarded the grant of almost $24,000 as part of the All West Australians Reducing Emergencies (AWARE) program, run by the Department of Fire and Emergency Services Western Australia. The program aims to enhance WA's emergency management arrangements by investing in capacity-building and preparedness activities, at local and district levels.

Melissa Pexton, Manager Emergency Management at the Western Australia Local Government Association, said the partnership with the CRC and research expertise will build further capacity in the local government sector, which carries the responsibility for recovery in the state.

"We are looking forward to bringing this unique training opportunity to WA over two days with up to 40 local governments. This will complement our existing training offering in emergency management, providing the sector with relevant skills to gain further confidence in their coordination and leadership tasks," Ms Pexton said.

The research will be conducted by CRC researchers from the University of Tasmania, Associate Professor Benjamin Brooks and Dr Steve Curnin. ■

New training on water-based fire protection systems

Fire Protection Association Australia (FPA Australia) has announced a new face-to-face training course, 'Routine Service of Water Based Fire Protection Systems Level 2', beginning in July and running through to November 2019.

The course will be held at Randwick TAFE in NSW and will be delivered via a combination of classroom and workplace-based learning.

In South Australia, this course will meet the requirements for the South Australian Hydrant Licence.

This course is for anyone working in the fire protection industry who wants to develop the skills and knowledge to undertake the routine service activities listed below in accordance with AS 1851-2012:

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3. fire hydrant and fire hose reel system pumpsets
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   b. monthly and six-monthly service of fire hose reel pumpsets
4. water storage tanks for fire hydrant systems
   a. monthly, six-monthly and yearly service. ■

More information is available at www.fpaa.com.au.

NEW FIRE SAFETY RESEARCH CENTRE LAUNCHED

A new research centre focused on fire-retardant materials and fire safety opened its doors in July. The ARC Training Centre in Fire Retardant Materials and Safety Technologies was granted $6.3 million in funding over five years through the Australian Research Council's (ARC) Industrial Transformation Training Centres scheme.

The Centre aims to become a world leader in innovation in environmentally friendly fire retardants, and in early intervention with cutting-edge fire preventive measures for safer materials and applications. Its five research objectives include:

PHOTO: UNSW DEX

Investigators and partners of the ARC Training Centre.

- nanotechnology and bio-inspired flame retardants
- multi-scale computational models for fire propagation
- innovative fire suppression and fire control approaches
- human behavioural models for crowd movement
- fire testing and standards.

Based at the University of NSW, the Centre is working closely with industry, fire and emergency services, government and a number of domestic and international universities. ■

For more information on the ARC Training Centre in Fire Retardant Materials and Safety Technologies visit http://fire.edu.au.

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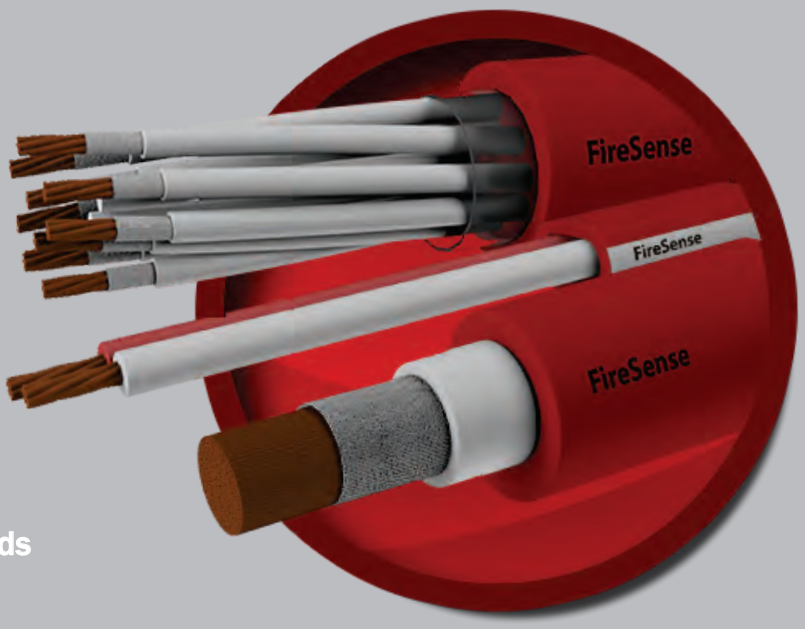

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FPA AUSTRALIA GOLD MEMBER Fire Protection Association Australia

PHOTO: WAYNE RIGG, COUNTRY FIRE AUTHORITY

PREPARING FOR AN ABOVE-NORMAL SUMMER

Australia needs to prepare for a hot and dry summer, with conditions exacerbating the bushfire potential across the country.

Air support will be on hand to assist firefighters across the country this fire season.

BY **NATHAN MADDOCK**

Bushfire and Natural Hazards CRC

Bushfires are predicted to be worse than normal across much of Australia this summer but research shows many people, especially those in high-risk areas, remain unprepared.

The Bushfire and Natural Hazards CRC's *Australian Seasonal Bushfire Outlook* shows the 2019–20 fire season has the potential to be an active season, following a very warm and dry start to the year.

The east coast of Queensland, New South Wales, Victoria and Tasmania, as well as parts of southern Western Australia and South Australia, face above-normal fire potential. September saw severe fires in Queensland and New South Wales, with houses destroyed in both states.

The ingredients for a bad fire season

Above-normal bushfire potential refers to the ability of a large fire to take hold. It takes into account recent and predicted weather for a particular area, the dryness of the land and forests and recent fire history.

The year to date has been unusually warm and dry for large parts of Australia. In fact, it has been the fifth-driest start to the year on record, and the driest since 1970. Some areas, such as NSW and south-eastern Queensland, are into their third year of dry conditions.

The warming trend means that above-average temperatures now tend to occur in most years, and 2019 has followed this pattern. These high temperatures further dry the landscape and vegetation.

Queensland

While northern parts of the state saw record rainfall earlier in 2019, rainfall has been very much below average in south-eastern Queensland for the year. The lack of rain has resulted in the root zone soil moisture being below average—in the lowest one percent on record for areas around Rockhampton and south to the NSW border. The rainfall and temperature outlooks make it very likely that this current soil moisture deficit will persist for the coming months, significantly increasing the available fuel in forested areas in south-eastern Queensland. Inland Queensland has been affected by drought since 2013, and as a result there has been very little grass fuel available. However, the rainfall received this year will is likely to see a return to average fuel loads in inland parts of the state.

Above-normal fire potential is expected in forested areas along the coast south of Rockhampton down to the NSW border, for woodland and grass vegetation, inland areas in the south, and a small area west of Mackay. The Darling Downs and Granite Belt districts are facing severe water shortages as a result of the ongoing drought. This has the potential to impact the availability of water for fire suppression. The Queensland Fire and Emergency Services have been working closely with relevant local councils and their partners to manage this risk. Normal fire potential is expected for all other parts of Queensland.

New South Wales

Weather conditions have been exceptionally dry across NSW leading into the 2019–20 fire season. Much of central and northern NSW has experienced well-below-average rainfall during the last three months, with a small percentage of areas experiencing their driest conditions on record.

Long-term rainfall deficiencies, including record lows for some areas in the north of the state, have severely impacted water resources. With limited water availability, fire agencies in NSW are planning for firefighting tactics that minimise the use of water.

At the beginning of August, the NSW Department of Primary Industries mapped nearly all of NSW into one of three drought categories, with approximately 55% of the state drought affected, 23% experiencing drought, and 17% experiencing intense drought.

Widespread significant soil moisture deficit resulted in an early start to the fire danger period for many local government areas in NSW. With the short to medium-range climate outlooks favouring warmer and drier than average conditions across much of the state, there is significant concern for the potential of an above-normal fire season in forested areas on and east of the Great Dividing Range.

Reports of grassland fuel conditions west of the Divide indicate that while grassy vegetation is cured, it is below average in quantity or load. These areas have been assessed as having normal fire potential. It should be noted that while grass load is reduced and therefore the potential intensity of grass fires may be reduced, highly cured grass creates the potential for grass fire to spread rapidly.

Australian Capital Territory

The ACT has received less than average rainfall over the last two years, leading to a persistent and high level of drought. The lowland forests are dry, while highland forests are relatively moist. This indicates that fuel flammability in the lowland forests could remain high, creating risks early in the fire season. The dry conditions and grazing by farm stock and wildlife have led to lower levels of grass growth, resulting in reduced grass fire risk. The outlook indicates a potential for the highland forests to dry out; however, this could be delayed by the occurrence of summer rain. Heatwaves and dust storms may make bushfire detection and suppression more challenging at times during the season. The overall bushfire risk for the ACT is above-normal.

Victoria

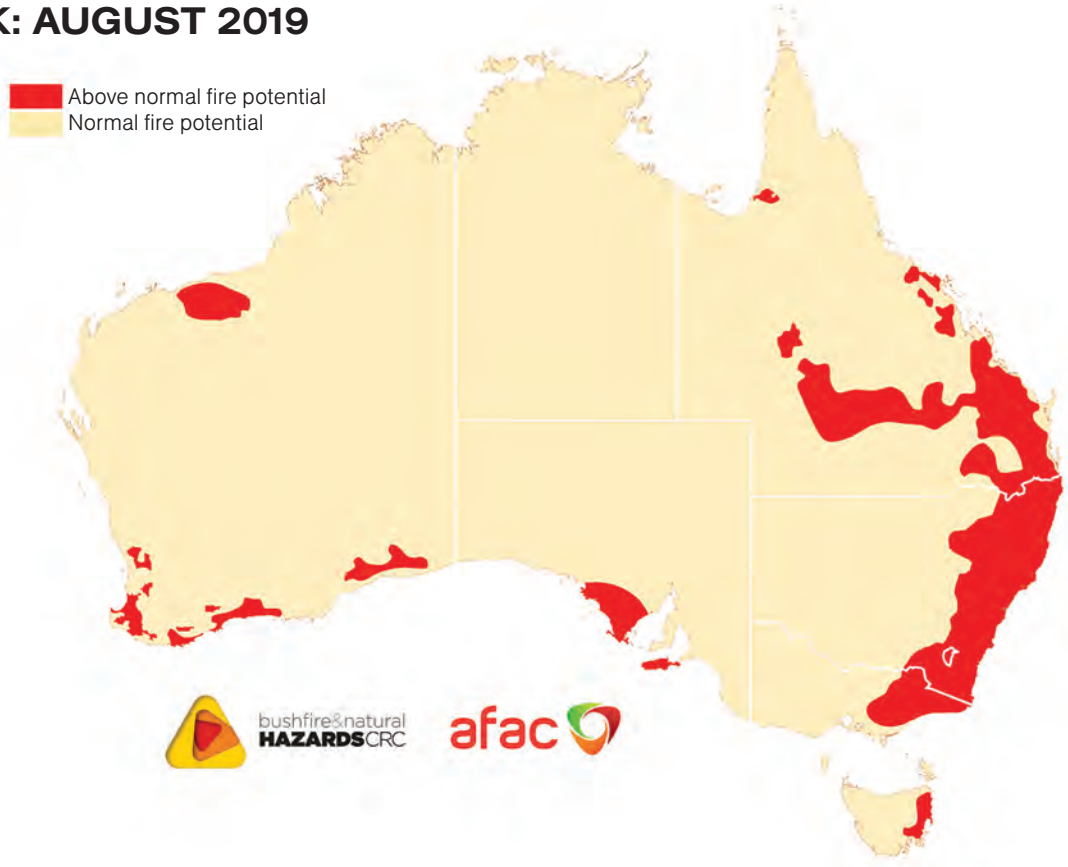
The potential for above-normal bushfire activity continues across the coastal and foothill forests of East Gippsland, extending into West Gippsland and the Great Dividing Range. These areas are now experiencing their third consecutive year of significant rainfall deficit, with severe levels of underlying dryness persisting in soils and heavy forest fuels, along with higher abundance of dead fuel components and higher flammability of live vegetation.

Across the rest of Victoria, mostly normal bushfire activity is expected, however there is likely to be increased growth rates in pasture and croplands in the west due to winter rain.

Tasmania

For the early part of Tasmania's fire season, most of the state has normal fire potential. The western half of the state is wet, but the east is drier than normal, especially between the Forestier Peninsula and Scamander. This eastern dry area has above-normal

AUSTRALIAN SEASONAL BUSHFIRE OUTLOOK: AUGUST 2019



Areas are based on the interim biogeographic 'Regionalisation for Australia and other geographical features'.

SOURCE: BUSHFIRE AND NATURAL HAZARDS CRC

fire potential. Without significant rain this area will expand. As in recent years, increased fire activity is likely in this dry strip before December and will require considerable response efforts. Eastern peat soils will be susceptible to fire and will burn to depth, with traditionally wet or damp gullies already dry.

The fire season in the remainder of the state will commence more normally, in late spring or early summer, and provide good conditions for planned burning.

South Australia

Average to below-average rainfall has occurred across SA, with some areas experiencing persistent dry conditions since the start of 2018. In areas of ongoing dry conditions, grass fuel growth is either average or well below average, which creates the likelihood of normal fire potential in these areas. This level of fire potential also continues in central and southern parts of SA, where average rainfall has occurred.

The Mount Lofty Ranges have recorded almost average rainfall, which has reset the soil dryness index to zero. However, late winter rainfall may promote increased vegetation growth before summer, and could increase the available bushfire fuels during the fire season. Forecast conditions maintain the potential for bushfire across the populated areas of the Mount Lofty Ranges. Parts of the Lower Eyre Peninsula have received good rainfall, resulting in a bumper cropping season and higher than normal grass fuel growth. Due to the increased fuel load, these areas have above-normal fire potential. Kangaroo Island also has above-normal fire potential, with a combination of drier and wetter than average conditions (depending on the vegetation type) across the island. These conditions may result in above-average fuel loads in parts, and drier vegetation in others, especially in areas of forested and scrub vegetation.

The prolonged dry conditions across much of SA are also likely to create increased occurrences of raised dust during the windy conditions that often accompany days with high fire risk. The dust may affect the operational capabilities of aerial firefighting assets and limit their effectiveness. Fire managers will carefully monitor this issue during the fire season, noting that without rainfall, dust suppression is impossible on the scale required.

Western Australia

Rainfall deficiencies have persisted across most of the south-west of WA, with this area experiencing its driest start to the year, followed by the seventh-driest autumn on record. In addition, conditions drier and warmer than average are forecast through to October, which will increase soil moisture deficits and stress in woody vegetation. These conditions have resulted in above-normal fire potential for parts of the Swan Coastal Plain, Avon Wheatbelt, Jarrah Forest, Warren, Esperance Plains and Mallee regions. In parts of the Nullarbor, high fuel loads will contribute to the above-normal fire potential.

Above-normal fire potential is also expected for coastal areas of the Pilbara, which experienced heavy rainfall in association with Severe Tropical Cyclone *Veronica* in March 2019. This rainfall promoted good growth of soft grass and spinifex, as well as delaying curing compared to the rest of the region. As conditions dry out, greater continuity and loading of grassy fuels will increase the fire potential in parts of the Pilbara affected by *Veronica*. ■

For more information on the *Australian Seasonal Bushfire Outlook*, see www.bnhcrc.com.au/hazardnotes/63.

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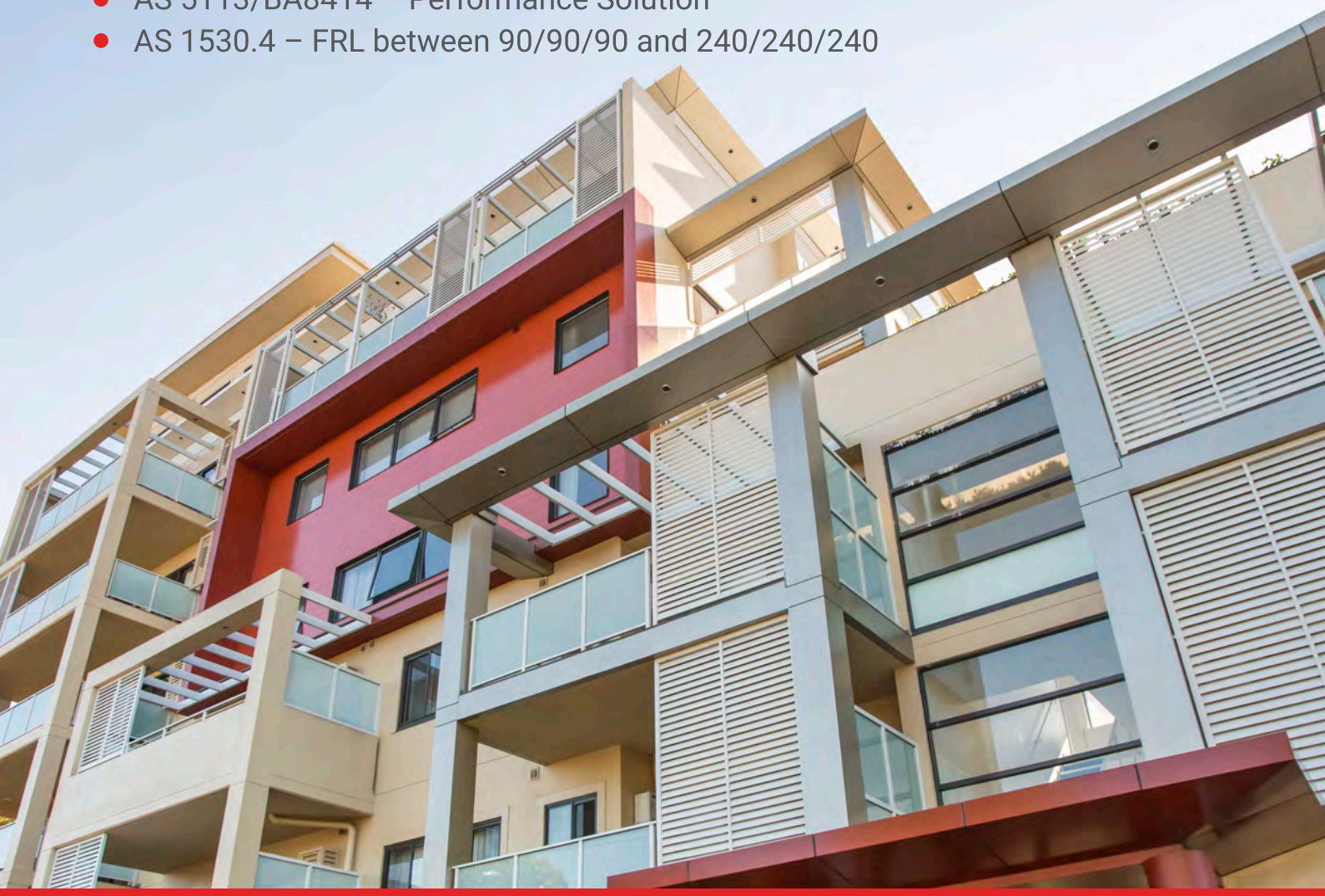

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THE NEXT LEVEL

PHOTO: AFAC

RIDING THE WAVE OF CHANGE AT AFAC19

The largest AFAC19 powered by INTERSCHUTZ was hosted in Melbourne, where delegates explored the conference theme 'a shift to the new norm: riding the wave of change'. Attendees came together to reflect and share their knowledge to better deal with a new era of technological, societal and environmental change in emergency management.

BY **COSTA HARITOS**
AFAC

Delegates voted for their favourite research-informed posters as part of the Knowledge Centre, sponsored by the Australian Institute for Disaster Resilience.

Over 4,000 practitioners, researchers, critical thinkers, international guests and delegates attended the largest-ever AFAC19 powered by INTERSCHUTZ Conference and Trade Exhibition.

Australasia's premier event for the fire and emergency management sector returned to Melbourne for the first time in six years, where the central theme was 'a shift to the new norm: riding the wave of change'.

Change is an inevitable part of the sector, as environments, technology and workplace cultures continue to evolve. Delegates had the opportunity to explore these concepts with presentations covering a wide variety of topics, including climate change, culture and diversity, land management, prescribed burning, flood mitigation, infrastructure and quantifying risk.

AFAC CEO Stuart Ellis said he was pleased with how the conversations evolved. "The conference makes people think beyond their day-to-day job. "They are looking at future ideas, future equipment and future experiences, but it's also projecting their thinking into the future."

"We want to be planning towards our future rather than reacting to it," Mr Ellis said.

Professor Lisa Gibbs opened the annual Research Forum, hosted by the Bushfire and Natural Hazards CRC, on the first day of the conference. Prof Gibbs, from the University of

Melbourne, focused her keynote on the recovery efforts after Black Saturday, Australia's most devastating bushfire. John Richardson from the Australian Red Cross joined Prof Gibbs on stage to explore how research has informed decision-making to avoid another catastrophic disaster like Black Saturday.

Professor Andy Pitman then took to the stage for his keynote presentation, which focused on the challenges in predicting future weather and climate extremes.

Embedding research into practice was high on the agenda as researchers met with practitioners and policymakers during the Research Forum. Attendees gained a comprehensive update on several topics including bushfire and smoke modelling, policy and practice, health and wellbeing, risk, recovery, severe weather and plenty more. All presentations continued to highlight the importance of research in mitigating natural hazards in a changing environment.

"Whether it's new research or how to do things differently, add to them, extend them or make their lives as the users of that research better, that's what we're here for," said Dr Katherine Woodthorpe, Chair of the Bushfire and Natural Hazards CRC.

PHOTO: AFAC

Former Head of the United Nations Office for Disaster Risk Reduction Dr Robert Glasser shared research about the growing impacts of climate change, and how policymakers and emergency managers must work together.

The Research Forum concluded with the annual welcome and awards ceremony, where key innovators and leaders were acknowledged for their contributions to the sector. The inaugural Dr Laurie Hammond Oration was a sombre reminder of the legacy left behind by the late Chair of the Bushfire and Natural Hazards CRC, who passed away in November 2018.

Keynote speaker Dr Robert Glasser opened the second day of the conference with his presentation that addressed the need to build resilience in an emerging era of ongoing disasters. Dr Glasser used his experiences as the

> "As our planet continues to warm, we will be entering an unprecedented time—an era of disasters unlike anything we've experienced before."
>
> Dr Robert Glasser

PHOTO: AFAC

Live demonstrations showed off the latest emergency management technology as part of the largest AFAC Trade Exhibition.

PHOTO: AFAC

Eliane Miles took to the stage as a keynote presenter, where she spoke about changing demographics and their predicted impact on emergency management.

Former Head of the United Nations Office for Disaster Risk Reduction, and his role as the Special Representative to the UN Secretary General for Disaster Risk Reduction, to paint a picture of the impacts of climate change.

"As our planet continues to warm, we will be entering an unprecedented time—an era of disasters unlike anything we've experienced before.

"It's human nature to assume the future will unfold in the same way as the recent past. That is a dangerously flawed way of managing disaster risk," Dr Glasser said.

Dr Glasser's presentation set the tone for the conference as delegates began to think about how to manage and respond to change moving forward.

Keynote speaker Eliane Miles then explored how Australian communities are adapting to change. Ms Miles prompted the audience to think ahead to 2030 and the steps to undertake to enhance resilience and preparedness.

Ms Miles spoke about the importance of a whole-of-community approach to preparing for natural hazards and emergencies.

"Engaging with younger generations is all about purpose, experiences, authenticity and stories. They often see with the eyes of their heart," Ms Miles said.

Britain's first full-time female firefighter, Josephine Reynolds, was a program highlight, as she discussed diversity and inclusion in the emergency management sector. Ms Reynolds was inspired to attend and present at AFAC19 after reading statistics on the low number of female firefighters in Australia, prompting her to ask: "where are the role models?"

AFAC19 powered by INTERSCHUTZ also offered the largest Trade Exhibition

in the history of the event. The exhibition spanned 12,000 square metres and delegates were able to witness the latest technology and operations equipment up close with a live demonstration area, an expo stage and over 200 exhibitors.

After a day filled with discussions, demonstrations and exhibitions, delegates then convened for the annual AFAC19 powered by INTERSCHUTZ Gala Dinner, where they traded their conference attire for lounge suits and colourful gowns to fit the 'endless summer' theme.

Day three of the conference opened with New Zealand keynote speaker Dr Lance O'Sullivan, who shared his expertise on positive disruptive leadership. As a self-confessed "disruptive troublemaker", Dr O'Sullivan reflected on the health industry and putting communities first to enhance resilience.

Co-author of the *Shergold Weir Building Confidence Report* Bronwyn Weir followed Dr O'Sullivan with a comprehensive look at the building sector and how the industry has been transforming, particularly after events such as the Grenfell Tower fire.

"The reason why I'm standing here today is that 72 people died at Grenfell Tower. Taking responsibility is a major part of changing culture and finding a solution to the situation we're in," Ms Weir said.

The day featured presentations on the built environment, fostering inclusivity and diversity, emergency volunteerism and how to empower communities to prepare for the future.

A sombre panel discussion reflecting on the lessons learned since Black Saturday closed AFAC19 powered by INTERSCHUTZ. Dawn Hartog, Forest Fire Management Victoria; Andrew Stark, South Australian Country Fire Service; Anne Leadbeater, Leadbeater Group; John Richardson, Australian Red Cross; and Steve Warrington, Country Fire Authority all shared their perspectives on how the sector has changed in the ten years since the devastating bushfire that claimed 173 lives.

The panellists took note of the cultural shifts that have emerged and how communities are increasingly considered a vital resource in emergency planning.

The conference was co-located with the Institution of Fire Engineers Conference and the Australian Disaster Resilience Conference, which ran concurrently during the event.

Delegates at the Australian Disaster Resilience Conference (hosted by the Australian Institute for Disaster Resilience) asked the question, 'are we future ready?' as presentations covered building resilience and connections in preparation for increasing climate change and ongoing weather anomalies.

AFAC19 powered by INTERSCHUTZ also offered opportunities for professional development, with a key highlight being the cultural burning field trip. Practitioners gained valuable insights from Indigenous fire managers as they discussed traditional management practices and opportunities to reignite cultural fire.

The Disaster Resilient Australia and New Zealand School Education Network hosted its fourth national forum as part of the professional development program, where educators discussed disaster resilience and preparedness with emergency services.

Preparations are already underway for AFAC20, which will take place in Adelaide. ■

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

HALON ALTERNATIVES SHOWING PROMISE

There is still no alternative to halon as a direct fire suppressant, but new systems in aviation and defence are gaining ground on it.

BY **PATRICK TANSEY**

Fire Protection Industry Board

Back in the early 1970s, the Australian fire protection industry welcomed the fire suppression agent halon into its armoury.

The impact of halon as a groundbreaking firefighting tool was virtually instantaneous, and it quickly replaced many previously accepted products because of its superior characteristics and ease of use.

But by the late 1970s, scientists had realised the significant damage halon was causing to the earth's ozone layer. Only a decade later, in 1987, delegates from 197 nations came together to ratify the Montreal Protocol, a international treaty designed to protect the ozone layer. Under the Montreal Protocol, production and importation of new halon has been prohibited since 1994 in developed countries, including Australia, and since 2010 in developing countries.

Despite international restrictions, halon is still very much an essential firefighting agent in industries such as aviation and defence.

While recycled and recovered halon can still be used in Australia today, its use is strictly regulated under the Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995 (made under the Ozone Protection and Synthetic Greenhouse Gas Management Act 1989).

Section 3.3.1 of the Act states that industry must obtain a Halon Special Permit (HSP) in order to possess halon for use in fire protection equipment and systems. Section 3.3.2 of the Act outlines the responsibilities that HSP holders must abide by. These include complying with the conditions attached to their

Ray Walton says new suppression systems are showing potential as halon replacements.

PHOTO: PATRICK TANSEY, FIRE PROTECTION INDUSTRY BOARD

permit, operating in accordance with the procedures contained within their risk management plans, and ensuring that all personnel handling halon hold the appropriate Extinguishing Agent Handling Licence (EAHL).

Applications for a permit must be made to the Fire Protection Industry Board (FPIB) and the premise applying must operate in a way that is consistent with Australia's obligations under the Montreal Protocol.

One particular obligation under section 3.3.2 of the Act underlines a major reason why certain industries are still able to use halon. It reads: "holders of Halon Special Permits must ensure halon is used only where necessary to protect human life or equipment critical to the community, and where no practical alternative to halon exists."

One company that specialises in the handling and production of recycled halon is TAE Aerospace, an Australian-owned organisation with sites across Australia and the US.

Ray Walton is the Business Development Manager at TAE Aerospace in Melbourne and he has worked within the aviation industry for 40 years. He also serves on the FPIB Advisory Body.

Mr Walton said the aviation industry still relies on two types of halon for fire protection: Halon 1301—a flooding agent used in cargo, engine and auxiliary power unit extinguishers; and Halon 1211—a streaming agent, used primarily in portable or handheld extinguishers and lavatory extinguishers.

Mr Walton said, for many years, his industry had been researching new technologies that could act as suitable and cost-effective replacements to halon, but that no major gains had been made due to a range of factors, with safety being the main criteria.

"At the moment there is nothing around that can offer the same extinguishing capabilities as halon pound for pound," Mr Walton said.

"There are certainly alternatives like FM-200, but the weight ratio of FM-200 compared to halon is about 1.8 to 1.0, so it's basically twice as heavy and that is a big reason as to why commercial airlines don't want to switch extinguishing agents," he said.

"On a large international aircraft you would be looking up to an additional 200 kg of agent, and that is the prime reason that halon 1301 will be in use on commercial aircraft for some time to come."

Despite the challenge in finding suitable alternatives to halon, Mr Walton said some minor changes were beginning to trickle into the market.

"Tests are ongoing for the use of dry powder agents in aircraft engine extinguishers with promising results. There is high expectation that eventually engine and APU extinguishers will be changed to dry powder, although halon will still be used in the cargo space."

Mr Walton said while gradual changes were happening, more could be done by major commercial aviation enterprises.

"Perhaps one day a major airline will consider swapping over all its potty bottles, located in the waste bins in aircraft lavatories, to the new green models that contain FM-200, as opposed to halon. That's a big change for a large airline to consider, but there is a significant groundswell out there for change and a socially responsible airline could justify the expense of a fleet-wide change-out because it's the right thing to do. It would be an industry first, but I'm sure it would lead to other airlines following suit."

PHOTO: PATRICK TANSEY, FIRE PROTECTION INDUSTRY BOARD

A halon bottle used for fire suppression in aircraft.

With no direct replacements currently available, TAE focuses on recycling of halon and other extinguishing agents. The company recycles Halon 1211 and 1301, and FM-200 and FE-25 in its 'REACH machine' at its Hallam facility.

While industry continues to strive towards cleaner alternatives, for the meantime halon is still very much relied on to keep commercial patrons and military personnel safe in times of fire emergency. ■

PROFESSIONALISING FIRE SAFETY ENGINEERING

THE METHODS REPORT

The third in a series of fire safety reports, the *Methods Report* aims to lift the level of professional practice of all fire safety engineers.

BY **PETER JOHNSON**
ARUP
AND **DAVID LANGE**
University of Queensland
AND **ASHLEY BRINSON**
The Warren Centre

This is the third in a series of articles on the research entitled *Professionalising Fire Safety Engineering* being conducted at the Warren Centre for Advanced Engineering at the University of Sydney. The research is progressing rapidly and is enjoying strong support from FPA Australia, AFAC and many other professional bodies, fire safety consultants, governments and industry.

The project is aimed at lifting the level of professional practice of all fire safety engineers across Australia through attention to stronger regulation, practitioner registration and enforcement. This will be complemented by improved competencies, education and accreditation, which can help all states and territories achieve better quality buildings and improved safety.

The first two reports completed by the Warren Centre were the *Regulation Report* and the *Education Report*. The third report completed and published is the *Methods Report*. All the research reports can be downloaded for free from the Warrena Centre website at https://info.thewarrencentre.org.au/firesafety.

The *Methods Report*

This research was led by a team from the University of Queensland, who examined the utility, benefits and risks associated with three different types of documents—currently or soon to be available for fire safety engineers to assist in design and verification of fire safety designs for buildings.

These documents reviewed were:

- The Fire Safety Verification Method (FSVM) developed by ABCB and now incorporated into the National Construction Code 2019
- The International Fire Engineering Guidelines (IFEG)
- Practice Notes, including those issued by the Society of Fire Safety (Engineers Australia).

The FSVM is directed towards verification of compliance of a building design with the National Construction Code (NCC), whereas the other two documents are more for guidance of design process and practice.

This research and report began by carefully defining the engineering design process, including the difference between the design process and the development of a building fire safety strategy, and the verification of a design against building code requirements.

The authors showed that engineering design is a balance of drivers and constraints associated with any project, and that verification of the design against the performance requirements of a building code has to remain a separate and independent process. The report also highlights that these design and verification roles undertaken by the fire safety engineers in the design team are, or should be, completely separate to the independent assessment or fire safety design check by a compliance certifier or building official who is representing or acting in the public interest.

The *Methods Report* highlights the fact that the FSVM crosses the boundary between a design or process document and a verification method. Thus, it has the potential to influence design outcomes and safety in an unsatisfactory manner.

When some of these issues were examined in more detail, the following became clear in relation to the FSVM:

- This confusion between the Deemed-to-Satisfy (DTS) provisions as a tool for establishing equivalence and as a means for meeting a performance

PHOTO: THE WARREN CENTRE

The Warren Centre team.

requirement is dangerous, because the DTS provisions have never been shown to result in a safe building when applied outside of the strict classifications of the code.

- In fact, the DTS provisions have never been shown to explicitly satisfy any specific performance objective, since an objective has never been defined for a fire safety strategy or its individual components.
- Further, this approach abstracts the overall objective of the fire safety strategy into specifications for individual components. This means that partial solutions, comprising a combination of components of a DTS solution and a performance solution, are never actually verified or integrated together to provide an acceptable level of safety.

In relation to the IFEG, it is recognised that the guidelines are significantly out of date, as many building designs have changed and fire engineering technologies and data have similarly developed. The IFEG is a fire safety engineering process document and not a verification method; its purpose is for guidance only. An update is planned for an Australian version.

Practice Notes are also non-mandatory and simply provide specific guidance to practitioners.

The Roles and Competencies Report

The research into the future role and competencies of fire safety engineers is still in progress.

However, the first part of the research, about future roles, has reached the following conclusions, which respond to the Shergold-Weir Building Confidence Report:

1. There are separate roles for fire safety engineers as members of a design team, as peer reviewers or as members of a fire brigade reviewing fire safety designs.
2. While many of the competencies will be the same, each role is different, with distinctly different deliverables, and each role should be separately identified.
3. In the past, design fire safety engineers have often just undertaken analysis of 'alternative solutions' and have only been involved in projects up until the stage when a building permit is issued.
4. The Hackitt and Shergold-Weir reviews have challenged fire safety engineers to adopt a much broader role, including looking at all aspects of fire safety design—from planning and concept design through to construction, commissioning and handover.
5. Fire safety engineers should examine design from the first principles and address all performance requirements, performance solutions and DTS solutions in an integrated and holistic manner.

These much broader roles will bring a requirement for new competencies and resultant new education programs, as well as industry training programs that support professional accreditation schemes.

At the same time, it is recognised that these new roles do not, in any way, take over the roles of designers, installers and certifiers of fire protection systems such as sprinklers and fire detection systems. The new roles ensure that all fire safety measures work together to ensure overall building fire safety. ■

The *Regulation Report* can be downloaded free of charge from the Warren Centre at https://info.thewarrencentre.org.au/firesafety.

For more information about the project, go to https://thewarrencentre.org.au/activities/fire-safety-engineering.

Further project updates will be available in future editions of *Fire Australia*.

Director-General Rob Cameron, Emergency Management Australia, launches the *Lessons Management Handbook*.

PHOTO: AFAC

THE GROWING INFLUENCE OF LESSONS MANAGEMENT

Presenters from a wide range of sectors met with practitioners and emergency managers in Sydney for the 2019 Lessons Management Forum, where delegates explored how learning from the past can create positive impacts for the future.

BY **ALANA BEITZ**

AFAC

More than 130 delegates and presenters with a keen interest in lessons management gathered for two days in Sydney in July for the 2019 Lessons Management Forum. AFAC partnered with the Australian Institute for Disaster Resilience, with generous support and sponsorship from the NSW Office of Emergency Management, to deliver the event.

This year, the driving theme of the forum was 'are we learning?'. The topic sparked discussion about lessons, insights, frameworks, communication, capabilities and leadership across a range of industries. Keynote speakers presented from a wide range of sectors including defence, health, air services, transport, federal agencies and fire and emergency services, and shared their insights and perspectives on effective lessons management. The conversation explored how culture, trends, recovery, learnings, research utilisation and innovative operational capability can all improve and maximise daily operations.

A poll conducted with forum participants indicated the majority in attendance were fresh to the field. Of those surveyed, 39% knew 'a thing or

PHOTO: AFAC

PHOTO: AFAC

Presenters met with practitioners and emergency managers at the forum.

A framework designed by the Emergency Management Unit of the Department of Natural Resources, Mines and Energy, Queensland won the 2019 AFAC Lessons Management Award.

The large crowd was relatively new to the concept of lessons management, and the forum showcases the emerging interest in the area.

two' about lessons management, while 31% were completely new to practice. Such figures indicate the growing interest in the area.

In another poll, attendees were asked to identify words and phrases that had impact for them during the forum. Terms such as **trust**, **culture**, **learning**, **community**, **culture change**, **storytelling** and **before action review** were mentioned, which captured the essence of the lessons management process and organisational learning.

Presenters from across jurisdictions shared their own experiences from incidents and operations, providing insights into successful lessons management. A digital presentation from NASA's David Oberhettinger, popular with forum attendees, saw Mr Oberhettinger outline the lessons practices that have proven effective at the NASA Jet Propulsion Laboratory, followed by a live video Q&A session.

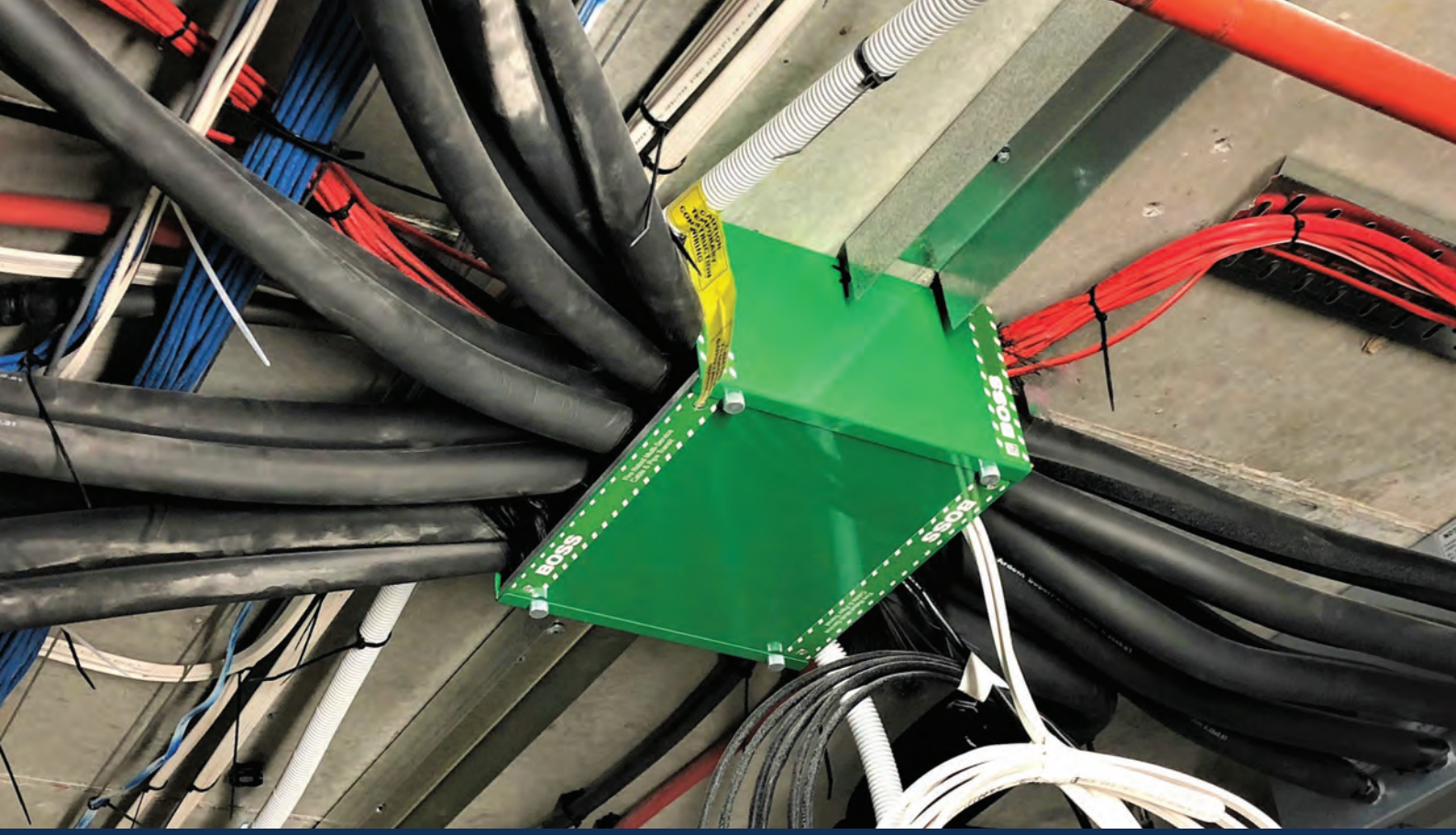
Another forum highlight was a video presentation from Travis Dotson, from the Wildfire Lessons Learned Center in the United States, who spoke about how the centre has developed a process for effective sharing of lessons.

At the forum Rob Cameron, Director-General Emergency Management Australia, launched the new *Lessons Management Handbook*, from the Australian Disaster Resilience Handbook Collection. Throughout the two days, many speakers referred to the handbook as an invaluable resource in setting up and supporting their lessons management processes.

The AFAC Lessons Management Award 2019 was presented to the Emergency Management Unit of the Department of Natural Resources, Mines and Energy, Queensland. With just three staff—Mark Ryan, Mark Prime and Sarndra Bell-Clews—the Emergency Management Unit affirmed the concept that size doesn't matter. They designed and developed an effective emergency management framework to implement a culture of objective-driven exercising that is led from previous learnings and reported live during operations. The Lessons Management Award was again made possible this year by the generous support of ISW, a recognised leader in lessons management software solutions.

The Lessons Management Forum was followed by a two-day Lessons Analysis Workshop, where content from the forum was analysed to identify recurring, potential and emerging insights and lessons across sectors and jurisdictions. The outcomes will drive Emergency Management Australia's pre-season briefings, which are conducted across the country. ■

The *Lessons Management Handbook* and companion resources are available on the Australian Disaster Resilience Knowledge Hub: www.bit.ly/2KV5utk.



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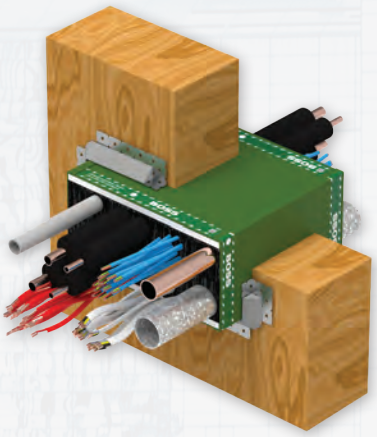

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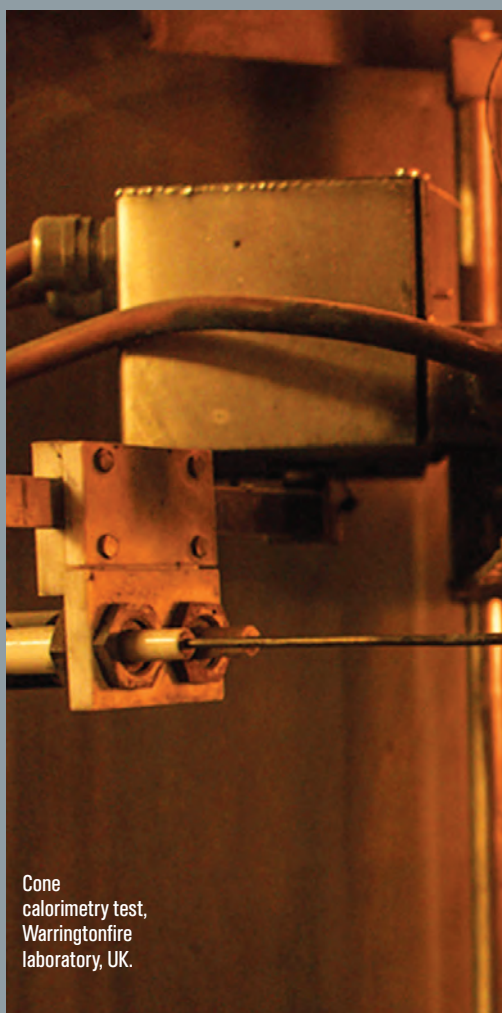
FIRE HAZARD PROPERTIES OF INTERNAL WALL AND CEILING LININGS

A guide to determining group numbers in accordance with AS 5637.1-2015.



Cone calorimetry test, Warringtonfire laboratory, UK.

BY **TANMAY BHAT**

Warringtonfire

Fire properties of building products are regulated to minimise fire spread and smoke growth in buildings, and to assist in the safe and timely evacuation of occupants. This article describes the compliance pathways available under the Deemed-to-Satisfy provisions for fire hazard properties of internal wall and ceiling linings, in accordance with Specification C1.10 of the National Construction Code (NCC) 2019, Volume One. The specification requires materials intended for use in internal wall and ceiling linings to be assigned a group number in accordance with AS 5637.1-2015 Determination of fire hazard properties—wall and ceiling linings. It also specifies limitations on the use of these materials, depending on the type and class of buildings and the corresponding fire suppression systems.

What is a group number?

The group number of a material can be determined by measuring its 'time to flashover' when tested in accordance with AS ISO 9705-2003 *Full-scale room test for surface products*, commonly known as the 'corner room burn' test. The time to flashover is defined as the time taken for the total heat release rate (HRR) to reach one megawatt. The group number of a material is assigned as follows when tested in accordance with AS ISO 9705-2003:

- **Group 1**—material that does not reach flashover when exposed to 100 kilowatts of heat for ten minutes followed by exposure to 300 kW for a further ten minutes.
- **Group 2**—material that reaches flashover following exposure to 300 kW of heat within ten minutes, after not reaching flashover when first exposed to 100 kW for ten minutes.
- **Group 3**—material that reaches flashover between two to ten minutes when exposed to 100 kW of heat.
- **Group 4**—material that reaches flashover within two minutes when exposed to 100 kW of heat.

Group numbers can be obtained from either of the following test methods:

1. A full-scale corner room burn test in accordance with AS ISO 9705-2003
2. Prediction from data from a small-scale cone calorimetry test in accordance with AS/NZS 3837 or ISO 5660-1.

Group numbers obtained via corner room burn tests

A typical AS ISO 9705 room burn test set-up involves a burner in the corner of a room that subjects the test specimen to an exposure of 100 kW for ten minutes followed by 300 kW for ten minutes. The exhaust gases are collected by the extraction hood and analysed to determine concentrations of oxygen, carbon dioxide (CO_2), carbon monoxide (CO) and the optical smoke density. The HRR is calculated by oxygen consumption calorimetry, while the smoke production rate (SPR) is determined from the optical smoke density and flow rate in the duct. The group number is determined by measuring the time to flashover.

When testing for the purposes of determining group numbers, the material being tested must be affixed to three walls and the ceiling, leaving the wall with the doorway opening unlined. The fixing methods used to mount the specimen shall, as far as possible, be the same as those used in practice. Tests for walls or ceilings alone cannot be used to determine group numbers.

PHOTOS: WARRINGTONFIRE

AS ISO 9705 room burn test depicting flashover.

Group numbers obtained via cone calorimetry

Cone calorimetry tests in accordance with AS/NZS 3837 *Method of test for heat and smoke release rates for materials and products using an oxygen consumption calorimeter* or ISO 5660-1 *Reaction for fire tests* involve exposing a flat specimen to a 50-kW per square metre incident heat flux generated by a cone-shaped heating element. Tests are performed in the horizontal orientation. The data recorded is the same as the AS ISO 9705 corner room burn test plus the mass loss. Like the corner room burn test, the HRR is determined from oxygen consumption calorimetry.

The group number is determined from an empirical model, which predicts the likely range of flashover times if the same material was tested under full-scale corner room burn conditions in accordance with AS ISO 9705-2003. Not all materials are suitable to be tested using cone calorimetry tests.

Suitable materials

Only materials that have confirmed correlations between the results obtained from cone calorimetry and those obtained from the corner room burn test can be tested using the cone calorimeter for the purpose of determining a group number. Those materials are:

- painted or unpainted paper-faced gypsum plasterboard
- untreated solid timber and wood products such as particleboard, plywood and medium-density fibreboard (MDF)
- rigid non-thermoplastic foams such as polyurethane.

Group numbers for multi-layered specimens can be determined by cone calorimetry, provided there is a demonstrated correlation between the cone calorimeter and room burn test for each individual layer. Each layer, including adhesive layers on the upper face of the substrates, needs to be tested. The group number assigned to the system is based on the layer, or combination of layers, that achieves the highest group number.

Unsuitable materials

Cone calorimetry tests are not suitable for:

1. profiled surfaces where more than 50% of the surface is rebated more than ten millimetres from the highest point
2. materials containing joints, large holes, cracks or fissures
3. materials that melt or shrink away from a flame
4. materials that intumesce, swell, bend or collapse appreciably when exposed to radiant heat
5. materials with a reflective surface
6. linings in which surface coatings or layers are capable of delaminating from the substrate.

Systems in which fixings and joints play a critical part in the fire hazard properties of a product are not suitable for testing in the cone calorimeter for the purpose of determining group numbers, despite having demonstrated correlations with the room burn tests. ■

Warringtonfire advises that the information contained in this article is based on evidence available at the time. Therefore no reliance or actions must be undertaken on that information without seeking prior technical advice from an accredited testing authority.

SPOT FIRES—A DYNAMIC INTERACTION

PHOTO: ANDREW SULLIVAN, CSIRO

An experimental separated v-shaped fire conducted in the CSIRO Pyrotron.

New research is developing the first two-dimensional fire simulation model that can operate faster than real time, while incorporating intrinsic fire line dynamics.

BY **ASSOCIATE PROFESSOR JASON SHARPLES**

Bushfire and Natural Hazards CRC and University of NSW

AND **DR JAMES HILTON**

CSIRO

AND **DR ANDREW SULLIVAN**

CSIRO

A pioneering Bushfire and Natural Hazards CRC project has highlighted the role pyroconvective interactions and spot fire dynamics play in the spread of fires across a landscape.

Fires that burn in close proximity can influence each other due to pyroconvective interactions between individual fires. The same processes can apply to different parts of a single fire line. A typical example is when intense spotting causes many fires to form and coalesce. Interactions between individual spot fires and other parts of the main fire perimeter can increase local rates of spread in unexpected directions, potentially producing broad, flaming zones that can entrap firefighters and increase the likelihood of extreme bushfires.

By combining advanced mathematical modelling with laboratory and numerical experimentation, this research is providing insights into the physical drivers of these interactions.

The knowledge gap

Current operational fire simulation methodologies cannot account for dynamic modes of fire propagation (see definitions, page 31) that are driven by complex interactions between the fire and the local atmosphere. Nor can they explain basic fire spread patterns, such as the observed parabolic rounding at the head of a wind-driven fire line. This project developed modelling techniques that address these shortcomings.

Fire behaviour in dry eucalypt forests in Australia is characterised by spot fires—new fires ignited by the transport of burning debris, such as bark, ahead of an existing fire. This also applies to many other vegetation types, but to a lesser extent. Under most burning conditions, spot fires have little influence on the overall spread of a fire, except where spot fires can overcome hurdles, such as topography or breaks in vegetation. However, in severe bushfires, spot fires can become the dominant propagation mechanism—the fire spreads as a cascade of spot fires that forms a 'pseudo' front, way ahead of the main fire front.

It is well known that multiple individual fires can affect the behaviour and spread of all fires present. Similarly, different parts of a single fire line can influence each other, particularly when the fire line develops certain geometric configurations. In such instances, fire spread is driven by the combination of extrinsic influences, such as wind and terrain, and intrinsic effects that arise when different fires or different parts of a fire interact through pyroconvective (and other) processes (see definitions). In some cases, intrinsic effects can become significant and result in distinctly dynamic modes of fire propagation, such as what occurs in junction fires, for

example, where fires meet and merge. These dynamic modes challenge an assumption behind all existing operational fire behaviour models—that fires spread at a quasi-steady rate. These operational models also assume that different fires, or different parts of a single fire line, essentially burn independently; this neglects any potential influence of intrinsic effects. These models cannot account for potential dynamic interactions, which may significantly influence the spread of a fire. The inability to accurately predict fire behaviours can place firefighters at risk and hinder issuing effective warnings to the general public.

Some aspects of dynamic fire behaviour can be modelled using coupled fire atmosphere models, but these models are too expensive for operational use. To meet this operational need, this research is developing computationally efficient, two-dimensional fire-simulation methods, an innovation which, for the first time, can account for key intrinsic dynamics of fire propagation.

How this research was conducted

This project treats a spreading fire as an evolving interface between burnt and unburnt ground. Previous research has also investigated this, but the methods used often encountered difficulties when fire lines merge or when isolated pockets of unburnt vegetation remain, which typically occur when spot fires coalesce (see Figure 1). A methodology that can successfully deal with these complexities is crucial—which is why our research team chose to use the level set methodology.

The level set method forms the basis for the development of efficient propagation models that use physically simplified proxies to account for complicated dynamic effects. To develop the model, the research team is conducting a series of experiments using the CSIRO Pyrotron facility.

These experiments target specific fire line configurations, such as parallel fire lines, v-shaped 'junction' fires, ring fires and multiple spot fires.

These laboratory experiments were also complemented by field experiments conducted in Portugal by international collaborators, under the auspices of the Portuguese Foundation for Science and Technology's 'Project fire whirl: vorticity effects in forest fires'.

What does this research mean?

The research has highlighted the critical role that pyroconvective interactions play in many aspects of fire propagation. For example, it has discounted radiative heat transfer as the main driver of the local increase in the rate of spread associated with junction fires—the observed effects were able to be accurately modelled using pyroconvective interactions alone. It has also highlighted the complex role that pyrogenic vorticity has in dynamic fire propagation.

Pyroconvective interactions can significantly affect fire behaviour—even in very basic patterns of fire spread, such as a line fire being driven by a uniform wind. The familiar 'parabolic head' shape that develops at the fire front is due to differences in the pyroconvective indraft along the fire line. Fire spread simulators

DEFINITIONS

Coalescence: The process of how nearby fires converge together.

Curvature: The degree to which a curve deviates from a straight line. In the case of fire, it is how curved the fire front is.

Dynamic fire propagation: Fire spread that abruptly changes its rate and intensity, without any significant changes in ambient environmental conditions.

Pyroconvection: The buoyant movement of fire-heated air, as distinct from normal atmospheric convection that mainly arises from solar heating and produces effects such as thermal winds, atmospheric instability and thunderstorms.

Quasi-steady rate of spread: A fire spreading from a point-source origin will increase its rate of forward spread until such time as an equilibrium state is reached; that is, until it reaches a constant spread rate for the prevailing conditions.

Vorticity: The rotational component of the movement of a fluid such as air; for example, a fire whirl has a high degree of vorticity.

Vorticity-driven lateral spread (VLS): A mode of dynamic fire behaviour—fire rapidly propagates across a steep, leeward slope in a direction nearly perpendicular to the wind direction.

FIGURE 1. Schematic representation of coalescing spot fires and the different forms of fire line interaction between individual spots. Examples of fire line interactions include (a) intersecting oblique lines, (b) non-intersecting converging fire edges, and (c) collapsing or constricting perimeters.

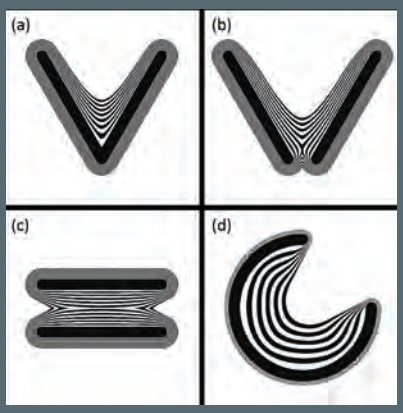


FIGURE 2. Examples of output from the pyrogenic potential model for different initial fire line geometries: (a) junction fire (v-shaped fire); (b) separated v-shaped fire; (c) two parallel fire lines; (d) a closed (270°C) arc. The black and white banding indicates the spread of the fires over equally spaced points in time, so thicker bands correspond to relatively higher rates of spread.

now used operationally in Australia don't account for pyroconvective interactions, and cannot accurately model the development of a basic, straight-line fire.

To address these types of shortcomings, this research initially attempted to model pyroconvective interactions using fire line curvature. Fire line curvature served as a good predictor of dynamic fire spread in some, but not all, cases. The research then considered a very simple idea—to treat each point on the fire line as an independent 'sink point' for horizontal airflow.

This means that each point along a fire line creates its own radially symmetric indraft wind, the strength of which is determined by the intensity of the fire at that point. Considering the fire line as a whole, the indraft effects created by each of the individual points combine to produce an overall indraft wind, which is referred to as the 'pyrogenic flow'—that is, the flow of air created by the fire itself. This pyrogenic flow can then be added to the ambient wind flow to more accurately model the spread of the fire. This model is called the pyrogenic potential model, due to its similarity to models for determining the electrostatic potential of an array of electric point charges.

The pyrogenic potential model is a highly simplified, coupled fire-atmosphere model. The influence of the pyrogenic flow depends critically on the geometry of the fire line (see Figure 2). For certain configurations, the pyrogenic flow locally increases the rate of spread of certain parts of the fire line. For example, in a junction fire it produces the rapid advance of the point of intersection, as has been observed in experiments and numerical simulations (Figures 2a and 2b). The pyrogenic flow causes two straight parallel fire lines to 'draw in' towards each other (Figure 2c) and accounts for the higher rates of spread encountered as a closed arc of fire collapses upon itself (Figure 2d).

Ongoing research will continue to develop the pyrogenic potential model. For example, the model was recently extended to account for other near-field effects, such as localised sources of vertical vorticity (see definitions). This has provided a way to model complex modes of dynamic fire propagation, such as vorticity-driven lateral spread (see definitions), which is highly efficient at triggering zones of deep and widespread flaming, consisting of many coalescing spot fires. This can increase the likelihood of pyrocumulonimbus (fire thunderstorm) development.

These state-of-the-art, near-field models are easily applied in fire simulation models such as Spark.

Research enhances predictive capability

The recognition that fires can mutually influence each other's spread has been used in various contexts, such as prescribed burning and backburning. This research provides a theoretical basis for such practices, enabling a more quantitative understanding of their effects.

By accounting for pyroconvective interactions between different fires or different parts of a fire line, this research improves the estimation of the overall power of a fire. When combined with research into the atmosphere's role, it can alert forecasters to the likelihood of a fire transitioning into a more extreme event, such as a pyrocumulonimbus storm. This could better inform burning operations and help to avoid unexpected fire blow-ups.

Ultimately, the research enables the modelling of key aspects of fire behaviour that was previously only possible using computationally expensive, coupled models. The near-field techniques that form the pyrogenic potential model allow complex modes of fire propagation to be simulated within operational timeframes.

The research team is discussing the potential uses of this research with end users, including use in firefighter training materials and equipping fire behaviour analysts with technological tools to assess the likely progression of bushfires and the potential for escalation. ■

A WORD FROM THE EMERGENCY SERVICES

"This project has demonstrated the feasibility of using computationally efficient approaches as a proxy for more costly approaches to modelling dynamic fire behaviours. Investigation toward incorporating this work into trial operational models and training is both progressing and very promising. This exciting work is directly relevant to strongly enhancing our understanding and predictive capacity in terms of dynamic fire behaviours."

Brad Davies, Fire Behaviour Analyst, NSW Rural Fire Service

NEW SA ROUTINE SERVICE REGISTRATION

Changes to South Australia's restricted plumbing registration for routine service work aligns with an FPA Australia proposal.

BY **TOM BICKNELL**

FPA Australia

The South Australian Government announced changes in June to the restricted classes of plumbing registration that cover individuals performing routine service work on fire protection systems.

The changes reflect a proposal made to the SA Government by Fire Protection Association Australia (FPA Australia) in 2018, and are the outcome of negotiations between the Association, Consumer and Business Services (CBS) SA and the state's Deputy Premier, the Hon Vickie Chapman MP.

Two new classes of restricted plumbing registration have been introduced with the changes, one covering routine servicing of fire hydrants up to six-monthly inspections and hose reels up to yearly inspections, and one allowing individuals undergoing training to conduct routine service work under supervision.

These new classes complement a single existing class of restricted plumbing regulation in SA, which was introduced in 2017 and covers routine servicing of all fire protection systems connected to the mains water supply. This class has been amended to add the ability to repair some hose reel components, and to remove one required unit of competency.

The SA Government is currently evaluating a phase-in period for the new classes of registration, in consultation with industry.

FPA Australia is delighted with the changes, which are the end result of two years of negotiation between the Association and the SA Government after the earlier introduction of the restricted registration for routine service work.

"Following the 2017 restricted registration introduction, the Association has fought hard for a revised system that better aligned with industry practices and delivered improved community safety outcomes, despite opposition from other stakeholders who were against any changes being implemented," said Chris Wyborn, FPA Australia's General Manager of Education and Bushfire Services.

"These new restricted classes of registration do just that, and we would like to recognise the willingness of the SA Government and Minister Chapman to work with industry on an improved approach."

CBS has invited FPA Australia to continue that collaboration, with an eventual extension of these new restricted classes of registration once the new routine service-training package is available.

The scope of the new classes of restricted plumbing registration is summarised below, and further detail on qualification requirements is available on the FPA Australia website.

Existing class

Condition of registration—limited to routine testing and inspecting of fire hose reels, repair of hose reel components downstream of the gate valve, and the six-monthly (or more frequent) testing and inspecting of other fire suppression systems as specified by AS 1851.

Scope of work—inspecting or testing of a fire protection service consisting of water pipes and firefighting equipment (such as sprinklers, hoses and hydrants) that are connected to the mains water supply. It includes all testing of fire hose reels but does not include annual or greater testing—e.g. three-yearly testing of fire sprinkler systems or hydrants. It does not include installation or repair work other than the repair or replacement of fire hose reel components that are downstream of the gate valve.

New restricted class of registration

Condition of registration—restricted plumbing work limited to routine testing and inspecting of fire hose reels, repair of hose reel components downstream of the gate valve, and testing and inspection of hydrant valves and booster assemblies up to six-monthly testing.

Scope of work—inspecting or testing of fire hose reels, hydrant valves and booster assemblies connected to the mains water supply, as specified by AS 1851. This includes:

- six-monthly and annual testing of fire hose reels
- the repair or replacement of fire hose reel components that are downstream of the gate valve
- inspection of hydrant valves and booster assemblies up to six-monthly testing.

It does not include:

- installation or repair work, other than the repair or replacement of hose reel components downstream of the gate valve
- inspection or testing of pumpsets.

New supervised class of restricted registration

Condition of registration—restricted plumbing work limited to routine testing and inspecting of fire protection equipment under the direct supervision of a person registered to perform this work without supervision.

Scope of work—inspecting or testing of a fire protection service consisting of water pipes and firefighting equipment (such as sprinklers, hoses and hydrants) that are connected to the mains water supply. The work must be performed under the direct supervision (within sight and/or hearing) of a person holding a plumbing worker's wregistration authorising them to perform the work without supervision. It does not include installation or repair work. ■

NEW CATEGORY AT FIRE PROTECTION INDUSTRY AWARDS 2019

PHOTOS: FPA AUSTRALIA

2018 Young Achiever of the Year Matt Dalgety (above).

The industry will come together in November to celebrate the best and the brightest at the Fire Protection Industry Awards 2019 Gala Dinner.

BY **TOM BICKNELL**

FPA Australia

Last year's awards saw record attendance levels and brought together nearly 300 fire protection professionals to celebrate the industry's finest.

Now in its fourth year, the Fire Protection Industry Awards continues to grow and this year it introduces a new category—the Emerging Fire Protection Industry Leader Award. This new honour acknowledges and celebrates industry professionals who have spent more than two years working within the fire protection industry and who are making their mark on their workplace and the industry.

At the upcoming Fire Protection Industry Awards 2019 Gala Dinner on 8 November, two awards will be presented by the Fire Protection Association Australia Board, and nine awards will be presented by a panel of judges drawing expertise from across the fire and construction space. The judges for 2019 are:

- Bronwyn Weir, Managing Director, Weir Legal and Consulting Pty Ltd
- Amanda Leck, Director Community Safety and Resilience, AFAC
- Blake Bambridge, Fire Designer, LCI Consultants
- Trent Curtin, Assistant Chief Fire Officer for Fire Safety, Metropolitan Fire Brigade.

Award winners and finalists will be recognised at the Awards Gala Dinner, held this year at the beautiful Crown Aviary overlooking the Melbourne skyline. ■

More information is available at www.fireprotectionawards.com.au.

Fire Protection Industry Awards 2019 categories

There are a total of nine award categories for the 2019 Fire Protection Industry Awards, including:

- Fire Protection Project of the Year (under $1 million/over $1 million)
- Harry Marryatt Fire Protection Company of the Year (1–49 employees/50+ employees)
- Barry Lee Technical Excellence Award
- Young Achiever of the Year
- Ron Coffey Award for Excellence in Bushfire Protection
- Innovative Product and Technology Award
- Emerging Fire Protection Industry Leader Award.

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Gala Awards Dinner
8 November 2019 – Crown Aviary, Melbourne

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WHAT HAPPENS WHEN WOMEN THRIVE

A LIFE AND A CAREER IN FIRE

Prominent women from across fire management in North America and Australia came together to share stories of what has helped or hindered their careers, and what still needs to be done to enable them to thrive.

BY **AMY MULDER**

Bushfire and Natural Hazards CRC

The fire and land management sector has engineered shifts in gender diversity over the last few decades that have allowed many women's careers to thrive. Despite this progress, challenges persist, including internal processes of unconscious bias and structural problems, such as the lack of private, comfortable spaces for women to breastfeed.

A shared livestreamed panel discussion was held as part of the 6th International Fire Behaviour and Fuels Conference this year between Sydney and Albuquerque, through the International Association of Wildland Fire. The panel 'What happens when women thrive—a life and a career in fire' saw prominent women from academic and operational backgrounds, at different stages of their lives, share their experiences of what helped or hindered their careers.

The Sydney panel was moderated by Bronnie Mackintosh, Training Officer, Fire and Rescue New South Wales. Panellists included:

- Dr Mika Peace, Research Scientist, Bureau of Meteorology and Bushfire and Natural Hazards CRC
- Erika Lind, Prescribed Fire Planning Officer, Forest Fire Management Victoria
- Allison Donovan, District Manager, Department of Biodiversity, Conservation and Attractions, Western Australia.

In Albuquerque, Dr Tamara Wall from the Desert Research Institute, and Tami Parkinson from the US Forest Service, moderated the discussion with the panellists:

- Annie Benoit, National Wildfire Coordinating Group Training Specialist
- Maria Sharpe, Fire Science and Information Manager, Canadian Interagency Forest Fire Centre
- Michelle Walker, Deputy State Director-Support Services, Bureau of Land Management Idaho State Office
- Deanne Shulman, retired, US Forest Service.

The panel session opened with an acknowledgement of the complementary sets of skills both women and men bring to teams.

"This panel is a discussion about the value of those skills and perspectives, and successes that can result for all, when women thrive in their fire careers," said US host Tami Parkinson.

Reflecting on strengths and skills women bring to teams, Allison Donovan also spoke of the difficulty in recognising her own personal strengths as she shared how the tragic impacts of the Black Cat Creek Fire became an opportunity to recognise how her strengths contributed to the recovery of the community.

"The aftermath of this event was really when my true strengths were needed by my team," said Ms Donovan.

PHOTO: AMY MULDER, BUSHFIRE AND NATURAL HAZARDS CRC

L to R– Dr Mika Peace, Allison Donovan, Erica Lind, Bronnie Mackintosh.

> "This panel is a discussion about the value of those skills and perspectives, and successes that can result for all, when women thrive in their fire careers."
>
> Tami Parkinson

She called upon skills including empathy, listening and understanding when engaging with lots of different people—staff, families and extended families—on the path to recovery.

"Many of these traits are often referred to as soft skills and can generally be attributed to the sorts of skills that women bring.

"I never really imagined that being a woman would help me get through a situation like this," Ms Donovan said.

For Dr Mika Peace, the difficulty in recognising her strengths was tempered by the support and confidence from supervisors, which was critical to her decision to do a PhD in fire weather and fire behaviour.

Dr Peace said the phenomenal support from her supervisors and the CRC made the decision easy.

"I went to the 2012 Perth AFAC conference with a seven-month-old child and gave a presentation there, and actually won an award for that presentation—the speaker award," said Dr Peace.

"People voted for me. The fact that all of my colleagues believed in the fact that yes I could show up with a child and contribute to the science, and to the fire space, was actually really important."

There is still a way to go though. Dr Peace called for changes in workplaces to make breastfeeding an easy reality for women. In providing a private, comfortable and clean space for women to express milk or breastfeed, organisations can better support mothers returning to work and, ultimately, benefit families.

Breastfeeding and workplaces are often incompatible, but Dr Peace thinks this can change by leveraging the existing strengths of the industry.

"It shouldn't be that hard. We are operational organisations. We are really good at logistics," said Dr Peace. "We should be able to find a better solution for the next generation of women."

Albuquerque panellist Annie Benoit also shared her experience breastfeeding as a working mum in fire.

"I would pump on prescribed fires and fires and go to great lengths to orchestrate and make it all work," said Ms Benoit.

"It's been a great career but definitely having a family and working full time in fires can be a challenging road. I'm very grateful: it's forced me to come up with some creative solutions to make it all work."

Among the moving stories of strength, support and struggle was the theme of unconscious bias as a persistent barrier to women's careers thriving in fire.

Erica Lind explained that language is part of this, and how witnessing even subtle comments can have an accumulative effect on those who people may assume are unaffected bystanders.

"We can all play a part in calling out those subtleties, particularly among peers—which can be really uncomfortable sometimes—but just think of the minority, them having to do that is even scarier," Ms Lind said.

She explained that a safe culture will ensure women can participate in robust conversations and ultimately contribute their potential to the organisations.

The panel discussion provided conference delegates with valuable insights into moments of both struggle and gratitude at points of varied careers.

Alen Slijepcevic, President of the International Association of Wildland Fire, said the panel session was one of his conference highlights.

"The panel provided great discussions and personal stories from female colleagues in Australia, the US and Canada. The words that come to mind are passion, caring, intelligence, clarity and thoughtfulness, but also hurt, sacrifice and self-doubt," Mr Slijepcevic said.

"It taught us that we need to think more about our biases. We also heard how important the Male Champions of Change are in changing culture and providing opportunities for women," he said.

The Sydney arm of the 6th International Fire Behaviour and Fuels Conference was hosted by the Bushfire and Natural Hazards CRC , with the support of the Bureau of Meteorology and the NSW Rural Fire Service. ■

PHOTO: AMY MULDER, BUSHFIRE AND NATURAL HAZARDS CRC

The two all-female panels from Sydney, Australia and Albuquerque, United States discussed women in fire management.

PHOTO: WARREN FREY

AFAC TASMANIA FIRE REVIEW

AFAC's independent review into the 2018–19 Tasmania fire season provides oversight to the contributing factors of the state's multiple bushfires and the operational response.

Following the devastating fires in Tasmania last summer, AFAC has published a review covering response and strategic recommendations.

BY **ALANA BEITZ**

AFAC

Spanning from December 2018 to March 2019, the fires that gripped Tasmania throughout summer scorched a staggering 210,000 hectares—the largest area burned in a fire season in Tasmania since 1967.

An AFAC independent operational review has been published to reflect upon how Tasmanian agencies responded to the event and provide observations and recommendations at a strategic level.

Learning for the future

Recognising the value of reflecting on incidents to identify lessons and seeking direction to plan and prepare for future events, the Tasmanian Government requested a review into the management of the 2018–19 bushfires by the state's fire agencies: Tasmania Fire Service (TFS), Tasmania Parks and Wildlife Service (PWS) and Sustainable Timber Tasmania (STT).

Tasmania has a history of proactively seeking external reviews of significant fire seasons, demonstrating the state's culture of seeking to learn from major events. Previous reviews for Tasmania's fire seasons also took place in 2013 and 2016.

Tasmania's 2016 fires were described as unprecedented, but the same cannot be said of this summer. The events of 2016 provided the precedent for the events of 2018–19. The 2019 review established that the Tasmanian fire agencies were not caught unaware by the most recent fire season and were able to successfully apply organisational structures and firefighting tactics that had been refined through past experiences. The review considered it a credit to the Tasmanian fire agencies that many of the lessons of 2016 appear to have been learned and put into practice by 2019.

The review sought to describe the causes and chronology of the 2018–19 fires, and to outline the lessons to be learnt from the recent fire season. After identifying the lessons, the review team made suggestions as to how they could be turned into improvement of practice.

Researching the field

AFAC identified a team of three from across the sector to carry out the review. Department of Fire and Emergency Services WA Deputy Commissioner Mal Cronstedt chaired the team, which also included Queensland Parks and Wildlife Service Director Asset Services Guy Thomas and AFAC Director Capability and Assurance Paul Considine. In conducting the review, the team drew upon their broad and varied experience of urban fire, rural fire, land management and aviation operations in both Australia and overseas.

The review team travelled to Tasmania in March and April 2019 to meet with Tasmanian fire agency personnel, as well as representatives from other agencies, government and representative bodies. During their Tasmania tour, the review team visited numerous firegrounds to discuss the

Firefighters in action at Gells Lookout Forest, Tasmania.

PHOTO: WARREN FREY

strategies used at each site. The team considered documentation relevant to state emergency management arrangements, preparedness, response and recovery and obtained feedback from stakeholders about their experience of the management of the fires.

To ensure the public's voice was represented in the review, a call for submissions was published in the Tasmanian press on 6 April 2019 and distributed through social media. In total, 80 submissions were received, read and regarded by the review team. While the number and detail of the submissions restricted the review team's ability to respond to each point, their content was carefully considered and reflected in the major themes of the review. Where permitted, the submissions have been published to form a record of all the issues that were subject to public debate following these events.

Testing conditions

The summer of 2018–19 was Tasmania's second warmest on record and most areas had little, if any, rain for about six weeks from late December to early February. January had about one-fifth of its average rainfall and was Tasmania's second driest on record. These conditions resulted in extreme dryness and rapid curing in most vegetation types, including wet forests and moorlands, turning vegetation that would ordinarily be too moist to burn into available fuel. The review received reports of firefighters witnessing unusual and unpredictable fire conditions they had not previously experienced, including fires carrying through very tall 'wet' Eucalyptus regnans forest and burning through rainforest ecotone vegetation communities that would ordinarily provide natural control lines.

Extensive bands of lightning extended across the western and south-western areas of the state on 14 and 15 January, with the second event producing over 2,400 dry lightning strikes. On the parched landscape, the lightning resulted in over 70 new fires breaking out across the state, with several becoming significant fires, including the Gell River, Riveaux Road, Great Pine Tier, Moores Valley and Celtic Hill fires.

While there was significant impact on Tasmania's landscape—including the 22 fires that burned through 95,000 hectares of the Tasmanian Wilderness World Heritage Area—the review credited the Tasmanian fire agencies and their staff for the prevention of injuries or fatalities to the public. There were also no fatalities among firefighters responding in arduous and remote locations and injuries did not occur in significant numbers.

Insights lead to improvement

The review offered nine recommendations, covering issues such as developing remote areas and winch-capable firefighting capacity, whole-of-state fuel management and burning programs, firefighters' shift length and patterns, centralised control, and the possibility of a state control centre for emergency management in Tasmania. The review invited Tasmanian authorities to consider these recommendations, while acknowledging that agencies will prioritise them as they see fit. In comments made at the time that the report was released publicly, the Tasmanian Government stated that it agreed in principle with all of its recommendations.

The review benefitted from the input of representatives of the Tasmanian fire agencies, representatives of interstate agencies that assisted with the management of the fires, officials from the Tasmanian Government and representatives of organisations with an interest in promoting the values of the Tasmanian wilderness areas. The review team also acknowledged the time taken by members of the public and interested parties to respond to the call for public submissions to the review. ■

PHOTO: TASMANIA FIRE SERVICE

Incident management professionals from Tasmania and other Australian jurisdictions work together at the Southern Region Office in Cambridge, Tasmania.

The AFAC independent operational review of the management of the Tasmanian fires of December 2018 to March 2019 is available on the Tasmania Fire Service website: www.fire.tas.gov.au/userfiles/AFAC/AFAC_Review.pdf.

BUILDING TRUST: PROFESSIONALISING FIRE INVESTIGATION

Fire investigators from across Australia and New Zealand can have their credentials recognised through industry-agreed standards developed through the Emergency Management Professionalisation Scheme.

BY **PETER WILDING**

Fire and Emergency NZ

Telling others to "trust us, we are professionals" no longer cuts it in our communities and our courts. We all want to know that the dentist about to drill into our teeth, the accountant providing crucial financial advice, or the engineer who calculated the load-bearing stresses of our buildings all had the necessary skills, learning and experience to carry out their roles to a competent and professional standard.

Many different industries have professional standards schemes that provide confidence their practitioners have the appropriate learning, experience and currency in their field to carry out their role proficiently.

Over the last two years, the AFAC Fire Investigation Network, comprising of representatives from fire agencies across Australia and New Zealand, has worked with AFAC Emergency Management Professionalisation Scheme (EMPS) General Manager Paul Considine to develop industry-agreed, professional standards for fire investigation to achieve and retain recognition through EMPS. Applicants can apply to become registered or certified fire investigators.

By July 2019, 69 fire investigators from across Australia and New Zealand achieved recognition as registered fire investigators. Several applications are currently in progress for the higher-level certification.

The AFAC brand carries weight and respectability and the endorsement of its professionalisation scheme serves our fire investigators well. Having access to a professionalisation scheme within our industry provides our fire investigators with an ability to illustrate their competence and credibility to courts, police and others who rely on our determinations of fire origin and cause.

To become a registered fire investigator, the applicant must:

- have successfully fulfilled the role of fire investigator at fire scenes of moderate impact and complexity for at least one year
- have investigated a minimum of five instances, including all associated reporting requirements with at least one instance being within 12 months
- have a minimum level of training equivalent to *501B Unit—Investigate cause of fire*
- commit to the EMPS code of ethics
- be supported by their home organisation or jurisdiction.

In order to maintain their registration, the fire investigator must complete four investigations over a two-year period and complete a minimum of ten hours of professional development in a series of topics specified by the EMPS standard.

Certification is the highest-level credential and is for very experienced fire investigators. To achieve certification, the applicant must:

- have PUA60913 Advanced Diploma in Fire Investigation or equivalent
- present a comprehensive portfolio of evidence
- have conducted three complex fire scenes
- be interviewed by a panel of industry-appointed scrutineers, including subject matter experts
- commit to the EMPS code of ethics.

To maintain certification, the fire investigator must complete 30 recorded hours of knowledge development per year, through training courses, seminars, conferences, online learning, journal articles and research, as specified by

PHOTO: AFAC

The AFAC Fire Investigation Network met in Melbourne in August to discuss steps forward for profession-alisation.

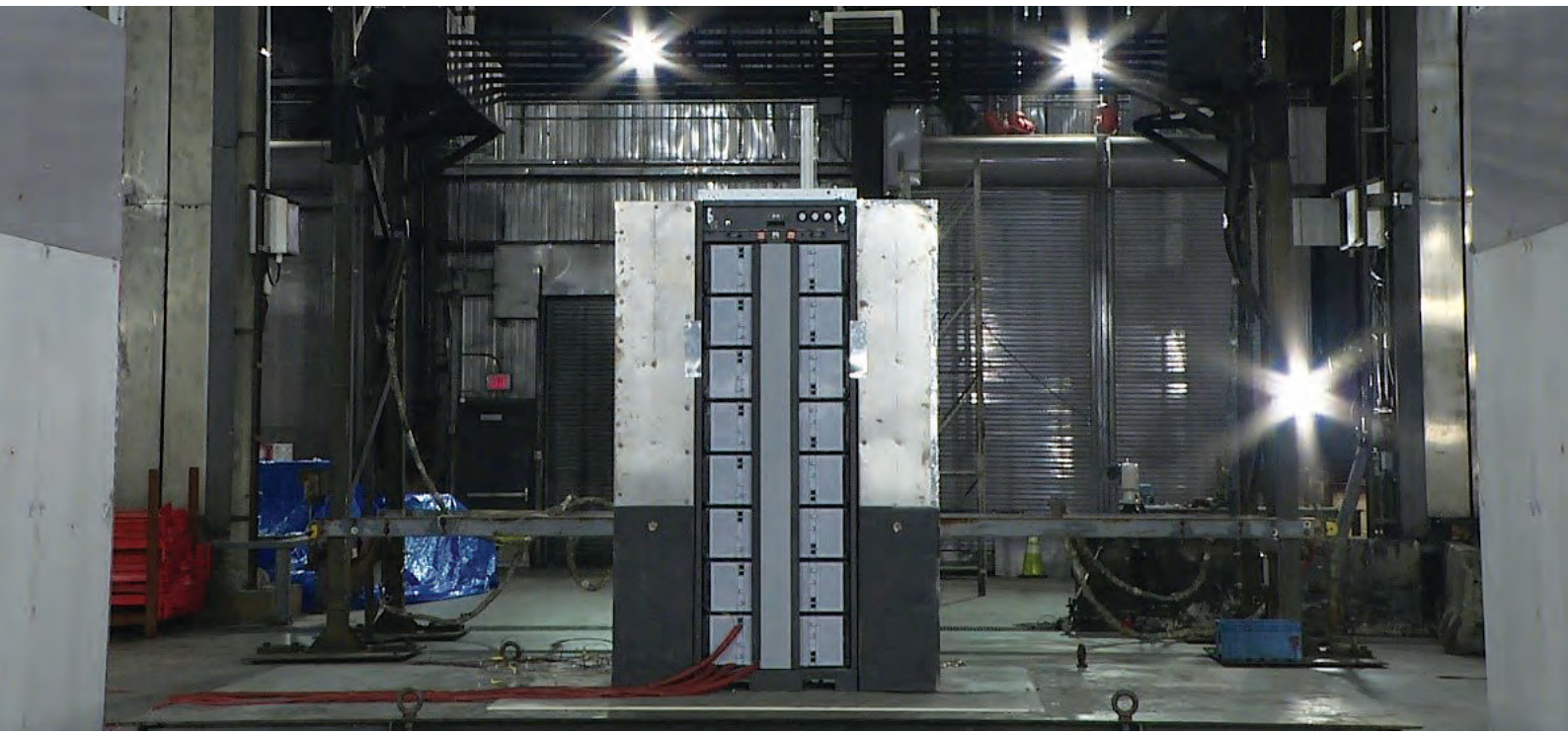
PHOTO: COUNTRY FIRE AUTHORITY

Fire investigators at the scene of the Berwick Aquarium fire.

the EMPS standard and undertake two complex fire investigations within a two-year period.

The community and our stakeholders place their trust in our fire-cause determinations. We owe it to them that our investigators are well trained, perform their role competently and maintain knowledge of their subject. The professionalisation scheme helps us to demonstrate exactly that. ■

Peter Wilding is the National Manager of Fire Investigation for Fire and Emergency NZ and the Chair of the AFAC Fire Investigation Network.



PHOTOS: FM GLOBAL

ENERGY STORAGE SYSTEMS AND FIRE PROTECTION

With demand rising for lithium-ion battery-based energy storage systems, new recommendations have been released for their protection from fire.

FIGURE 1. Example of full-scale free burn test set-up for the NMC module. Mock racks are located on either side of the ESS rack to measure the exposure hazard to adjacent equipment, and representative structure walls are located across a 2.7 m separation to measure the exposure to surrounding objects.

BY **MICHAEL STUCKINGS**

Operations Chief Engineer, FM Global

Lithium-ion battery-based energy storage systems (ESS) are in increasing demand for supplying energy to buildings and power grids. However, they are also under scrutiny after a number of recent fires and explosions. It has become clear that lithium-ion batteries are vulnerable to thermal runaway, leading to a venting of flammable gases and subsequent combustion, and creating new fire protection challenges.

To increase awareness of what can be done to improve safety around this technology, mutual insurance company FM Global has publicly released first-of-its-kind research and recommendations. These are based on small to large-scale fire tests recently conducted on ESS sized for commercial applications, such as manufacturing, office buildings, power generation and utility use.

The good news is that the research shows that ESS deployments can be made safer through the combination of automatic sprinklers and the careful spacing of ESS racks.

Determining the fire hazard

From a fire protection standpoint, the overall fire hazard of any ESS is a combination of all the combustible system components, including battery chemistry, battery format (for example, cylindrical, prismatic or polymer pouch), electrical capacity and energy density. Materials of construction and the design of components such as batteries and modules also play a part in determining hazard levels.

The fire testing was conducted at the FM Global Research Campus in Rhode Island, US, and the ESS comprised of either iron phosphate (LFP) or nickel manganese cobalt oxide (NMC) batteries. Both of the ESS tested had solid metal side and back walls, an open front, and contained 16 modules of prismatic batteries arranged in eight levels of two modules. The LFP system had a rating of 83.6 kilowatt hours, while the NMC system had a rating of 125 kWh. Figures 1 and 2 show the arrangement and results of a large-scale free burn test on an NMC system.

At all test scales, which ranged from a single-battery module to full ESS racks containing 16 modules each, the ESS comprised of LFP batteries was found to have a lower overall fire hazard. In the sprinklered tests where a single sprinkler operation was sufficient to contain the

FIGURE 2. NMC fire development during large-scale free burn test: near time of ignition (left), near time of predicted sprinkler operation (centre), peak heat release rate (right).

fire to the rack where it ignited, the fire did not significantly affect any of the modules in the adjacent rack.

Under the same conditions, a test involving a system comprised of NMC batteries resulted in the fire spreading to an adjacent rack, and the number of sprinkler operations represented a demand area greater than 230 square metres.

Delay or prevent

Despite the design of the racks effectively shielding the fire from sprinkler water, the fire tests proved that sprinklers could delay or prevent fire spread to adjacent racks. Coupled with adequate separation from nearby combustibles and the addition of thermal barriers between racks, the hazard can be reduced even more. However, without a protection system that can suppress the fire in the early stages, a prolonged burn, high water demand and damage to surroundings are likely.

We recommend protection coupling sprinkler system design and ESS installation guidance, such as the appropriate separation distance, to keep the fire hazard within acceptable levels.

Current understanding tells us that the best protection recommendations are as follows:

- the sprinkler system should provide a minimum discharge density of 12 millimetres per minute using sprinklers with a K-factor of 81 litres/min/bar$^{1/2}$ or greater
- a nominal 74 degrees Celsius temperature rating and RTI of 27.6 m$^{1/2}$s$^{1/2}$
- for ceiling heights in the range of 3.0 metres to 7.6 m, the ceiling construction should have a minimum one-hour fire rating.

The protection recommendations for this type of LFP system should include:

- Without fire protection: the minimum space separation from any part of the ESS should be 1.2 m from non-combustible objects and 1.8 m from combustible objects, including adjacent ESS racks.
- With sprinkler protection: the minimum space separation from any part of the ESS should be 0.9 m from non-combustible objects and 1.5 m from combustible objects. The sprinkler system water supply should be designed for a minimum 230 m^2 demand area and a duration of at least 90 minutes.

Protection recommendations for this type of NMC system:

- Without fire protection: the minimum space separation from any part of the ESS should be 2.4 m from non-combustible objects and 4.0 m from combustible objects, including adjacent ESS racks.
- With sprinkler protection: the minimum space separation from any part of the ESS should be 1.8 m from non-combustible objects and 2.7 m from combustible objects. The sprinkler system water supply should be designed for the total room area where the ESS is located, and the water supply should be calculated as 45 minutes times the number of adjacent racks, but no less than 90 minutes.
- For ESS comprised of multiple racks, without large-scale fire testing, each individual rack should be separated like combustibles at the distances outlined above.

For ESS that represents a different kind of fire hazard to those already listed, due to design features and/or power rating, appropriate large-scale fire testing is recommended to determine if a more robust protection scheme is needed.

As fires involving lithium-ion batteries are known to reignite at any time—from minutes to days after the initial event—a fire watch should be present until all potentially damaged ESS equipment containing lithium-ion batteries is removed from the area. Adequate cooling of the batteries is necessary in order to prevent reignition.

The results show that properly designed sprinklers can be effective in delaying or preventing fire spreading to adjacent ESS racks and that separation between ESS and other combustibles is essential to effective fire protection. ■

To learn more, download the full research report from the FM Global website at www.fmglobal.com/researchreports.

PERSPECTIVES ON THE SECTOR
WITH DOMINIC LANE

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 Dominic Lane, Chief Executive of the South Australian Fire and Emergency Services Commission.

You have recently taken up the CEO role with the SA Fire and Emergency Commission (SAFECOM), but could you provide us with a little background of your previous involvement in emergency management?

I started my career in emergency management as a volunteer at my local fire brigade. I came from a small rural community that could be described as highly resilient. Nearly everyone in the community helps each other out. This is as strong today as it was back then.

My first paid role was as a part-time Deputy Fire Control Officer at my local council, and I was then fortunate to secure a full-time role as Fire Control Officer in western NSW. I gained a broad range of experiences in strategic planning, advocating for change and working across the emergency management and community sectors. I also learnt a lot about listening, adapting to community expectations and working with local community leaders to achieve results. From there I worked in a range of management and executive roles in the NSW Rural Fire Service until I moved on in 2012.

PHOTO: SAFECOM

Dominic Lane has been appointed Chief Executive of the South Australian Fire and Emergency Services Commission (SAFECOM).

You were the Commissioner of ACT Emergency Services Agency (ESA) for six years. What were the biggest challenges for ESA?

Community complacency. It's fair to say every state and territory in Australia faces its own challenges around community complacency. In the ACT, as Canberra is a planned and relatively new city, the impact of natural disasters is less than what other communities potentially face. It also has a relatively transient population so there is a constant challenge to continually engage with and educate the community of the risks.

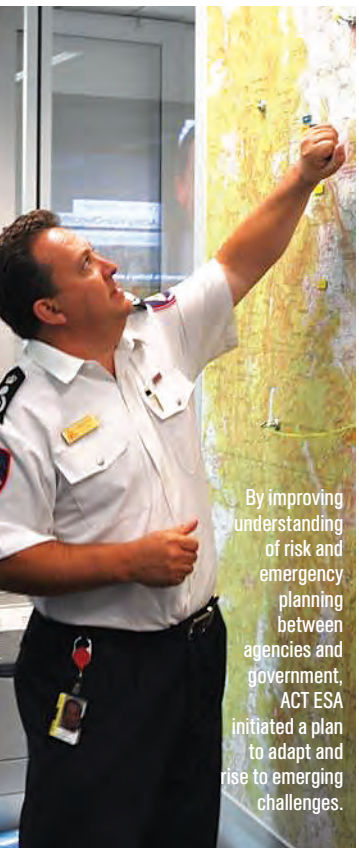
And what achievements are you most pleased with?

I was very fortunate to lead a progressive organisation through a period of growth and change. Canberra is a fast-growing city. Such growth places pressures on the governments' effectiveness to deliver all sorts of services. In the ACT ESA we were able to work in partnership with our government to better understand its risks and challenges in emergency management. By improving this understanding we were able initiate a plan that guides its emergency services to adapt and rise to emerging challenges. This plan is also underpinned by a significant government commitment to grow investment in its ambulance, fire and emergency services.

South Australia is reliant on aerial firefighting support and you have had a long association with National Aerial Firefighting Centre (NAFC). Can you comment on the benefits of national cooperation through NAFC?

NAFC is an outstanding example of national cooperation. Under our federated model, states and territories are responsible for emergency management. The NAFC model enables effective and ongoing cooperation between each of the states, supported by Australian Government funding. Through NAFC we have a joint capability that no single state could achieve on its own.

SA has long been an actively engaged and effective partner in NAFC. For many years, Greg Nettleton, former Chief Officer of the South Australian Country Fire Service, chaired the board of NAFC and through his tenure we saw progression towards shared and well-managed aircraft contracts, improved



By improving understanding of risk and emergency planning between agencies and government, ACT ESA initiated a plan to adapt and rise to emerging challenges.

PHOTOS: ACT ESA

Dominic Lane (front, third from left) held the position of ACT ESA Commissioner from 2013.

intelligence gathering and information management systems.

There is a strong reliance on volunteers in CFS SA and SA State Emergency Service, as are reflected in other jurisdictions. Do you see this continuing?

Of course this will continue. There is obvious evidence that the community is willing to help each other, particularly in times of crisis. To best tap into this willingness to help, we as emergency services need to adapt. As government agencies we need to be better engaged with our communities. We need to be asking the question, 'what can we do to help you to help yourselves?'. We need to possibly break away from some of our traditional mindsets of what our structures and services are. We have challenges in volunteering, and if we ask the right questions, the solutions will follow. If we adapt to where the evidence leads us then we will continue to effectively deliver sustainable services to our communities through our incredible volunteers.

As emergency services, while we operate in the community, we sometimes take our eyes off reporting up to the ministers and governments. How important is this in your opinion?

This is important. My opinion and experience is that it's also quite simple. We have to operate in partnership with our governments. Partnerships do not work effectively unless there is trust. Trust builds confidence and assurance and if, as leaders of our emergency services, we have the confidence of our ministers and governments, they will listen and make things happen which provides betterment for our own people and improved community safety outcomes.

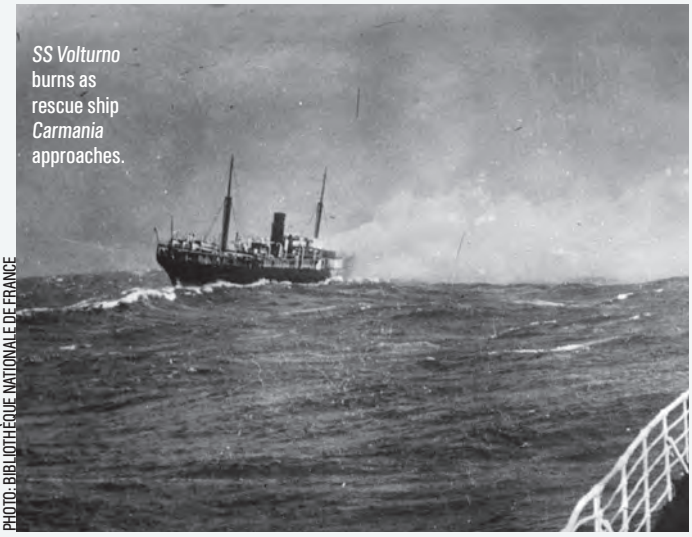
Are there particular themes or initiatives you are keen to pursue in this new appointment?

I haven't thought too much about this yet. Since commencing I have undertaken a detailed analysis of the history of Emergency Management in SA over the past 20 years. I have also spent time listening and learning from a range of people, including the four previous Chief Executives of SAFECOM. The past is providing me with significant guidance to what the future looks like.

At the commencement of my new role I feel very privileged to be playing my part in providing better outcomes to the South Australian community through our remarkable fire and emergency service agencies. ■

PHOTO: ACT ESA

Dominic Lane's upbringing in a small and resilient rural town has driven his values of community engagement and empowering strong and safe populations.



SS Volturno burns as rescue ship *Carmania* approaches.

PHOTO: BIBLIOTHÈQUE NATIONALE DE FRANCE

A fleet comes to the rescue.

SOURCE: THE GRAPHIC

La Catastrophe du Volturno.

PHOTO: LE PETIT JOURNAL SUPPLÉMENT ILLUSTRÉ

As long ago as 1907 two vessels belonging to the New England Navigation Co, the Pequannock and the Plymouth, were fitted with automatic sprinkler systems. The Princess Maud, an LMS cross-channel steamer, was the first British-built ship to be so protected. A demonstration fire in one of her cabins was successfully extinguished in 1934, heralding widespread adoption of shipboard sprinkler protection. Currently, water mist systems are increasingly proposed for passenger ships, citing lightweight and reduced water demand.

THE SS *VOLTURNO* DISASTER—1913

BY **BARRY LEE OAM**

The SS *Volturno* was an ocean liner that caught fire, and ultimately sank, in the North Atlantic Ocean in 1913. Built in Glasgow, the twin-screw ship was launched in 1906, weighing 3,000 gross tonnes and with a length of 100 metres, a beam of 13 m and a speed of 14 knots. It was a London-registered Royal Line vessel, under charter to the Uranium Steamship Company.

Volturno was on a voyage from Rotterdam to New York City, carrying a mixed load of passengers, mostly immigrants, and cargo that included highly flammable chemicals. On 9 October 1913, at approximately 6 am, fire broke out—in the middle of a gale in the North Atlantic at 49.12°N 34.51°W (about 960 kilometres from where the RMS *Titanic* was lost the year before). The forward cargo hold was fully engulfed in flames, and shortly afterwards, part of the cargo exploded, killing 80 or 90 people. Later, fire spread to the ship's coal bunkers, effectively cutting off the fire pump fuel supply.

The crew attempted to fight the fire for almost two hours; however, realising its severity and the limited options for dousing fire on the high seas, the captain had his wireless operator send out SOS distress signals. Meanwhile, several of *Volturno*'s lifeboats were lowered—but with tragic results. Carrying mostly women and children, the lifeboats either capsized in the water or were smashed by the hull of the heaving ship, killing all in those first-launched boats.

Eleven ships responded to the distress signals and headed for *Volturno*'s reported position, arriving throughout the day and into the next. Despite the heavy seas, the rescue ships launched their own lifeboats in an attempt to save passengers from the stricken vessel, but poor weather, high seas and passengers' reluctance to jump into the frigid waters all hampered rescue efforts. On board *Volturno*, the crew and some of the male passengers were unable to extinguish the fire, but they were at least able to keep it from spreading to the aft cargo holds, over which the others on board had gathered.

Shortly before dawn, a large explosion rocked *Volturno*, probably from its boilers. This caused the rescuers to feel that the ship, which had thus far not been in imminent danger of sinking, might founder at any time. And so, in the early morning of 11 October, one of the 11 rescue vessels—the tanker SS *Narragansett*—sprayed lubricating oil on the sea to help calm the surface. The combination of the oil and the lessening of the storm allowed many lifeboats to be sent to *Volturno*'s aid.

The lifeboats were all recovered by 9 am, and the rescue ships resumed their original courses. In all, 521 passengers and crew were rescued by ten of the 11 ships. The death toll was 136—mostly women and children from the early lifeboat launchings. On the night of 17 October a Dutch tanker, unaware of the events of a week before, came upon the still-smouldering hulk of the *Volturno*. The tanker lowered a boat and attempted to hail any possible survivors on board, but at daybreak, the full extent of the damage became clear. The captain, recognising the hulk was a hazard to passing ships, ordered *Volturno*'s seacocks opened and scuttled the ship. ■

FIRE AUSTRALIA 2020

Conference & Tradeshow

6-8 May – ICC Sydney

All facets of the fire protection industry come together under one roof when Fire Australia 2020 returns to Sydney.

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BY **JESSICA TEMPLE**

Technical Administrator–Projects and Standards, FPA Australia

AND **IAN FINDLAY**

Technical Officer–Projects and Standards, FPA Australia

STANDARDS

CE-030 Maritime structures
Public comment on the draft revision of AS 3962 *Guidelines for design of marinas* has closed and is currently being reviewed.

FP-002 Fire detection and alarm systems
Progress continues on revisions of AS 1603.17 (warning equipment for people with hearing impairment), AS 1670.6 (smoke alarm installation), AS 4428.3 (fire brigade panel) and AS 4428.16 (emergency warning CIE).

FP-004 Automatic fire sprinkler installations
Public comment on Amendment 2 to AS 2118.1-2017 has now closed and is being reviewed.

Progress continues on revisions of AS 2118.2 (drencher systems), AS 2118.6 (combined systems) and HB 147 (sprinklers simplified).

FP-009 Fire hydrant installations
Work continues on AS 2419.4 (new standard for STORZ connections).

FP-011 Special hazard fire protection systems
Progress continues on the revision of AS 4587-1999 (water mist systems), while the project to revise AS 3772-2008 (kitchen systems) has now been approved and will begin shortly.

FP-020 Construction in bushfire-prone areas
The taskforces for the review of outstanding items continue to progress those items.

FP-022 Fire protection of mobile and transportable equipment
The project to revise AS 5062 *Fire protection for mobile and transportable equipment* has been approved and will kick off later this year.

TS-001 Building commissioning
Progress continues on a new technical specification on building commissioning.

TECHNICAL ADVISORY COMMITTEES

The most recent round of TAC meetings was held in July, with the next round to be held in November.

TAC/1 Maintenance of fire protection systems and equipment
The draft technical documents on fire doors and exit doors, replacement of detection devices, and external barriers to evacuation are still in progress.

TAC/2 Fire detection and alarm systems
A possible technical document to address confusion regarding fire detection and alarm systems for carparks is ongoing. A speaker layout document is under review by the TAC.

The TAC discussed some common issues relating to the AS 1670 series and the different grades of Emergency Warning Control and Indicating Equipment (EWCIE).

TAC/3/7 Portable and mobile equipment
A potential document on the replacement of extinguishing agent in extinguishers after use was identified and development commenced.

Lithium battery risks and fire extinguishers were discussed.

Continuing discussions on the Australian Standards.

TAC/4/8/9 Fire sprinkler and hydrant systems, tanks and fixed
Discussions continued on the ongoing impact from the NSW building reforms and the development of guidance to industry.

The issue of different types of compressors being used in pre-action systems and dry systems was also discussed.

There was detailed discussion on "evidence of suitability" and related issues. The draft GPG on Hydrant Commissioning is being reviewed by the TAC.

TAC/11/22 Special hazards fire protection systems
Further to the approval of the project to revise AS 3772, a working group has been established and is reviewing Section 9 (Maintenance) to align with the current edition of AS 1851.

Work continues on revising IB-06 *Selection and use of firefighting foams* to address ongoing developments in this area.

FPA Australia gave evidence at the senate inquiry into the 'provision of rescue, firefighting and emergency response at Australia airports' at a Melbourne hearing in March 2019, and continues to engage with regulators on firefighting foams.

TAC/17 Emergency planning
The possibility of a revision of AS 3745 is still being considered.

IB-11 *Evacuation diagrams* is being revised to reflect changes from Amendment 2 to AS 3745-2010.

The differing state and territory requirements for emergency planning in schools were discussed.

The issue of placarding was also discussed as it is not currently identified and reflected in emergency plans.

TAC/18/19 Passive fire protection
TAC/18/19 is continuing work on updating PS-05 *Product compliance and evidence of suitability*.

Information Bulletin IB-17 *Changes to note on AS 1530.4:2014 reference in the NCC 2019* was published on 2 August after many months of development.

TAC/20 Bushfire safety
Work continues on a general Bushfire Attack Level assessment guide, as well as a proposed draft on sarking.

Bushfire planning and design practice note—performing work outside of accredited level has been published.

The TAC also discussed the effect of radiant heat for bushfire-prone roofs and the competing legislations for bushfire protection and protecting biodiversity.

AUSTRALIAN BUSHFIRE BUILDING CONFERENCE

23–25 October 2019,
Blue Mountains, NSW

The 5th annual Australian Bushfire Building Conference is 2019's essential event for building, planning and associated professionals living and working in Australia's bushfire-prone areas. FPA Australia is an event partner with the Conference.

This year, the theme of 'Liveability' will be explored across the main two-day program, featuring presentations from renowned national and international experts who will discuss the latest research, updates and technologies on building in bushfire-prone areas.

For more information, visit https://bushfireconference.com.au.

PHOTO: BMEE

FIRE PROTECTION INDUSTRY AWARDS GALA DINNER 2019

8 November 2019,
Crown Casino, Melbourne

Join us in celebrating the brightest and the best in the fire protection industry at the Fire Protection Industry Awards 2019 Gala Dinner. The Awards Gala Dinner will be held in the beautiful Crown Aviary, overlooking the Melbourne skyline.

The fire protection industry's only dedicated awards night has become a pivotal date on the calendar, with winners taking their own special place within the lasting legacy of this industry.

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

PHOTO: FPA AUSTRALIA

Russell Porteous, winner of the Meritorious Service Award 2018, Fire Protection Industry Awards.

2018 Australian Bushfire Building Conference.

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MOVERS AND SHAKERS

Greg Ayers

Dr Greg Ayers has been appointed to the Bushfire and Natural Hazards CRC's Board. Dr Ayers was the former Director of the Bureau of Meteorology and Chief of the (then) CSIRO Division of Marine and Atmospheric Research.

Mark Jones

Mark Jones has been appointed to the position of Chief Officer of the South Australian Country Fire Service (CFS). The highly credentialed fire and emergency services veteran of more than three decades has gained significant experience from roles in the Buckingham Fire and Rescue Service and the Essex County Fire and Rescue Service, United Kingdom.

Stephanie Rotarangi

The Deputy Chief Officer for the Country Fire Authority Victoria, Dr Stephanie Rotarangi, has been appointed to the Board of the Bushfire and Natural Hazards CRC. Dr Rotarangi previously was the Chief Fire Officer for Forest Fire Management Victoria (Department of Environment, Land, Water and Planning) and has over 20 years of firefighting experience in Australia and New Zealand.

Greg Leach

Greg Leach is currently the Acting Chief Officer/ Chief Executive Officer, Metropolitan Fire and Emergency Services Board (MFB) Melbourne. Mr Leach has been with the MFB for four years, and brings over 30 years of emergency service experience from senior operational and executive positions at the Country Fire Authority and Ambulance Victoria.

Kyle Stewart

Kyle Stewart has assumed the role of Acting Commissioner, NSW State Emergency Service. He has a distinguished career with the NSW Police Force, including Assistant Commissioner, Operational Communication and Information Command. Since joining the NSW Police Force in 1985, Mr Stewart has developed an extensive understanding of emergency management.

Alistar Robertson

Professor Alistar Robertson has retired from the Bushfire and Natural Hazards CRC's Board, after serving since 2007 on both this Board and its predecessor, the Bushfire CRC. He was the Chair of the Research and Utilisation Committee and was Acting Chair in 2018, during Dr Laurie Hammond's illness and following his death late last year. Prof Robertson has made many valuable contributions during his long service and his retirement will be a loss to the sector.

Fiona Gill

Fiona Gill has been appointed Director, Fire and Flood at the Department for Environment and Water (DEW) South Australia. As DEW has the role of Flood Hazard Leader, Ms Gill leads its coordination and delivery under state emergency management arrangements. She has worked with DEW in state government for the past 20 years, including as a regional director.

Dan Stephens

Dan Stephens has resigned from the position of Chief Officer/ Chief Executive Officer at the Metropolitan Fire and Emergency Services Board (MFB) Melbourne. Mr Stephens took the position in June 2018 after being recruited from England, where he was the Chief of Liverpool's Merseyside Fire and Rescue Service for seven years.

Paul Smith

Former Chief Executive Officer of the Country Fire Authority Victoria, Dr Paul Smith has resigned from his position on the Bushfire and Natural Hazards CRC Board. The CRC thanks Dr Smith for his contribution.

Michael Morgan

Michael Morgan has been formally appointed as Chief Officer and Chief Executive Officer, South Australian Metropolitan Fire Service (MFS). He took the role for an interim period of 12 months after previous MFS Chief Officer Greg Crossman retired in July 2018. Mr Morgan joined the MFS in 1986 and progressed through the ranks to Deputy Chief Officer in 2015.

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Storage | K28 ESFR Pendent Sprinkler

Viking's Model VK514 is now FM Approved as a Quick Response Storage Sprinkler providing ceiling-only sprinkler protection for storage facilities up to 55 ft (16,7 m) in height. The K28 ESFR can help increase racking flexibility while also reducing the installation and maintenance costs associated with in-rack sprinklers.

- Specifically designed to suppress high-challenge storage fires, without the need for in-rack sprinklers.
- The only storage sprinkler FM Approved* to provide ceiling-only protection for warehouses with 55 ft ceilings.
- Design Pressure of 80 psi (5,5 bar) with a remote area calculation consisting of nine sprinklers (three sprinklers installed on three adjacent branch lines).
- Classified as a Quick Response Storage Sprinkler, FM Approved to protect Class I-IV commodities, as well as cartoned unexpanded plastics, stored in either single- or double-row racks up to 50 ft (15,2 m) in height.
- Available in ordinary and intermediate temperature ratings - 165° F (74° C) and 205° F (96° C).
- Available with 1 inch NPT or 25 mm BSP thread size.

Model Number:	VK514
Base Part Number:	22894
Listings/Approvals:	FM, UL
K-factor:	28.0 (404)
Connection:	Threaded 1" NPT 25 mm BSP
Temperature:	165° F (74° C) 205° F (96° C)
Operating Element:	Fusible Link
Finish:	Brass
Item Price Group:	V150
Occupancy/Hazard:	Storage
Technical Datasheet:	F_010715

*FM Approval offered in addition to the VK514 sprinkler's existing K28 ESFR UL Listing.

General reference only. Prior to the design, layout, and/or installation of any sprinkler system, please refer to Viking's technical documentation and consult with the AHJ.

FM APPROVED

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