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AUSTRALIA Fire



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AUTUMN 2015

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About Fire Australia

Fire Australia is a joint publication of Fire Protection Association Australia, the Australasian Fire and Emergency Service Authorities Council 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 fire research organisations. *Fire Australia* is produced quarterly and distributed throughout Australia and New Zealand.

Editorial submissions are welcome and can be sent to joseph.keller@fpaa.com.au.

For more details on submitting a contribution, please contact the editors.

OUR COVER: Right around Australia, more and more homes are being constructed in bushfire-prone areas, such as this one in Melbourne's rural-urban interface.

PHOTO. DAVID BRUCE, BUSHFIRE AND NATURAL HAZARDS CRC



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RECOGNITION OF A NATIONAL CAPABILITY



By Stuart Ellis
Chief Executive
Officer, AFAC

As part of our work as the industry's national council, AFAC is currently focused on improving the standing of the fire and emergency services as a collective and formidable capability. Largely this is about recognition. Recognition of ourselves as a national capability, recognition among industry peers as well as in the community, and recognition for current serving members as well as those who have served in the past.

Today, like most days, fire and emergency services will attend on average 2,000 incidents and emergencies across the country. We have a significant national capability with 288,000 fire and emergency service personnel made up of 34,000 paid and 254,000 volunteers. Our workforce is three times the size of the Australian Defence Force, but because we all identify only with our agency, we do not consider ourselves, and are not considered by governments, as a national capability.

The publication *Every Day*, launched by The Hon Michael Keenan MP, Federal Minister for Justice, at Parliament House in December 2014, highlights the work of fire and emergency services personnel who protect communities, help people and save lives every day. It provides some insight into the work the sector undertakes. Traditionally the focus was on reacting to emergencies. Today, the priorities are working proactively and collaboratively with communities to minimise risk, developing and delivering response capabilities, and providing relief and recovery services.

The Australian community should be reassured that we have a very large and capable workforce that is well trained and ready to protect them.

What is unique about this commitment from our volunteers is that they respond when called on regardless of whether it is a public holiday, over 40°C in the shade, a family birthday or simply inconvenient. For our workforce this can often mean being exposed to danger even though every effort is made to keep their workplace as safe as possible.

This danger has on occasion resulted in the ultimate sacrifice—the death of a serving member. How our fallen are honoured and recognised is a reflection of how we respect our 'living' workforce. The Defence Force has Anzac Day, and police have held a national service annually

for some years now, which receives wide community recognition. In contrast there is currently no such industry-wide initiative for the fire and emergency services. On 1 May 2015, AFAC members will hold a memorial service on the banks of Lake Burley Griffin in Canberra to better recognise the commitment made by fire and emergency workers who have died on duty. I believe this to be an important step towards elevating our standing among governments and community for service past and present.

I am confident our work every day, as well as this memorial service, will result in a greater level of recognition nationally. I look forward to keeping you updated on our progress.

I trust you enjoy this edition of *Fire Australia*. ■

PHOTO: CES PROMOTIONS UNIT



Improving the standing of the fire and emergency services is a high priority for AFAC.

MEMORIAL SERVICE FOR FIRE AND EMERGENCY SERVICES



PHOTO: MANDY CANT, AFAC

How our fallen are honoured and recognised is also a reflection of how we respect our 'living' workforce. We have Anzac Day for defence personnel, police have held a national memorial service annually for some years and now fire and

emergency services will receive greater recognition for those who have died on duty.

AFAC is planning a National Fire and Emergency Services Memorial to better acknowledge those who have died on

duty. The memorial will be held 1 May 2015, close to St Florian's Day (4 May), who is the Patron Saint of Firefighters.

"This is the first step to establish a day of significance for fire and emergency services," AFAC CEO Stuart Ellis said.

Scheduled immediately after the first AFAC Council meeting for 2015, the event will take place at the fire and emergency services national memorial in Canberra on the banks of Lake Burley Griffin. This is a privileged position adjacent to the Anzac Parade vista from the War Memorial to Parliament House. Event attendees will include Members of Parliament, Commissioners and Chief Officers.

"We hope this service is the first in what is to become an annual tradition for recognising the commitment of the people in our industry," Mr Ellis concluded.

REPORT SHOWS STRONG GROWTH OF EARLY WARNING DETECTION ALARMS



Peter Meikle

Recently, a global fire protection industry report by IHS Technology entitled *The World Market for Fire Detection and Suppression Products—2014 Edition* was

released showing strong growth in early warning smoke detectors worldwide. *Fire Australia* sat down with Peter Meikle, Vice President of Xtralis, to find out why.

What did the report find?

Peter: We are seeing a significant increase in the sales of early warning aspirating smoke detection and alarm systems. IHS is a very reputable organisation that has been doing this market research for many years so we are very pleased that, as well as showing strong upswing in the category, the report has also found that Xtralis has grown its market share in detection with a significant lead in the aspiration smoke detection (ASD) category.

Why is there such strong growth in ASD?

Peter: We believe a combination of factors has led to this growth. First, the rise of nuisance alarms is adding significant time and cost across the board. ASD or early warning systems are much less likely to trigger in error, basically cutting out the false alarm issue.

Second, insurers are now taking a much more active role in the process of specifying what types of detection equipment should be installed in certain building types. This means that insurers are specifying early warning systems for more buildings that require or can benefit from them.

The third point is about education. Brands like Xtralis and other advocates of very early warning detection systems have spent many years highlighting the usefulness of these systems to end users and this work is now really bearing fruit.

What do you believe are the biggest challenges in the current market for detection manufacturers?

Peter: Awareness is always a challenge. There is still a lack of awareness and all manufacturers have a challenge to continue promoting the key benefits of very early warning systems.

What is the future of ASD?

Peter: With regard to very early warning detection, I think the remaining growth areas will be where the value of ASD is not absolutely mission critical, but the overall benefits outweigh the use of traditional detection equipment. For example, while high-value storage and data centre operators have understood the need for very early warning for some time, we are seeing a shift towards ASD in aged care, hospitals and residential buildings not only because of the early warning component but also multiple levels of alarm, rich data reporting, dust monitoring, integrated analytics and all of the other benefits. I anticipate it will be these areas that drive our growth into the future.



ALL RESEARCH TO DRIVE CHANGE

RESOURCES ONLINE

The resources from the Bushfire CRC's Research to Drive Change online forum series are all now available at www.bushfirecrc.com/drivechange. This includes videos, reports and *Fire Notes*.

The series communicated the final three years of Bushfire CRC research, providing the means to begin sharing research findings with fire and land management agencies. All the forums and their accompanying documentary videos are available online. These

important resources will continue to be accessible into the future.

The forums used a practical approach to allow participants from all over Australia and overseas to be involved in interactive discussion. The series was well attended, with many agencies and brigades showing the forums on big screens, allowing participants to watch and discuss as a group.

Each forum featured leading researchers and industry end users

discussing the research findings, implications for industry and answering questions from the audience.

Topics included community safety and education, human behaviour, next-generation fire modelling, firefighter health and safety, ecology, incident management, legal and policy issues, mapping fire in the tropical north and economics to aid decision-making.

For all the research resources, make sure to visit www.bushfirecrc.com/drivechange and for research utilisation, visit the AFAC website.





FIRE AUSTRALIA CONFERENCE SHAPING UP AS LARGEST EVER



The Fire Australia 2015 Conference and Exhibition on the Gold Coast is shaping up as the largest in the event's history. With all sponsorship opportunities now taken and 71 exhibition booths, the event is sure to be an outstanding success.

Fire safety depends on many factors. Critical to this is ensuring that fire safety products are designed, installed and maintained so that they are fit-for-purpose. It is essential that the right decisions are made from concept to completion and that appropriately certified products are selected and installed to ensure the reliability and longevity of every system.

This year FPA Australia is pleased to have secured a number of highly influential and sought-after keynote speakers from Australia and abroad for the Fire Australia 2015 conference. Check out all the keynote speaker profiles on pages 28-29 of this edition of *Fire Australia* magazine.

Fire Australia 2015 is the premier fire protection industry conference, attracting a wide range of representation from businesses, government and fire safety practitioners. The breadth of information on offer will ensure a rewarding experience for everyone who attends the conference and exhibition.

Announcement of Fire Australia 2015 sponsors

FPA Australia is extremely pleased to announce the sponsors of the Fire Australia 2015 Conference and Exhibition.

We have previously announced the Platinum Sponsors Flamestop and Tyco Fire Protection Products. The association is now also pleased to announce the Gold Sponsors as Alan Wilson Insurance Brokers and Brooks Australia. The Silver Sponsor is Kidde Australia while the Conference Dinner sponsor is Chubb Fire & Security. We also thank Pertronic Industries and Globe Fire Sprinkler Corporation for their satchel and stationery sponsorships and Flamestop Australia for taking up Identification and Café Seating in addition to their Platinum commitment.

For all Fire Australia 2015 info visit www.fireaustralia.com.au.

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To find out more about the conference and to register contact the FPA Australia events team on **03 8892 3131** or events@fpaa.com.au.

RESEARCH HELPS TASMANIA FIRE SERVICE WIN NATIONAL AWARD

The Tasmania Fire Service was recently awarded a national Resilient Australia Award for their Bushfire Ready Neighbourhoods program, backed by Bushfire CRC research.

The Bushfire Ready Neighbourhoods program focuses on building a shared responsibility approach to bushfire preparedness. It is conducted by TFS and developed in collaboration with the University of Tasmania and the former Bushfire CRC.

The Resilient Australia Awards, coordinated nationally by the Attorney-General's Department, recognise best practice initiatives that build disaster resilience in Australia. Representatives from TFS and the University of Tasmania accepted the award in November 2014 from Federal Minister for Justice, The Hon Michael Keenan MP.

TFS Bushfire Ready Neighbourhoods program coordinator Peter Middleton said: "This is national recognition of

PHOTO: ATTORNEY-GENERAL'S DEPARTMENT



an action research project that is now driving the TFS program and leading the way nationally in community engagement for bushfire.

"The program is now operating in many parts of the state and takes a community development approach to building community capacity for bushfire prevention and preparedness.

"The success of the program would not

L to R—Sandra Barber (TFS), The Hon Michael Keenan MP, Mai Frandsen (University of Tasmania) and Peter Middleton (TFS) at the Resilient Australia Awards.

have been possible without a collaborative partnership between TFS, the University of Tasmania and the Bushfire CRC," Mr Middleton said.



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 ADELAIDE • SOUTH AUSTRALIA • 1-3 SEPTEMBER 2015

Join us for the 2015 conference to be held at the Adelaide Convention and Exhibition Centre, for Australasia's largest and most important emergency services and public safety conference and trade expo.

The theme for the 2015 conference is **New Directions in Emergency Management.**

The approach to emergency management is rapidly evolving, and with it the need for better knowledge and understanding. Driven in part by the escalating cost and complexity of major incidents, the emphasis is shifting towards a holistic view that encompasses research, readiness, risk reduction, response and recovery. At the same time, our emergency service agencies are being comprehensively reformed to improve their effectiveness before, during and after a major event.

afac.com.au/conference

RESEARCH LEADS TO FUNDING IN NSW

Fire & Rescue NSW has recently received over a million dollars in funding to implement recommendations from Bushfire and Natural Hazards CRC research.

Following the October 2013 Blue Mountains bushfires, Fire & Rescue NSW asked the CRC to examine the effectiveness of Community Fire Units (CFUs). Based on this research, Fire & Rescue NSW has now received \$1.375 million to upgrade equipment for all 600 CFUs, as well as develop a smartphone app.

Radios will be rolled out to all CFUs across the state, along with equipment such as 25 mm hoses, additional pumps and nozzles. The smartphone app will better alert CFU volunteers to fire activity in their area, and include mapping information and other handy functions.

In NSW, CFUs are teams of local residents living in urban areas close to

bushland who are supported by Fire & Rescue NSW to enhance their safety and resilience to bushfires. Volunteer CFU members learn how to prepare themselves, their family and their homes for bushfire, including how to make informed decisions about whether to leave early or stay and defend when fire threatens.

Community Fire Units in NSW have received a boost in funding thanks to research findings from the Bushfire and Natural Hazards CRC.



PHOTO: NSW FIRE & RESCUE

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THE PREMIER EMERGENCY MANAGEMENT CONFERENCE COMES TO ADELAIDE

This year Adelaide will host the largest and most important emergency services and public safety conference in Australasia. Held at the Adelaide Convention Centre on the banks of the River Torrens, the theme for this year's AFAC and Bushfire & Natural Hazards CRC conference is *New Directions in Emergency Management*.

The approach to emergency management is rapidly evolving, and with it the need for better knowledge and understanding. Driven in part by the escalating cost and complexity of major incidents, the emphasis is shifting towards a holistic view that encompasses research, readiness, risk reduction, response and recovery. At the same time, our emergency services agencies are being comprehensively reformed to improve their effectiveness before, during and after major events.

This conference will provide an

opportunity to discuss and share new approaches in an all-hazard emergency management environment, and work together to examine sector reform, examine the challenges and opportunities of 'shared responsibility' and seek out new and engaging ways to partner with the community, researchers and the sector to foster and build disaster resilience.

Conferencing activities have been scheduled across four days to allow delegates to explore the conference theme and topics:

- ▶ **All-hazards Research Forum**
—1 September
- ▶ **Two-day Conference**
—2–3 September
- ▶ **Six Post-conference Development Sessions**
—4 September.

Stay updated about the conference on Twitter using #AFAC15.

Throughout the conference, delegates will hear from a wide range of leading international and Australian experts, with more than 90 sessions scheduled across the four days. Confirmed speakers include:

- **TREFOR MUNN-VENN**
President and Chief Executive Officer, Rhapsody Strategies, Canada
- **ROWAN DOUGLAS**
Chief Executive Officer, Global Analytics, Willis Group, UK
- **DR PAUL WILLIS**
Director, RiAus
- **DR BILL GRIGGS**
Director, Trauma Service, Royal Adelaide Hospital
- **DR MARK FINNEY**
Research Forester, US Forest Service, USA
- **PAUL BOISSONNEAULT**
Fire Chief, Canadian Association of Fire Chiefs, Canada
- **PROFESSOR LYN GILBERT**
Director, Infection Prevention and Control, Western Sydney Local Health Network

Early bird registrations open!
Online registrations, conferencing activities, speaker bios and more at
www.afac.com.au/conference.



EUROPEAN FIRE SCIENCE LINK

European and Australian researchers will work closely on the latest fire science through an agreement signed in Portugal in late 2014.

The Bushfire and Natural Hazards CRC and the Portugal-based Association for the Development of Industrial Aerodynamics (ADAI) at the University of Coimbra have

L to R—CRC CEO Dr Richard Thornton with Her Excellency Anne Plunkett, Australian Ambassador to Portugal, and Professor Domingos Viegas of ADAI.

agreed to share staff and information in research, management and policy.

The two organisations signed a memorandum of understanding (MoU) at the 7th International Conference on Forest Fire Research in Coimbra in November. The Australian Ambassador to Portugal attended the function.

ADAI was also a partner with the previous Bushfire CRC though a MoU. The latest agreement will build on those initial links and extend into a range of fire research fields.

WORKPLACE RELATIONS PLUS

Significant discounts are currently available as part of the launch of the premium Workplace Relations Plus service.

Corporate members of FPA Australia are now eligible for an exciting 50% off introductory offer if they sign up to Workplace Relations Plus before 31 March 2015 (service must commence by 31 December 2015).

All FPA Australia Corporate members who subscribe to Workplace Relations Plus are eligible to use a range of enterprise agreements tailored by FPA Australia for the fire protection industry and other exclusive services.

Services available for Workplace Relations Plus subscribers include:

- a range of tailored enterprise agreements for the fire protection industry, including agreements for Licensed Sprinkler Fitting, Licensed Electrical, Non-Trade Fire Protection work and much more
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SAVINGS FOR EXTINGUISHING AGENT HANDLING LICENCE (EAHL) QUALIFIED PERSONS

FPA Australia has bundled the training required for a technician to apply for both Extinguishing Agent Handling Licences (EAHL) Qualified Persons Licences 2 and 3 into a single, discounted offering. The bundle includes all nine units required to achieve EAHL Qualified Persons Licence 2 and 3. Participants can save up to \$1045.

The training is suited to technicians who currently hold an EAHL Experienced Person's Licence and want to transition to a Qualified Person's Licence. It may also be suited to those with industry experience who haven't previously held a licence.

Each participant who enrolls will receive a set of self-paced training manuals to work through and the written assessment paper. On completion of the



training, simply book your practical tasks assessment at one of many sessions conducted around the country.

On successful completion students will be issued with a nationally recognised statement of attainment, which can be provided to the Executive Officer, Ozone Protection of the Fire Protection Industry (ODS & SGG) Board, as evidence towards transitioning to an EAHL Qualified Persons Licence.

To take advantage of this offer, simply download and complete the enrolment form available at www.fpaa.com.au/training and return it with payment to FPA Australia. We will confirm your enrolment and send you the training materials and assessment instructions.

For any enquiries please contact the FPA Australia Engagement & Education Department on 03 8892 3131.





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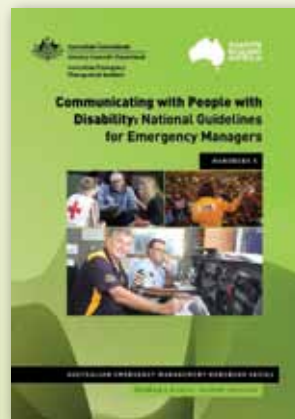
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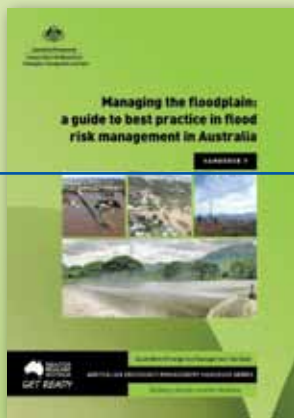
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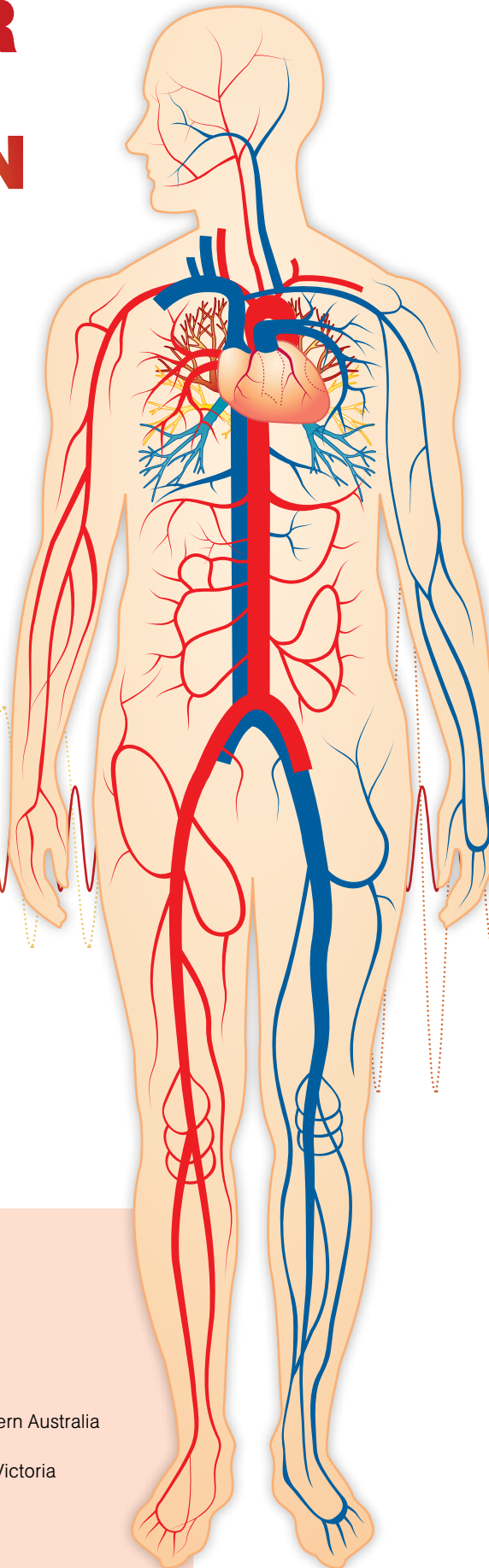
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Building a disaster resilient Australia

FIREFIGHTER HEALTH EXAMINED IN LANDMARK AUSTRALIAN STUDY

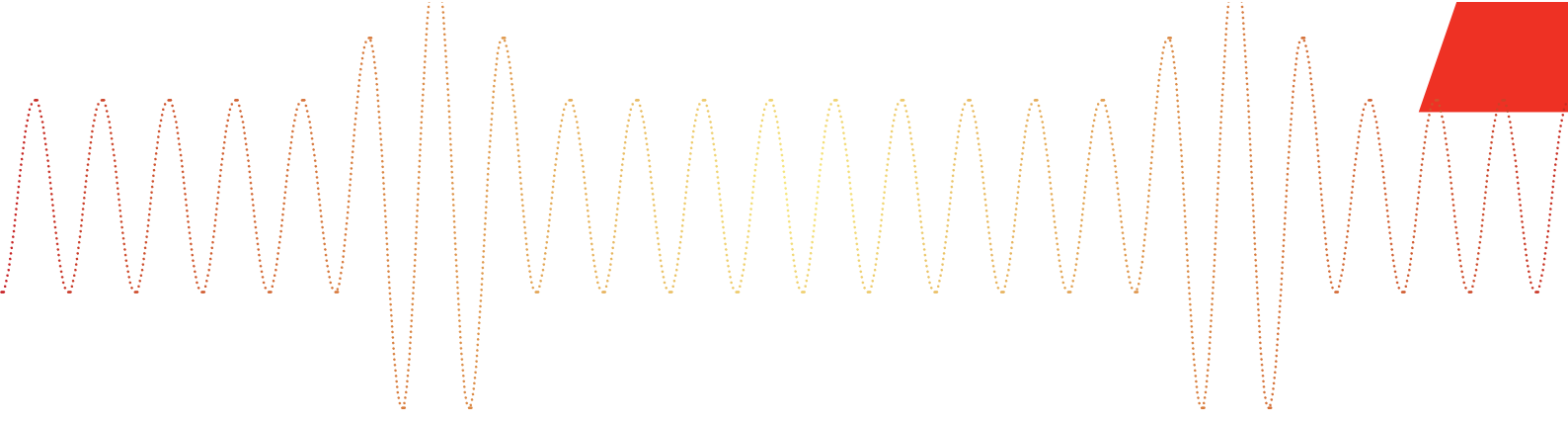
By **Samantha
Kitchen**

Project Officer
Work Health and
Safety, AFAC



Study snapshot

- 232,871 firefighters
- More than three decades of data
- Nine firefighting agencies
 - ACT Fire and Rescue
 - Air Services Australia
 - Country Fire Authority, Victoria
 - Department of Fire and Emergency Services, Western Australia
 - Fire & Rescue New South Wales
 - Metropolitan Fire and Emergency Services Board, Victoria
 - New South Wales Rural Fire Service
 - Northern Territory Fire and Rescue Service
 - Queensland Fire and Emergency Services.



The largest ever study on firefighter mortality and cancer incidence has found that firefighters, although having a lower rate of mortality than the general Australian population, have a higher risk of developing certain cancers including melanoma and prostate cancer.

In 2011 AFAC, on behalf of fire agencies across Australia, commissioned Monash University's Centre for Occupational and Environmental Health to undertake a national retrospective study of firefighter mortality and cancer incidence.

AFAC CEO Stuart Ellis said it was important for industry to have access to research that provides Australian firefighters with locally relevant information on the health risks associated with firefighting.

"Previous research has been in other countries where firefighting practices may differ considerably to those here, so these findings are highly relevant to those Australians who have served or are currently serving either as career firefighters or volunteers," Mr Ellis said.

The study was led by Monash researchers Associate Professor Deborah Glass and Professor Malcolm Sim. An advisory committee, which included representatives from nine participating fire agencies, trade unions, volunteer associations and AFAC, supported the study.

Associate Professor Glass said firefighters were assigned groups that allowed researchers to understand mortality risk and cancer incidence in a detailed way. "The study was retrospective in that it matched cancers and death information stored within the National Death Index (NDI) and the Australian Cancer Database (ACD) to personnel records for firefighters," she said.

Deaths that occurred between 1980 and 2011 and cancers diagnosed between 1982 and 2010 were included. Incident data was collected from agencies so attendance at fires could be used as a surrogate measure of firefighters' exposure to particular types of fires and combustion by-products.

Australian population data were used to calculate the expected numbers of deaths and cancers for each firefighter group based on the age and sex distribution of the firefighters. The expected numbers were then compared to actual numbers observed from the NDI and ACD. In depth analyses were undertaken in an effort to better understand the risk of mortality or cancer including duration of service or employment, era of first employment and service pre and post-1985 (when diesel engine appliances were introduced).

As well as comparing firefighters to the Australian population, the full-time, part-time and volunteer groups were separately examined in internal analyses for trends in risks related to duration of service or number and type of incidents attended.

"It is important to note that the study was a

data-matching exercise and could not consider any individual risk factors such as obesity, smoking or family history that may influence mortality or cancer incidence," remarked Associate Professor Glass.

The final report was published in December 2014 after three years of data collection and statistical analysis.

Key findings

When compared to the Australian population, the overall mortality of Australian firefighters was reduced by 30%. This is likely to be a result of the healthy worker effect—which acknowledges that healthier people comprise the bulk of the workforce. This situation is particularly the case for firefighters who need to pass and maintain high standards of physical fitness. While most causes of death, such as heart or lung diseases and suicide, were lower than expected, deaths from cancer were not as reduced as deaths from these other causes.

"In particular we found that paid firefighters were at greater risk of cancer overall, and particularly melanoma and prostate cancer, especially after multiple exposures or prolonged service," Associate Professor Glass said.

"Results for particular subgroups need to be carefully interpreted and understood within the pattern of results and the broader context of the existing literature on the subject."

Cancer incidence among firefighters

Overall cancer incidence was elevated in part-time and full-time male firefighters, especially among full-time firefighters who served more than 20 years, which suggests an employment-related effect.

This elevation in cancer rates was strongly associated with increases in melanoma and prostate cancer for both groups. Unfortunately, small numbers in the female groups studied meant that in many instances the data were not sufficient for extensive or meaningful analysis.

The results for male part-time firefighters found that those who were first employed before 1970 may have an elevated risk of brain and thyroid cancers. Yet those who worked in other eras did not have the same risk. It also showed an elevated rate of brain cancer among female part-time firefighters when compared to the Australian population. There was some suggestion that melanoma and

thyroid cancer may also be elevated; however, additional research would need to be conducted at a later date to confirm if this was the case.

Male and female volunteer firefighters have lower overall death and cancer death rates than the Australian population. There was, however, a statistically significant increase in prostate cancer incidence among those male firefighters who had volunteered for more than 10 years. Testicular cancer was also increased for those who attended fires vs those who had not attended fires and among those who had served for more than 20 years. Other types of cancer in particular subgroups of male volunteers were also found to be elevated. The study also showed that female volunteer firefighters were found to have higher rates of melanoma, particularly those recruited after 1994.

Comparison to other studies

The major strength of this study was the very large number of firefighters studied. The fact that Australia maintains national databases on death and cancer incidence is also an advantage not available to researchers in other countries. Cancer registration is mandatory and therefore complete at a national level.

Many other international studies have been conducted on firefighter health, in particular cancer incidence. Some of these studies have found probable links between firefighting and many forms of cancer. The results of the Monash University study are not entirely consistent with these results, with melanoma and prostate cancer the only two major types of cancer identified as having clear, consistent evidence of an increased risk.

“From the available data, it would appear that Australian firefighters do not have the same elevated incidence of all the identified cancers that have been found in previous overseas studies of cancer incidence in firefighters,” Mr Ellis noted.

“As an industry, fire and rescue agencies across Australia will continue to work together to understand how workers can be protected from risks, including those that may lead to diseases such as cancer.”

While the study is very important in the context of research into firefighter health and significantly adds to the understanding of cancer incidence and mortality among firefighters, it does not provide any insight into the health prospects of individual firefighters. Personal risk of cancer or death from other causes is linked to many factors, not just occupational exposures.

Comments from industry

Nine fire agencies from across Australia participated in the firefighter health study. These agencies, along with trade unions and volunteer associations, also held positions on the study’s advisory committee. NSW Rural Fire Service Association (RFSA) advisory committee member, Ken Middleton, was pleased to part of the study.

“The NSW Rural Fire Service Association, which represents over 72,000 volunteer firefighters in NSW, was proud to be part of the advisory committee of the Monash Cohort Study.

“This is an important study which impacts all firefighters across the country and we are pleased to be able to provide our members with a voice,” said Mr Middleton.

RFSA will now work alongside industry to identify how the health of firefighters can be best protected in the future.

“We look forward to continuing our engagement with AFAC on this and other studies.”

“All of these factors mean the results should be interpreted cautiously,” Associate Professor Glass added. It should also be remembered that findings do not confirm a cause-and-effect relationship between a risk factor and the likelihood of cancer or death.

Next steps

Associate Professor Glass noted that the cohort of firefighters studied had an average age of 50. “Many cancers have latency periods, which mean they may not be diagnosed until older age. Additional and ongoing analysis of the group in five to ten-year increments will strengthen the results and give us a better understanding of cancer and mortality risk of Australian firefighters,” she said.

As an industry, fire and rescue agencies across Australia will continue to work together to understand how workers can be protected from risks, including those that may lead to diseases such as cancer.

“Australian fire agencies, unions and volunteer associations have worked hard to reduce the risk of exposure and other health risks to firefighters, and this study may be reflecting those efforts,” Mr Ellis said.

“The two most elevated cancers, prostate and melanoma, do have early detection screening tests available, so the industry will investigate opportunities to incorporate screening for those cancers into health-monitoring programs. This is the first study of this size of Australian firefighters that also includes information on attendance at fires, so the industry is currently working through the findings to identify how the health of firefighters can be further protected.” ■

The complete report is available to download from www.coeh.monash.org/ausfirefr.html.

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BUILDING IN BUSHFIRE-PRONE AREAS— CONSIDERATIONS FOR CONSTRUCTION

Australians are building more homes in bushfire-prone areas as cities and towns sprawl and climate change takes effect. Consequently, there are some important considerations for builders and property owners designing and constructing residences in these areas.



A home constructed in accordance with the Bushfire Standard.

PHOTO: FPA AUSTRALIA

By Joseph Keller
Communications
Manager,
FPA Australia

and Chris Wyborn
Engagement
and Education
Manager,
FPA Australia

Australians have a fundamental connection to the bush. Much of our cultural folklore invokes Australia's beautiful bushland areas. It is of little surprise then that many of us share a desire to build our dream home in such an area.

The increasing urban sprawl of most major Australian cities means more residential construction in areas that carry a high chance of bushfire. The frequency and severity of bushfires in Australia as a result of climate change is increasing: this was clearly evident by the tragic events of Black Saturday on 7 February 2009 in Victoria and many significant bushfire events since, including the Blue Mountains fires in 2013. These events have led to a number of revisions in building codes and standards in relation to bushfire construction in Australia in order to reduce the potential impact of these events in the future.

All of this leads to significant need for rigorous and safe bushfire construction measures to be implemented in a consistent and nationally harmonised way, and then be applied in a uniform manner by designers, certifiers and builders.

Legislative framework for bushfire construction in Australia

The construction of buildings in bushfire-prone areas throughout Australia is generally governed by both the land use planning and building regulatory frameworks. In New South Wales, for example, development

for residential purposes on bushfire-prone land must comply with the *Environmental Planning and Assessment Act 1979 (NSW)* including *Planning for Bushfire Protection* published by the NSW Rural Fire Service or, where applicable, State Environmental Planning Policy (Exempt and Complying Development Codes) 2008. Each state and territory has its own requirements in this regard.

Construction of homes and residential buildings in Australia is prescribed by the National Construction Code. Notwithstanding any land use planning requirements, stand-alone residential housing construction in bushfire-prone areas is specifically controlled by Part 3.7.4 in Volume 2 of the Building Code of Australia 'class 1 and class 10 buildings.' This part generally calls up some or all of Australian Standard AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* as the primary reference for construction requirements.

In NSW AS 3959-2009 is regarded as the Deemed-to-Satisfy solution with the exception of Section 9 for flame zone construction. Buildings that are assessed as requiring flame zone construction are required to comply with planning for bushfire protection including any specific measures required by the NSW Rural Fire Service through a Bushfire Safety Authority which forms part of the Development Approval for the land.

While the Standard is generally applied across all states and territories in Australia, the way it is implemented may vary according to the requirements of various pieces of relevant legislation. These state-based regulations vary the planning requirements and instruments required for applying the standard and may tweak elements of it. However, the overall requirements of AS 3959-2009 are fundamentally the same across Australian jurisdictions.

An important component of construction in bushfire-prone areas is determining the Bushfire Attack Level (BAL). The BAL is determined by combining the values of measurements including the Fire Danger Rating for an area, the vegetation classification, distance of proposed building site from vegetation and effective slope of the land proposed for development. There are five Bushfire Attack Levels: BAL-12.5, BAL-19, BAL-29, BAL 40 and BAL-FZ. The numbers associated with each BAL denote anticipated levels of radiant heat in kilowatts, while BAL-FZ stands for Flame Zone, the highest bushfire attack rating.

Bushfire rated construction materials

AS 3959-2009 is primarily concerned with improving the ability of buildings to better withstand attack from bushfire, thus giving a measure of protection to the building and its occupants (until the fire front passes).

Of significance to AS 3959-2009 was the publication (in 2007) of the AS 1530.8 series of standards that set out testing methods for building materials, elements of construction and systems subjected to bushfire conditions.

The publication of these standards provides confidence to builders and consumers that using products that have been shown to meet specific test requirements will result in a safer building.

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Smoke plume from bushfire.

The standards also provide manufacturers with a process that allows for repeatable and consistent evaluation of products.

AS 3959-2009 allows for the use of tested materials, but it also allows for the use of other materials and components that have been deemed, but not tested, to withstand the assessed level of bushfire impact. FPA Australia believes that all products used in bushfire-prone construction should be based on the results of testing and has consistently opposed the use of deemed-to-satisfy solutions in sites subject to the highest level of bushfire risk (BAL-FZ).

Benefits of using tested construction materials

The main benefit of using a tested system or component is that only the specific materials and construction techniques used in the tested system can be used. Thus, the final product installed in the building will perform in the same manner as that originally evaluated by the Registered Testing Authority.

In contrast to a fully tested and certified system, use of a generic system or a non-tested product, such as detailed in Appendix I of AS 3959-2009 for roof systems, does not allow for any control over the type of materials used or the installation method.

FPA Australia believes that this makes a generic system or non-tested product far less reliable than a tested or certified system. This concern arises because there is no guarantee that the types of materials used on-site will match those used in the testing and evaluation undertaken by the Registered Testing Authority and will therefore perform differently under fire conditions.

Selecting plywood as part of a generic system is an example of using different materials. Plywood is wood panel manufactured from thin sheets of wood veneer. In Australia, plywood is widely available in many forms from numerous product manufacturers and importers. Plywood can be manufactured from softwood, hardwood and tropical timbers and the thin sheets of wood veneer can be bonded using various glues. Such variations in plywood production make it most unlikely that all brands of plywood will perform the same when tested under fire conditions. This is just one example of where product selection could influence the performance of a generic system.

New technologies and products

FPA Australia acknowledges that the initial application of AS 3959-2009 throughout Australia was troublesome for property owners, particularly those assessed as subject to a BAL-FZ rating. This was in part due to the unexpected adoption of AS 3959-2009 shortly after the Black Saturday fires.

The rapid publication of the Standard, which included referencing the newly developed AS 1530.8 standards, unfortunately meant that there was little opportunity for products to be developed and tested to comply with the new test standard.

Despite the problems associated with the initial publication of the Standard, the fire protection industry has responded by investing considerable

funds to design and test systems to meet the new requirements. In fact the rapid release of the Standard not only encouraged innovation, it defined an expected level of performance and an even playing field. This has resulted in an increased level of protection for the community.

Referencing the AS 1530.8 series of standards as a benchmark requirement has created a demand for tested product that industry has responded to and continues to innovate towards. Many products have been tested and found to comply with the test standards and are now available in the marketplace.

Homeowners have a right to expect that design and construction to a particular assessed BAL means just that. Any opportunity for reduced performance, inadvertently or otherwise through the use of generic systems or untested products, should be very carefully considered to ensure consumer and community safety is respected as the priority when determining construction in bushfire-prone areas.

Using accredited practitioners

These findings highlight the importance of property owners and developers using trained, professional practitioners when bushfire reports are required during planning, approval and development when building in bushfire-prone areas.

To meet this need, FPA Australia has developed the Bushfire Planning and Design Accreditation Scheme (BPAD). The scheme accredits consultants who offer bushfire assessment, planning, design and advice services. BPAD practitioners meet criteria based on specific accreditation and competency requirements, including a detailed knowledge of the relevant planning, development and building legislation for each state and territory. Through the accreditation scheme, BPAD accredited practitioners are recognised by industry, regulators, fire agencies, end users and the community as providers of professional services. The scheme provides improved confidence for government and the community that practitioners are accredited by a suitably robust scheme that is administered by the peak national body for fire safety.

Accredited practitioners can provide advice pre-construction and post-construction on product selection, testing and compliance with AS 3959-2009 and any required development approval. An accredited practitioner can also advise on additional bushfire safety measures that are not prescribed as the minimum requirements. These measures can include the application of bushfire sprayer systems, construction and use of private bushfire shelters, emergency planning and bushfire survival plans, and landscaping to reduce bushfire impact. ■

For more information about finding bushfire-tested building products visit www.fpa.com.au/providers.

For information about the BPAD scheme visit www.fpa.com.au/bpad or call the FPA Australia National Office on 03 8892 3131.

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A new publication provides a comprehensive evaluation of the models for bushfire spread prediction or prescribed burning planning.

FIRE SPREAD MODELS—A PRACTITIONER'S GUIDE

By Brenda Leahy
Communications
Officer, AFAC

How do bushfires behave? How fast will they spread? Where will they spread and at what time will they get there? Where and how best can they be controlled? AFAC and CSIRO have released a publication designed to assist fire behaviour analysts and incident managers answer some of these critical questions in predicting bushfire behaviour.

The capacity to forecast the path and speed of a bushfire flame front is critical to public and firefighter safety. Successful fire suppression strategies, reliable community warnings and effective evacuation planning all hinge on the timeliness and accuracy of bushfire-spread predictions, according to AFAC CEO Stuart Ellis.

New reference guide

"This publication consolidates, for the first time, all Australian rate of fire-spread models into one practical reference guide to assist fire behaviour analysts and incident managers carry out bushfire spread predictions and suppression planning," Mr Ellis said.

"Different fire-spread models work in different burning conditions. The challenge is knowing which to apply in formulating accurate and timely predictions. This publication will assist fire managers and incident managers in making decisions for

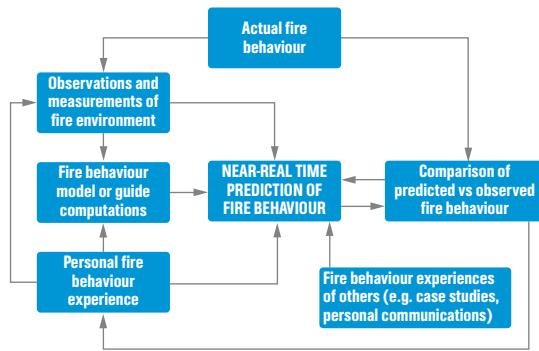
the best outcomes in different bushfire conditions. These are decisions that can save lives."

CSIRO bushfire research leader Dr Andrew Sullivan said the use of fire behaviour models to forecast propagation and potential is an essential component of today's fire management practices. The operational models have been developed over the past 60 years of scientific research.

"This publication details all fire-spread models used in Australia and the science that underpins them, covering fire behaviour in vegetation such as grasslands, shrublands and native eucalypt forests, as well as in pine plantations. It also provides a comprehensive evaluation of the performance and potential applications of the models for wildfire-spread prediction or prescribed burning planning," he said.

Dr Sullivan said that while the models assist decision making on when, where and how to control bushfires, they are not prescriptive.

Figure 1 Fire behaviour modelling methods.



“A bushfire is a very complex phenomenon and every prediction will be subject to uncertainty in information used to carry it out, especially in key variables such as weather, fuel and topography. The experience and capability of practitioners when applying the models contribute significantly to the quality and accuracy of predictions,” he said.

The idea for the publication came from a synthesis of fire behaviour research conducted by CSIRO scientists for the Bushfire CRC. One of the chapters contained an overview of fire-spread models, which caught the attention of AFAC’s Research Utilisation Manager, Dr Noreen Krusel.

“We immediately engaged the researchers to convert the chapter on fire-spread model science

into a tool for practitioners,” Dr Krusel said. “At the time, the feedback from industry was that there was a clear need for this type of resource. The science wasn’t easy for practitioners to find or use.”

The project proceeded as a research utilisation initiative, funded by the former Bushfire CRC and published by AFAC in conjunction with CSIRO.

Collecting knowledge from diverse sources

The publication’s main author, Dr Miguel Cruz, a scientist at CSIRO’s Land and Water Flagship, said end users and researchers alike had identified the need to collate into one publication the evolution and state of the art of bushfire spread science in Australia.

“The knowledge was contained in disparate sources, from scientific papers to unpublished reports, which was sometimes for users to access and use,” Dr Cruz said. “The main aims of the guide were to make the science accessible and useful and this is reflected in the structure and design of the publication.”

A Guide to Rate of Fire Spread Models for Australian Vegetation was written by scientists from CSIRO, the University of Alberta, Canada, and the department of Parks and Wildlife WA. It was published by AFAC as a research utilisation initiative, drawing on joint research conducted by the former Bushfire CRC and CSIRO. ▀

Copies of *A Guide to Rate of Fire Spread Models for Australian Vegetation* are available at the AFAC shop at www.afac.com.au.



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WHERE TO NEXT WITH FIRE MODELLING?

By **Nathan Maddock**

Communications
Officer, Bushfire
and Natural
Hazards CRC

Excessive amounts of heat and moisture generated by large bushfires can affect the surrounding atmosphere, changing wind speed and creating pyroconvective (thunderstorm) clouds. These in turn can profoundly change the way a bushfire behaves. Researchers are starting to incorporate these vital elements into operational fire behaviour models.



Large bushfires have the potential to alter the atmosphere and local weather. This project aims to further develop the understanding of how this occurs.

“Our biggest fires influence the atmosphere and weather around them,” says Dr Simon Heemstra, Acting Group Manager Community Resilience at the New South Wales Rural Fire Service, and lead end user representative for the Bushfire and Natural Hazards CRC.

“These are our worst fires, and yet they are the ones that are really hard to forecast what is going to happen, because we do not know how the fire and the weather interact.”

Fire modelling is a vital part of the firefighting toolkit, with significant advancements made in the past decade. As outlined on page 22, the current knowledge for fire behaviour analysts has been recently published as a practical guide by AFAC and CSIRO, based on a Bushfire CRC-commissioned synthesis report. The guidebook presents the here and now; but

coupled fire-atmosphere models, incorporating how bushfires influence the atmosphere, and therefore the weather, are a key pathway to the future.

This new technology and know-how is still years away from operational use, but the research is underway now through the Bushfire and Natural Hazards CRC, ensuring fire agencies across Australia will continue to use the latest knowledge to fight fires. Dr Jeff Kepert, Head of High Impact Weather at the Bureau of Meteorology (BoM), is leading the project with BoM colleague and recent Bushfire CRC PhD scholarship graduate Dr Mika Peace part of the team, along with Dr Heemstra.

Modelling weather around large fires

“By having a coupled fire-atmosphere model, we are going to get a much more accurate forecast leading into the really bad days,” Dr Heemstra said.

The same applies after bad fire days too, if there have been big fires.

“The State Mine Fire in the Blue Mountains in October 2013 ran 35 km in one day and left a massive amount of black ground behind,” Dr Heemstra said.

That affects the weather models, as they are based on a certain amount of reflectance from the earth’s surface. Changing from green vegetation to burnt black makes a big difference.

“We found that the winds and the temperatures in the days following were not as forecast. A coupled fire-atmosphere model will give a better indication of this,” he said.

The project uses the Weather Research and Forecasting fire model, known as WRF-Fire, which was developed in the USA. Dr Peace

half of the study devoted to recreating the fire model with the BoM’s operational atmospheric model. The BoM upgraded to a new modelling system in 2009, which has brought a large improvement in weather forecast performance.

Practical outcomes

Dr Peace believes it is important to define the outcomes into something fire behaviour practitioners can use. As fire danger ratings are number based, the researchers hope to integrate particular fire phenomena into a formal, quantitative system.

“Subjective ideas from research are quite hard to integrate into the formal, numerical, rating structure that we have in the current fire forecasting system,” Dr Peace said.

Coupled models will be able to better predict fire behaviour along ridgelines, such as this bushfire in the Grampians National Park in Victoria, 2014.



PHOTO: WAYNE RIGG, CFA

completed her PhD through the Bushfire CRC in 2014 using WRF-Fire, investigating interactions between fire and the atmosphere leading to extreme, or unexpected, fire behaviour.

“We have learned all sorts of things about dynamical fire-atmosphere using the model—things we could not have found out about through taking observational measurements at the fireground,” Dr Peace said.

“That is the big advantage from coupled fire-atmosphere models from a research point of view.”

One of the big challenges of combining a fire model with an atmosphere model is computer power, and it has only been in recent years that the computing speeds required to merge the two have become realistic.

Naturally WRF-Fire is being configured for Australian conditions, with the first year and

This includes factors like interactions with topography, potential for pyroconvection, potential for three-dimensional interactions, potential for winds to change substantially around a fire, water vapour dry slots, plume development and spotting processes.

“We understand them in a subjective sense, but how do we turn them into some sort of metric which can be incorporated into a risk measure when there actually is a fire?”

“I think coupled fire-atmosphere modelling offers an avenue for doing this, because if a series of simulations are run with various thresholds, you can actually find out what the thresholds are for certain phenomena,” Dr Peace said.

“When you talk to the [fire agency] operational people, they are very receptive to these sorts of ideas, because it matches

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what they are seeing on the fireground. They just do not have a way of measuring it.

“But in order to fit the new knowledge into the systems we have now, we need to tie it down to a more quantitative measure. The challenge is how to do it in a sensible way.”

Dr Peace said timing is important. Currently, computer speeds do not allow coupled models to run fast enough to be useful for routine operational purposes.

“When you look at computer power and how far it has come in the last five or ten years, we are probably not that far away before the computing power catches up and we can run the coupled simulations in real-time,” she said.

Complex wind and topography interactions

Dr Heemstra believes there are a number of other significant circumstances where coupled fire-atmosphere models will make a difference.

“It comes down to three key factors,” he said. “Understanding the effects of the [smoke] plume on the local winds, how the plume might affect a wind change and the potential of the plume to generate lightning through pyroconvection.”

Dr Heemstra uses the example of how a smoke plume can affect local winds and therefore spot fire behaviour. Fire behaviour analysts will benefit greatly from a much better understanding of when a spot fire will continue with the prevailing winds fanning the main fire front, or when it is more likely to be drawn back into the main fire front, operating under different wind conditions from the prevailing winds.

“There are some really complex interactions that occur in that kind of fire behaviour and hopefully we will get a better insight,” he said.

“Spot fires can land a long way in front of the main front. At what point do they start getting drawn back in? Is it 500 m? Is it a kilometre? Is it 4 km? Just understanding how the plume is affecting local winds is really critical.”

How the topography surrounding a fire influences wind speed and direction is also vital.

“The coupled model will also show how the winds around the fire change with the topography. This is a pretty big advantage that we do not have at the moment,” Dr Peace said. “This will give us additional information about spotting processes and how a fire will move along ridgelines and through valleys.”

Current atmospheric models are run operationally at around 5 km resolution, but in research mode, the resolution is 200 or 400 m. Fire models are run at tens of metres. Models that take an hour to run in current operational use can take half a day at the increased resolution.

“There can be an order of magnitude difference with wind speeds through gullies and along ridges,” Dr Peace said. “This difference has a big impact on how the fire propagates.”

The increase in knowledge that will come from this research will inform weather forecasts, which in turn will benefit warning messages about any fire threat.

Comparing with previous studies

Dr Peace and Dr Kepert are aiming to conduct case studies to assess the results of the coupled fire-atmosphere work.

“We will do a comparison with what we have done in the past, using three fires from my PhD studies, so there is a benchmark to work with,” Dr Peace said.

These case studies will cover two bushfires on Kangaroo Island (the D’Estrees Bay Fire and the Rocky River Fire) in December 2007, and the West Australian Layman fuel reduction burn in October 2010.

Dr Peace said the end user support for the work is very encouraging.

“It makes sense with what they see in the real world. Their response has been overwhelmingly positive.” ■

Smoke plume over the Siding Spring Observatory in NSW in 2013. This fire exhibited extreme behaviour. It is hoped in the future coupled fire-atmosphere models will be able to predict these extremities more accurately.

For more information about this research, visit www.bnhcrc.com.au.

FIRE AUSTRALIA 2015 – KEYNOTE SPEAKER PROFILES

Fire Australia 2015— Delivering a Fire Safe Future: the right choices for product compliance and approval



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This year FPA Australia is pleased to have secured a number of highly influential and sought-after keynote speakers from Australia and abroad for the Fire Australia 2015 conference.

Fire Australia 2015 is the premier fire protection industry conference, attracting a wide range of representation from businesses, government and fire safety practitioners.

Fire safety depends on many factors. Critical to this is ensuring that fire safety products are designed, installed and maintained so that they are fit-for-purpose. It is essential that the right decisions are made from concept to completion and that appropriately certified products are selected and installed to ensure the reliability and longevity of every system.

STEPHEN KIP SKIP Consulting



Stephen Kip has 30 years of work experience in the building industry from apprentice through to specialist professional consulting roles in the inspection, supervision and coordination of major construction projects, and research and regulatory development schemes.

His experience as a building surveyor in local government and the private sector has provided him with a clear understanding of the expectations, relationships and responsibilities of both divisions of this category of practitioner.

With subsequent experience in

regulatory development, Mr Kip has liaised with senior government personnel and formed a close working alliance with the Office of the Parliamentary Counsel and the Minister for Planning and Local Government.

Mr Kip's most recent experiences as a business director, practising fire safety engineer and part-time lecturer have exposed him to the design side of the building industry and the training needs and expectations of students.

Mr Kip's Fire Australia keynote address is titled 'How to ensure product compliance in a national marketplace'.

DON BLISS National Fire Protection Association (USA) Vice President, Field Operations Product Testing, Certification and Suitability



Don Bliss's career began with the Durham-UNH Fire Department in 1970 and he has been a part of the fire service in some way since then, holding such titles as director of the University of Connecticut Fire Department, and both Fire Chief and town emergency management director for Salem, New Hampshire.

He served as a member of NFPA's Board of Directors 2003–2009, was the chair of the NFPA 1 Uniform Fire Code Committee and served as chair of NEC Code Making Panel 13. Mr Bliss has also been on the NFPA Technical Committee on Emergency Management and Business Continuity and was a trustee of the Fire Protection Research Foundation.

Mr Bliss is the current Vice President for Field Operations at the National Fire Protection Association, Quincy, MA, where he oversees NFPA's International Division, Government Affairs and NFPA's Field Operations in the USA and Canada.

NFPA is a worldwide leader in fire, electrical, building and life safety. The mission of the international non-profit organisation founded in 1896 is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training and education.

Mr Bliss's keynote presentation is titled 'The US approach to this critical safety issue: product compliance'.

JAMES GOLINVEAUX
Tyco Fire Protection Products
Senior Fellow, Water Fire Suppression



With 26 years of experience in the fire protection industry, James Golinveaux is currently serving as the General Manager of Water Fire Suppression Products for Tyco Fire Suppression and Building Products. In his role he applies his experience in the fire protection industry to develop next-generation fire protection devices and systems. He is also responsible for monitoring and participating in the Global Fire Protection Codes and Standards Development process for Tyco's US\$1.2 billion of product sales.

Mr Golinveaux's other areas of interest include the research, design and applications of fire protection systems, as well as their history. In addition to being active in numerous NFPA

technical committee memberships, Mr Golinveaux has contributed his time as a presenter for multiple US national education seminars sponsored by organisations such as the Society of Fire Protection Engineers, universities and highly protected risk (HPR) insurance companies. Mr Golinveaux has authored many technical papers and is a subject matter expert for the 2nd edition of the *Fire Protection Handbook*. He has also contributed editorial text for the 2002 and 2007 *NFPA 13 Handbooks*.

Mr Golinveaux's presentation is titled 'The changing face of warehouse commodity classifications—its impact to achieving a fit-for-purpose and compliant fire system.'

ROBERT JAMES
Underwriters Laboratories LLC
Regulatory Services Manager



Robert James is the Global Inspection Leader for Underwriters Laboratories LLC (UL). His responsibilities include managing international building and security inspection planning and directing the building, fire, life safety and security industry inspection programs. These include training and education, code development and technical support programs.

With more than 30 years of experience in fire protection enforcement in the

public and private sectors, Mr James currently chairs the National Fire Protection Association 400 Hazardous Materials Code, and is a technical member on multiple committees. He was also a committee member of the International Green Construction Code.

Mr James's keynote presentation is titled 'How US construction codes and standards work together to help enable safe and long-lasting buildings.'

HANK VAN RAVENSTEIN
Victorian Department of Human Services
Principal Manager, Fire Risk Management Unit



Hank Van Ravenstein is the Principal Manager of the recently formed Victorian Department of Human Services Fire Risk Management Unit, which leads the development of a statewide fire safety culture in the department. The unit is responsible for managing the delivery of those services related to fire risk management that are required to maintain all the department's properties, safeguarding people from illness and injury from fire, and managing compliance with relevant Acts and Regulations, Codes and Australian Standards.

He is a registered building surveyor and builder, and has practised as an independent building expert and regulatory consultant in state, municipal and private sectors for more than 28 years, providing consulting services to the building industry on building codes, regulation and

control, and fire safety. He has also been a municipal building surveyor and mediator.

Mr Van Ravenstein was one of the first independent building experts to be appointed for both the Victorian Civil and Administrative Tribunal and the Building Commission to undertake investigations of buildings and works with respect to compliance with building contracts, Building Code of Australia, Australian Standards and building practitioners.

Mr Van Ravenstein has served on numerous Australian Standards committees and is still a current active technical consumer member. He has undertaken further postgraduate studies in fire risk management and engineering as well as project management.

Mr Van Ravenstein's presentation is titled 'Fire safety systems—what are the pitfalls of certification?' ■

For all Fire Australia 2015 information and to register as a delegate visit www.fireaustralia.com.au.

Many buildings built before the mid-1980s are vulnerable to severe wind, with Cyclone Larry wreaking havoc on Innisfail in Queensland in 2006.



HOUSE UPGRADES IN THE WIND

By **Nathan Maddock**

Communications Officer, Bushfire and Natural Hazards CRC

How can we ensure our houses can withstand the rigours of severe winds?

Cyclone Tracy, which destroyed Darwin overnight on Christmas Eve 1974, is one of Australia's most well known disasters. The Northern Territory capital today bears little resemblance to the town it was the night Tracy hit. New research by the Bushfire and Natural Hazards CRC is investigating the most practical ways of retrofitting older homes to withstand severe wind, and has its origins in Tracy's aftermath.

Typical Australian houses built before the mid-1980s do not offer the same level of performance and protection during windstorms as houses constructed to contemporary building standards. Given that these houses will represent the bulk of the housing stock for many decades, practical structural upgrading solutions based on the latest research will make a significant improvement to housing performance and to the economic and social well-being of the community.

"The key to this research is producing practical and economical upgrade solutions for these legacy Australian homes," said researcher Dr Daniel Smith from James Cook University's Cyclone Testing Station (CTS).

Dr Smith, who completed his PhD studying tropical cyclone loads on housing at the University of Florida, USA, is a recent addition to both the CRC and the CTS, joining Associate Professor John Ginger, Dr David Henderson, Adjunct Professor John Holmes and Adjunct Professor Geoff Boughton, alongside Geoscience Australia's Mark Edwards and Martin Wehner, on the Improving the Resilience of Existing Housing to Severe Wind Events project in the second half of 2014. He brings to Australia his research experiences from the cyclone-prone state of Florida,

where wind-resistance issues for legacy housing are similar and have been the subject of research for many years.

The need for better standards

Cyclone Tracy in 1974 was the catalyst for change in Australia, Dr Smith explained.

"In the aftermath of Cyclone Tracy, there was a clear performance gap between infrastructure (i.e. industry, critical function, type of buildings), that seemed to withstand severe wind loads, and most residential structures that incurred significant damages," he said.

"It became clear that engineered structures perform better in cyclonic loading scenarios."

Research from that point forward became more focused on how to design houses to resist the loads experienced during Tracy.

Both the Northern Territory and Queensland changed their building codes in the early-to-mid 1980s to incorporate the lessons learned from Tracy. Other states also gradually began to modify their building codes too.

"This means that homes built before these code upgrades are not designed to the same performance criteria as those built to the current building code standards," Dr Smith said.

When considered across the country, that is a substantial proportion of houses.

"One of the project objectives will be to determine the proportion these at-risk homes represent, using multiple survey sources including the Geoscience Australia National Exposure

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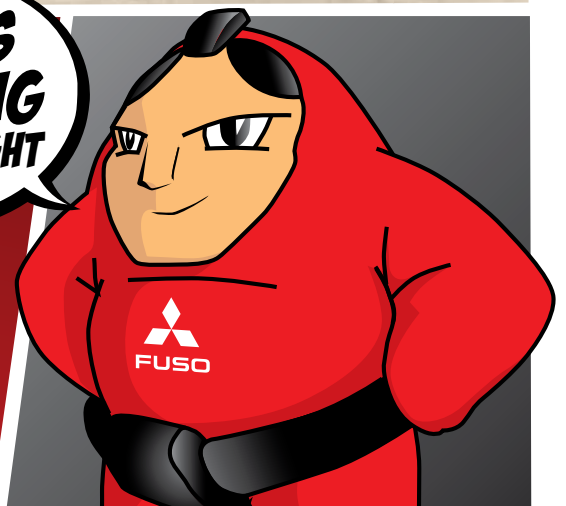
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PHOTO: JAMES COOK UNIVERSITY CYCLONE TESTING STATION



The research is not just relevant for cyclones—this house was badly damaged by a storm in the Brisbane suburb of The Gap.

Information System database,” Dr Smith said.

But not just houses in cyclone-prone areas across northern Australia are at risk. Houses further south can experience storms with severe winds too.

“Our aim is to develop practical solutions to upgrade, or retrofit, these older Australian homes. We are looking for cost-effective solutions and as an added benefit, to quantify potential insurance benefits for the homeowner too,” Dr Smith said.

The current guideline

Currently, Standards Australia Handbook HB 132 provides guidelines for structural upgrading of older homes in non-cyclonic (HB 132.1) and cyclonic areas (HB 132.2).

To gauge the effectiveness of HB 132, the researchers have undertaken a nationwide survey of the building industry to evaluate usage of the guidelines and how effective they are at providing retrofit construction information. “So far [late January] the survey has been completed by 245 participants from a range of building industry groups across Australia. Over 91% have responded that they are unfamiliar with HB 132,” Dr Smith said.

“Of the 9% who are familiar with HB 132, the majority of respondents said the handbook was either too expensive, and therefore they would not purchase it, or that solutions in the standard were not practical or architecturally pleasing.”

What older houses are out there?

There is a lot of incentive Australia-wide for the research. To help achieve a nationwide outcome, the research team also includes Geoscience Australia, with access to the National Exposure Information System (NEXIS) database. NEXIS aims to collect, collate and maintain nationally consistent and best available exposure information at the level of individual buildings. Geoscience Australia has assisted in undertaking a physical survey of ten houses in Canberra. These houses were selected as they provided a reasonable representation of housing types across southern Australia.

“Older homes (pre-mid 1980s) were not built to any one standard, so there is a degree of variability in how they were assembled. It was

not standardised construction,” Dr Smith said.

“The Canberra survey allowed us to record physical dimensions and observe a range of building components, to estimate the range of features in these older houses.

“We will be supplementing this information with additional surveys in areas where our current physical information may be lacking.”

Brisbane severe storm, November 2014

In addition to investigating older homes in Canberra, the research team seized the opportunity presented by Brisbane’s 27 November 2014 severe storm, and were on the ground within days.

“Most of the damage was hail related, although there were some cases of wind damage. We wanted to know if homes were subjected to the 141 km/h wind gust speed measured at Archerfield airport. Our general feeling was that the housing stock likely experienced wind speeds lower than this due to the localised nature of the storm, and the typical reduction in wind speed that occurs near the built-up topography of residential neighbourhoods,” Dr Smith said.

“It is important that homeowners are provided realistic wind speed information. If the media presents only the strongest wind speed recorded, people assume their home was exposed to that speed. If little or no damage occurred at their property, there is a false sense of confidence and often they are less likely to properly prepare or upgrade their home before the next wind event.

“Shaping how people look at this storm is very important. While most of the damage was hail-impact related, those structures that were damaged by wind were generally subjected to speeds much lower than 141 km/h. The range of wind speeds one storm can generate is quite large, and just because one speed is measured in an area does not mean the same speed was experienced elsewhere.”

Making a difference

While it is early days in the research, the CRC’s industry partners believe the project will deliver significant benefits.

“It is certainly important applied research aimed at long-term improvements in community resilience,” said Geoscience Australia’s Leesa Carson.

“The strategies under development will not only benefit homeowners and builders, but policy-makers too.

“It is hoped the case studies the team has undertaken, as well as future studies, will illustrate effectiveness in risk reduction, encouraging homeowners to implement changes.

“As part of Geoscience Australia’s ongoing work program in natural hazard mitigation, our involvement with the CRC is providing an opportunity to collaborate with leading researchers—ensuring that our capability includes the current thinking in the field of vulnerability to severe wind.” ■

Find out more about this research at www.bnhcrc.com.au.



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Research has revealed carbon and greenhouse gases released during a bushfire could be reduced by fuel reduction burning.

BUSHFIRE GREENHOUSE GAS EMISSIONS— FROM MILD TO WILD

By Nerissa Hannink

Communications Officer, University of Melbourne

Researchers have conducted the first-ever experiments to prove that fuel reduction burning prior to bushfire decreases the intensity of fire and reduces the amount of carbon and greenhouse gases emitted to the atmosphere.

A study in Australia's eucalypt forests has revealed levels of carbon and greenhouse gases released during bushfire could be reduced by fuel reduction burning, or planned burns conducted prior to the bushfire season in high-risk forests.

Funded by the Bushfire CRC, the work was led by researchers at the University of Melbourne and is published in the *International Journal of Wildland Fire* and the *Forest Ecology and Management* journal.

The results will inform land management decisions and government policy regarding planned burning, and enable more accurate estimations of the contribution that bushfires make to Australia's National Greenhouse Gas Inventory.

This new capability is timely given that Australia is a signatory to phase two of the Kyoto Protocol and must account for greenhouse gas emissions from managed forests for the 2013 to 2020 commitment period.

Carbon emissions and fire intensity

Project scientists Chris Weston and Luba Volkova measured forest carbon before and after planned burning in eucalypt forests across Australia's south-eastern states.

When a high-intensity bushfire occurred three months after a fuel reduction burn they had measured in Victoria's Gippsland forest, Dr Weston and Dr Volkova teamed up with CSIRO's Dr Mick Meyer to compare greenhouse gas emissions from low-intensity planned burning and high-intensity bushfire. The mild to wild bushfire comparison could then begin.

"With bushfires expected to increase in intensity and frequency due to climate change, we wanted to produce some baseline greenhouse gas emissions estimates to inform the debate over whether fuel reduction burns are effective in reducing emissions," Dr Volkova said.

"Current estimates of bushfire emissions are conservative because they are based mainly on fine fuels monitoring data, derived for the purpose of bushfire-spread predictions. This approach has not been able to adequately determine the contribution to emissions from logs and other large or coarse fuels.

"We measured all major fuel types including litter, small plants and bark as well as dead trees and large woody debris on the forest floor, to calculate the carbon and greenhouse gases emitted."

The team studied the fuel types in three scenarios: before and after planned burns alone, before and

after a planned burn and bushfire in the same area three months apart, and before and after an extremely severe bushfire in a long-unburnt forest.

They found that fuel reduction burning in forests reduced emissions from subsequent bushfire by around 40%.

Low-intensity planned burns reduced total forest carbon by around 6% but high-intensity bushfire reduced forest carbon by around 30%. This shows that when it comes to fire and greenhouse gas emissions, mild is definitely better than wild.

“We found that bushfires generate more smoke and burn a lot more of the heavy fuels such as dead trees, producing more methane, which is a much more potent greenhouse gas than carbon dioxide,” Dr Weston said.

“Fuels are also usually much drier at the time of bushfire and so burn more completely than fuels in the planned burns that are conducted in cooler and more controlled conditions.

“It was encouraging to see bushfire intensity reduced by the prior fuel reduction burn, suggesting there is significant potential to mitigate greenhouse gas emissions from forests at high risk from bushfires through fuel reduction burning.”

Future emissions model

The next step for the team is to generate a model of forest fire emissions over decades and centuries to compare emissions from mild and high intensity bushfires that occur at different frequencies.

The results of this analysis will encompass more intense and more frequent fire during the transition to a changed climate and improve strategic burning decisions and adaptive forest management in the future.

The model will also indicate whether planned burns are likely to reduce total emissions over the longer term.

“We hope these results will help land managers develop predictive tools to enhance the management of our forests and allow Australia to better plan for emissions targets in our changing climate,” Dr Volkova said. ▀

The National Burning Project

Research indicating planned burning in forests reduces greenhouse gas emissions delivers important evidence to Australian fire and land managers.

“Until now, it was only hypothesised that prescribed burning was good for greenhouse gas reduction in Australia’s eucalypt forests,” said Gary Featherston, Bushfire Consultant, AFAC, and Manager of the National Burning Project.

“The main idea is that removal of forest fuels through managed, lower intensity burning in mild conditions results in lower greenhouse gas emissions than when vegetation is left to burn in higher intensity bushfire conditions.”

“There has been some evidence that managed burning of tropical savannahs reduced greenhouse gases. However, the potential benefits for south-eastern Australia’s eucalypt-forested areas had not been scientifically evaluated until the Bushfire CRC study.”

The research, he said, helps to build a crucial evidence base for the land management sector to move forward with efficient fire and forest management planning in a carbon-conscious climate.

The National Burning Project is developing national approaches to prescribed burning. Its key aims are to develop common standards and approaches and establish best practice guidelines for industry.

The project, jointly managed by AFAC and the Forest Fire Management Group, recently released the Risk Management Framework—Smoke Hazard and Greenhouse Gas Emissions.

The framework focuses on developing strategies and practices that can be used in the context of prescribed burning, to manage smoke and emissions impacts to amenity, prosperity, health and safety.

“Minimising the effect of smoke from prescribed burning is an essential part of using fire as a land and bushfire risk management tool. Smoke management applied during prescribed burning was primarily focused on avoiding conditions that can cause safety issues to the public and which would be objectionable to local communities.

“New demands on fire managers have emerged, including requirements to comply with air quality regulations, greenhouse gas emissions and respond to increasing community and industry concerns about smoke.”

This report is part of a series about risk management and prescribed burning, including a Risk Management and Review Framework for Prescribed Burning Risks Associated with Fuel Hazards also released this month. Reports about ecological and operational safety risks are planned and, together, these reports will build a national framework.

By **Brenda Leahy**, Communications Officer, AFAC

For further information about the National Burning Project visit www.afac.com.au/research/newsdetails/2012/09/30/nbp-progress-report



Research helps build a crucial evidence base for efficient fire and forest management planning.

“When it comes to fire and greenhouse gas emissions, mild is definitely better than wild.”

MANAGING A SUBSURFACE LANDFILL FIRE

By Darren Davies
Assistant Chief
Fire Officer,
Metropolitan Fire
and Emergency
Services Board

The case study shows how emergency services worked with industry to manage a landfill fire in Melbourne's western suburbs that had the potential for far-reaching impacts.

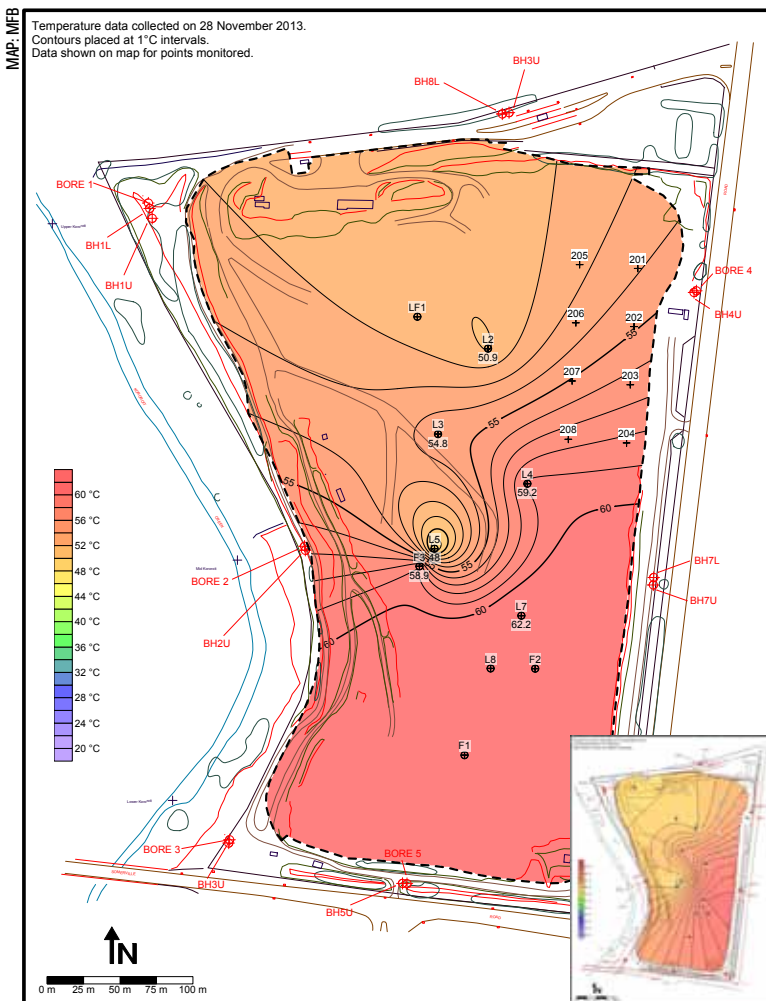
Subsurface landfill fires can be difficult to identify and extinguish due to their very nature—deep seated and involving complex chemical and physical inter-reactions with the waste. However, the potential impact of these fires on health, the environment and site infrastructure means they cannot be ignored.

Modern landfills are designed to minimise odours, air pollution, litter, vermin and contamination of groundwater. They are subject to government regulations requiring them to protect the environment. To do this their design usually incorporates a composite liner and a liquid (leachate)

collection system to prevent contamination of the surrounding soil and groundwater. Landfill operating procedures require the waste to be compacted and completely covered to exclude air. Without air, decomposition is mainly anaerobic and creates landfill gas, which contains approximately equal parts of carbon dioxide and methane gas.

The landfill gas can be collected, treated and used to produce electricity, or upgraded to pipeline-grade gas. However, as methane is highly flammable and an explosion threat, its production needs to be carefully managed. Too much methane in the wrong conditions plays a significant role in landfill fires. Subsurface fires are not always readily visible and can be hard to detect.

Temperature contours
20 m below the landfill
surface on 28 November
2013, six months after
the fire was detected.



Brooklyn landfill

The solid waste Brooklyn landfill is a 12 ha former basalt quarry in Melbourne's western suburbs. It is excavated to 40–45 m below natural grade. Landfilling ceased in 2012 and the site was in the process of being rehabilitated when fire was detected in June 2013. The landfill mound was about 25 m above ground level, and contained about 3.5 million tonnes of solid waste.

The surrounding area is predominantly industrial, but there are residences nearby. The closest residential property is 200 m away and within 1.7 km there are approximately 13,000 residences and a primary school. Adjoining the site is a major gas supply line—the main supply to western Victoria. Kororoit Creek runs along the western boundary.

Transpacific Industries Group (TPI), a recycling, waste management and industrial services company, owns the landfill.

The landfill fire

On 27 June 2013, staff undertaking routine landfill gas management work noticed two sinkholes and evidence of smouldering at various sites across the landfill mound. The Metropolitan Fire and Emergency Services Board (MFB) was contacted because TPI was concerned that the detected hotspots could result from up to nine small subsurface fires.

MFB undertook a preliminary inspection, determining that one large subsurface fire was more likely than nine smaller ones. If untreated, the risk was major subsidence in the mound, resulting in an extensive and prolonged fire.

Firefighting would be challenging, as applying



A frame grab from MFB's UAV, showing the site and surrounding area. Melbourne's CBD is visible in the background.

water to douse the fire would raise leachate levels, thereby risking contamination of the nearby creek. Limited vehicle access to the mound would make applying foam difficult. The fire would likely burn for weeks or months, emitting large quantities of toxic smoke. Depending on the weather conditions, the landfill's proximity to large populated areas and the north-south flight path of Melbourne's international airport could have significant consequences. Road closures or restrictions would affect nearby industry. If the adjoining gas line were compromised, there would be significant impacts.

MFB and TPI agreed that it was not an emergency, but rather, a complex situation the waste industry was best suited to manage. TPI engaged a technical specialist to advise on a multi-pronged approach to mitigate the risk, with MFB overseeing the response. Should an emergency occur, MFB would take control of the site with TPI's support.

Initial monitoring indicated several areas of concern including two sinkholes, higher levels of carbon monoxide at nine wells and elevated temperatures with pockets reading up to 58°C. Normal decomposition in landfills produces temperatures around 45°C.

Situational awareness

Environmental monitoring helped clarify the size, location and depth of the fire, and identified any escalation of the fire and the impact of the corrective actions. Weekly visual surveys of the perimeter and mound identified fissures emitting smoke along the site's perimeter. Surveys of leachate and groundwater wells found that the wells—several 3 m-long by 1.2 m-wide reinforced concrete pipes stacked on top of one another from the base to the surface of the landfill—were acting as unintentional passive air vents. They were not sealed at the top, their construction was not vapour-tight and they had degraded over time. Installation of thermocouples within each well at 5 m intervals allowed twice-weekly subsurface monitoring

of temperature and gas composition. Thus, contour temperature maps were created and changes to the gas composition tracked. Methane surface emissions monitoring indicated the areas of high emissions that needed to be sealed in order to improve the overall site's cover.

Historical mapping data and aerial photogrammetry helped determine the original perimeter of the quarry, discounting a concern that it had extended beyond the current boundary, potentially risking the gas line.

Developing a response plan

TPI developed a Fire Response and Environmental Management Plan in consultation with MFB and the Environmental Protection Authority (EPA). The plan contained key site information, resourcing requirements and health and safety procedures for the project team managing the situation, and short-term and long-term corrective actions.

Initial corrective actions

Ideally, decomposition in landfills should be kept anaerobic. At Brooklyn, the sinkholes, surface fissures, cracks, areas of settlement and leachate wells were all allowing air to infiltrate the landfill. This aerobic reaction fuelled the fire.

Initial corrective actions taken included:

- Remediation of the sinkholes—The two sinkholes were secured and filled to the surface with bentonite, an absorbent clay. Surface emissions were monitored to ensure they were stable.
- Sealing of perimeter areas—The perimeter was secured and a bentonite-soil mix was placed around the entire perimeter to a width of 5–10 m and a thickness between 500 mm and more than 3 m. Monitoring equipment installed around the perimeter checked for stability. A further 20 m of soil was added once the ground movement stabilised.
- Sealing of leachate wells—The tops of the

leachate wells were capped with a high-density polyethylene cap to minimise air infiltration but still allow gas and temperature monitoring and gas recovery. The caps also decreased odours.

- Improving perimeter access—The access road was improved to allow large vehicle access around the entire site, including alternative access points for emergency vehicles.
- Improving stormwater drainage—The existing stormwater system was improved to ensure runoff from the mound did not drain into Kororoit Creek.

Regular reports using records, photographs and notes were used to assess the impact of the corrective actions throughout this period.

Communication with key stakeholders

Key stakeholders formed a Regional Emergency Management Team (REMT) in early July 2013. This group identified the risks and consequences of a worst-case scenario incident, developed a strategic plan and prepared for a worst-case scenario incident should it occur.

MFB briefed the State Emergency Management Team, the then Fire Services Commissioner and the Minister for Police and Emergency Services. TPI briefed the Minister for the Environment

MFB firefighters assisted TPI with the response to the fire.



PHOTO: MFB COMMUNICATIONS

Want to learn more about fires at waste management facilities?

The 2015 AFAC and Bushfire & Natural Hazards CRC conference in Adelaide features a post-conference development session studying a waste management facility in Wingfield, where firefighters fought a fire in extreme temperatures and high winds for six days. Participants will visit the site, where they will hear an overview of the findings, recommendations for agency practice and changes to standards and codes of practice for waste management in South Australia. Register at www.afac.com.au/conference.

and the local state Member of Parliament.

Local communities and businesses received regular updates on the progress of the remediation. The updates included what the community would see, the outcomes of the environmental testing and who to contact if more information was required.

Information was placed in the local papers, mailed to residents in the immediate area and made available on the local council's website. Meetings were held with other councils in the surrounding area, five peak community interest groups and local industry.

Monitoring

Carbon monoxide levels and temperature readings were monitored across the site during the works. A downward trend in both would indicate that the remediation was working. No change would require a rethink of the approach.

During the eight weeks after the fire was discovered, temperatures remained stable and the gas composition within the landfill began returning to that expected in a normal (non-fire) landfill—methane levels greater than 50% and oxygen levels less than 3%. However, carbon monoxide levels increased and visual inspections identified a new sinkhole—although the actions had had an impact, the fire was still active and seeking oxygen.

MFB felt that a more aggressive strategy was required. Technical advice was again sought from engineers, who recommended the whole site be remediated and new smaller wells be installed across the entire mound to provide better data from which to base future remediation strategies.

Long-term corrective actions

Long-term corrective actions are still being implemented as per expert advice. This will transition the site to a more formal rehabilitation program. Works include:

- rehabilitation and abandonment of leachate wells and installation of new ones
- installation of a more robust site-wide gas collection and control system
- continued monitoring
- control of landfill gas.

Conclusion—lessons learned

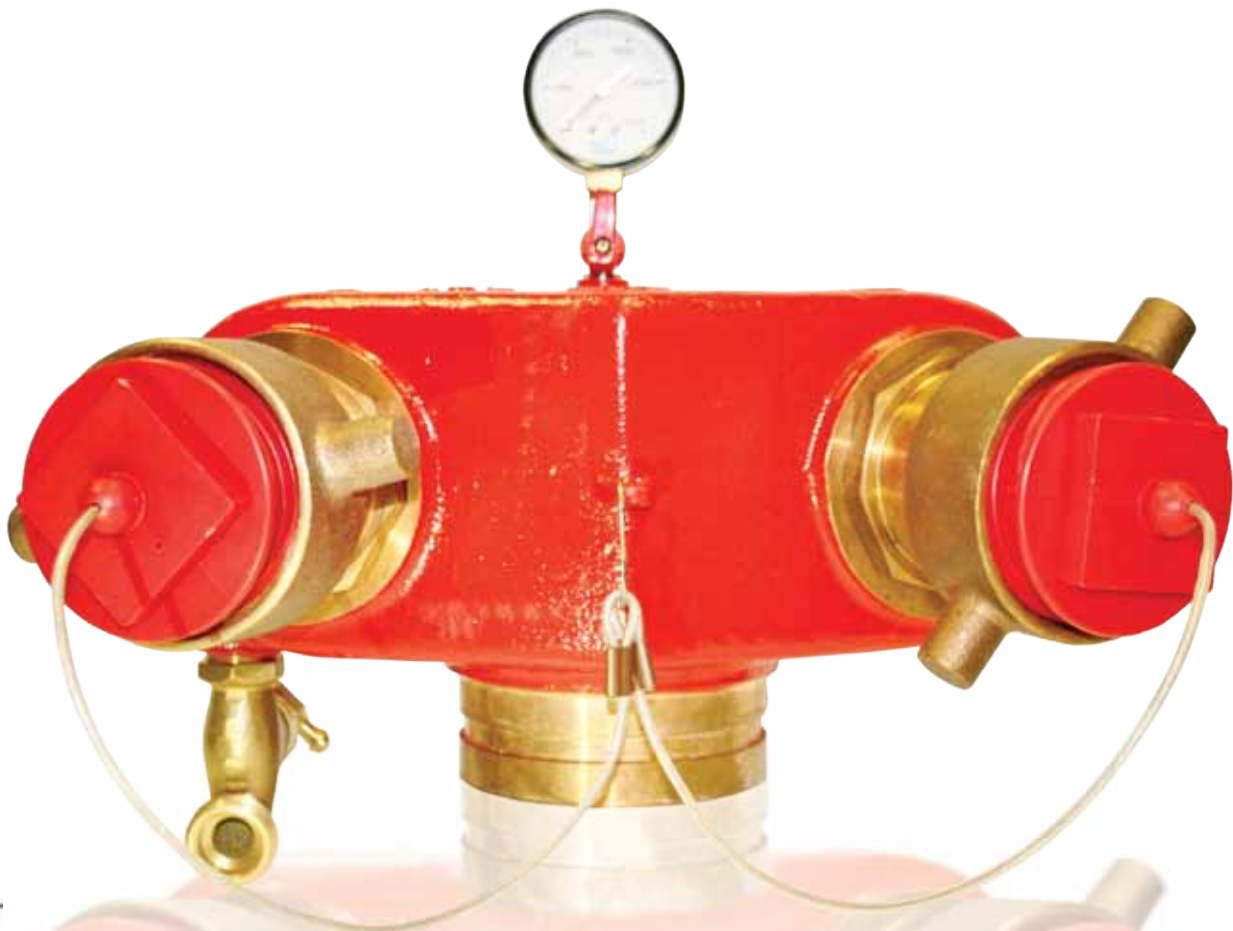
This incident is a case study in collaboration—an example of two organisations with very different roles and responsibilities working together to deal with a potentially significant incident.

MFB still has an active plan for the site. This plan identifies resources, contacts, tactical considerations, situational data, risk and safety assessments, alternative incident management strategies and a full event log. It can be reactivated as required.

TPI instituted inspections of all its landfills in Australia for subsurface fires.

EPA examined licensing requirements to ensure site management plans contain information on managing subsurface fires. ■

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SMOKE ALARMS —WHAT YOU NEED TO KNOW

By Joseph Keller
Communications
Manager,
FPA Australia

If one piece of fire protection equipment is likely to save your life, it will be your residential smoke alarm. This simple and inexpensive device is a requirement for all new buildings under the Building Code of Australia, and retrospective laws are gradually being introduced in most states and territories.

Today, having a working smoke alarm is a legal requirement in all Australian homes. Along with the ongoing educational work of fire agencies and organisations such as FPA Australia, such legislative requirements are aimed at a continued reduction in the number of residential fire deaths each year; however, residential fire safety is still an ongoing concern for the fire safety industry, authorities and the community. A significant number of fire deaths and injuries in Australia occur in residential buildings, far more than any other building type. Also, the speed at which fires develop is increasing due to the properties of materials and commodities now commonly found in residential buildings. This has the effect of reducing the time available to escape from a building.

The following are some important points for all readers of *Fire Australia* to be aware of with regard to residential smoke alarms.

Ionisation vs photoelectric

Currently, compliance with Australian Standard AS 3786 for smoke alarms as referenced by the Building Code of Australia (BCA) can be achieved in residential buildings by installing photoelectric or ionisation smoke alarms. Australian Standard AS 1670.1 for smoke detection as referenced by the BCA currently requires photoelectric smoke alarms be installed in all sleeping areas and exits, as well as pathways to an exit like passageways, corridors and hallways.

Within the fire protection community, there has been an ongoing debate about which type of smoke detection technology offers optimal performance in providing sufficient early warning to occupants in residential buildings. The debate arises because of the two different types of fires that can occur in residential environments.

Building fires can be identified as either smouldering fires or flaming fires. While there are no significant data to suggest that one of these fire types happens more frequently than the other, the types of materials found in homes, combined with



likely ignition sources, suggest the most likely fire encountered in a home while occupants are asleep will be a smouldering fire. Sleeping is the most vulnerable time as sensory cues are reduced.

Each smoke alarm type performs differently. Photoelectric smoke alarms contain a chamber with a light source projected into it. When visible smoke enters the chamber, it scatters and disturbs the light source, which is detected by a light-sensitive receiver, causing the alarm to sound.

Published research has shown that although photoelectric smoke alarms are generally more effective than ionisation smoke alarms in detecting the visible smoke produced by smouldering fires, they can be slower to respond to flaming fires.

Ionisation smoke alarms contain a chamber containing electrical particles, called ions, that have been charged by a small amount of radioactive material. This chamber is sensitive to small particles of combustion (typically not seen by the human eye) that enter the chamber and disrupt the charge balance of ions, causing the alarm to sound.

Conversely, published research has shown that ionisation alarms are more effective than photoelectric smoke alarms in detecting flaming fires, which produce significantly less visible smoke than smouldering fires.

FPA Australia considers that all residential buildings should be fitted with photoelectric smoke alarms in the first instance in order to treat the highest fire safety risk in residential buildings: smouldering fires while residents are asleep. Ionisation smoke alarms are effective in detecting fast flaming fires that contribute to some of the fire risk in residential buildings but should be considered supplementary to photoelectric alarms.

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PHOTO: FPA AUSTRALIA

Examples of heat alarms, which should never be used as the only form of detection.

Interconnection

Many models of smoke and heat alarms offer the optional function of interconnection. When an interconnected smoke or heat alarm actuates, it places a small voltage on the interconnect circuit, which in turn powers the sounders in all other interconnected devices. The only device that is actually 'in alarm' is the one in the area of fire origin, even though all are raising the alarm.

Manufacturers specify the maximum number of devices that can be interconnected and exceeding this number may mean that the sounders will not function correctly and thereby not provide sufficient warning to occupants. Manufacturers also specify the types and models of device that can be successfully interconnected. As individual manufacturers have no control over their competitors' product specifications, no manufacturer can claim a universal interconnection capability.

Manufacturers therefore preclude the interconnection of their devices with those of other manufacturers. The interconnection of non-related devices will void the warranty, leaving the installer or certifier liable for the performance of the smoke alarm system. Simply interconnecting the devices and testing the interconnect function at time of installation does not provide an adequate assessment of long-term reliability.

Mains-powered smoke and heat alarms typically do

not use an isolation transformer when converting the 230 V AC to 9 V DC. Instead, they use a capacitive and resistive circuit through a regulator and zener diode. This means the negative of the DC voltage is directly connected to the neutral of the incoming mains. The negative of the interconnect signal is therefore also directly connected to the neutral of the incoming mains. For this reason, when interconnecting mains-powered smoke and heat alarms, the interconnect wiring must be treated as if it were at mains voltage and double insulation integrity must be maintained.

Heat alarms are not early warning and should never be used as the sole form of detection; sole reliance on heat alarms reduces safe evacuation time because a fire will have generally reached the flaming stage before triggering a heat sensor. Heat alarms provide supplementary detection in areas where smoke alarms may be overly prone to nuisance alarms. Heat alarms must be interconnected to the installed smoke alarms to provide a general warning. ■

This article contains extracts from FPA Australia Position Statement 01 – Selection of Residential Smoke Alarms. Readers can review this article and a range of other important technical documentation at www.fpa.com.au/technical.

To contact FPA Australia call 03 8892 3131.

Frequently Asked Questions

When do smoke alarm batteries require replacement?

Generally, smoke alarm batteries should be changed every 12 months. Several models are mains powered with rechargeable batteries, so there is no need to change the battery in these units. There are also 9 V models with a 10-year non-removable battery, and these also do not require battery replacement for this period.

Why is there a green light?

The green light is to tell you that the external power, 240 V AC or 12 V DC (depending on model), is on. This is a requirement of AS 3786 Australian Standard for Smoke Alarms.

Why does the test button flash red?

The smoke alarm performs a self-check approximately every 40–60 seconds. The red flash is to tell you that the alarm is normal. This feature may not be included on all smoke alarms.

What does the 'hush' button do?

If your smoke alarm sounds because of cooking, for example, the hush button will silence the smoke alarm for approximately 10 minutes. This gives you time to clear the cooking fumes from the room. The alarm will automatically reset to normal after 10 minutes.

How do I test a smoke alarm?

All smoke alarms have a test button, which may be a separate, clear button in the centre of the smoke alarm or a part of the smoke alarm cover. Gently push the test button and hold for approximately 10 seconds. The smoke alarm will sound. Release the test button and the smoke alarm will continue to sound for a few seconds and then stop. Note: the test button does not test the sensitivity of the detector.

Why do alarms chirp or alarm for no reason?

There could be many reasons for a random chirp; however, the most likely reason is something causing electrical noise or spikes. This could be caused by switching lights on or off, particularly fluorescent lights, or some other appliance such as air conditioning, heaters or fans. Electrical noises like this can also cause flickering patterns on your TV or crackling and humming in your stereo or radio. This can also occur if the detector is dirty.



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ONLINE INTRODUCTION TO AIIMS COMES TO YOU

By Andy Armiger-Grant
Project Portfolio
Manager, AFAC

At last! Australasian Inter-service Incident Management System (AIIMS) training is now online. This half-day awareness course, entitled *Introduction to AIIMS-4*, has just been released. Access this opportunity through AFAC-licensed registered training organisations[†] (RTOs) today.

AIIMS-4 provides a common incident management framework, with processes and procedures that can be applied by all responding personnel. Growing numbers of private and public sector organisations are adopting AIIMS practices, enabling a seamless integration of activities and resources for the effective and safe resolution of any incident. Introduction to AIIMS-4 explains these practices in a flexible learning format.

Driving demand for online delivery, 32 AFAC member agencies funded the developments along with a generous donation from the Newman's Own Foundation. The two-day course, renamed *Principles of AIIMS*, will also be available online later in 2015.

Falck Australia is one of the AFAC-licensed RTOs delivering AIIMS-4 online products. Director Jonathon Silbert is an enthusiast, for more than one reason. "Private sector organisations can access online courses from AFAC-licensed RTOs at lower participant cost and with more efficiently distributed delivery than ever before. But the big leap comes from moving through this education step and into scenario practice and then full implementation much quicker," Mr Silbert said.

No more booking expensive facilitation rooms and no more travel arrangements. The online product is easy to access and simple to set up.

According to Helen Foster, Barwon Water's Risk and Resilience Manager, her organisation has been

training in AIIMS principles and using AIIMS-based incident management processes for a number of years. "AIIMS provides us with consistent processes which we use to manage all types of incidents—from bushfire impacts and infrastructure issues to ICT failures."

"Online learning will provide an efficient forum for equipping our people with the knowledge required to manage incidents. In addition it will increase our capacity to assist our partners in other industry and emergency services," Ms Foster said.

AFAC CEO Stuart Ellis encourages all organisations to improve their readiness and response through participation in AIIMS training. "It's a very exciting time. We get the opportunity to improve the resilience of organisations because a technological solution has become available, enabling us to deliver AIIMS to a wider audience. It offers greater flexibility in delivery, but still maintains our high standards. If the response to online learning is what we anticipate, we plan to release a range of other AIIMS products online," Mr Ellis said.

Visit the AFAC website or one of the AFAC-licensed RTOs for more information. ■

[†]Falck Australia, Industrial Foundation for Accident Prevention (IFAP) and Risk Response and Rescue are registered training organisations licensed by AFAC.

Introduction to AIIMS will improve the shared knowledge required to respond to an incident.



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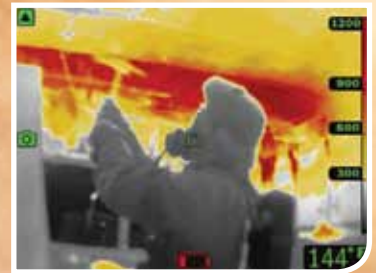


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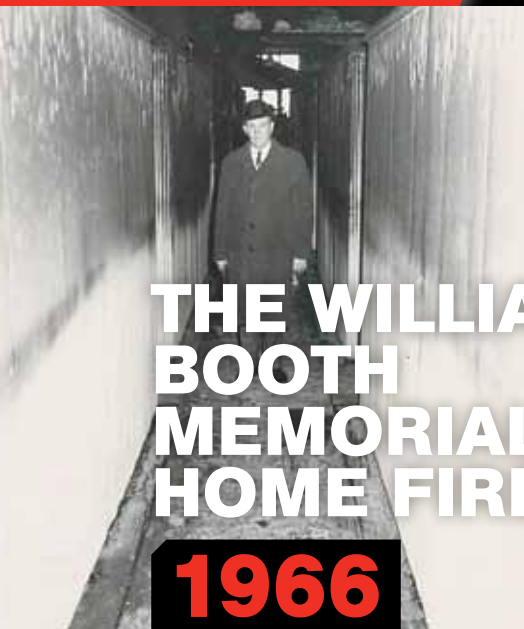
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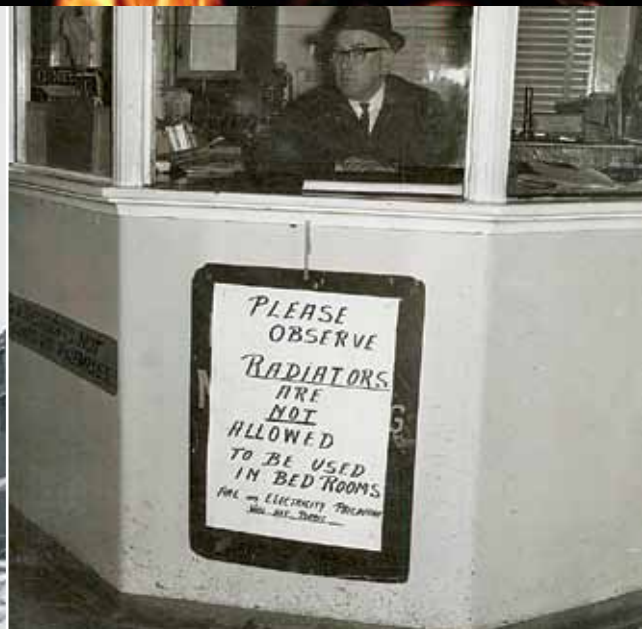
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THE WILLIAM BOOTH MEMORIAL HOME FIRE

1966



Australia's deadliest building fire is also one of its least well remembered. On 13 August 1966 a resident of Melbourne's William Booth Memorial Home for Destitute and Alcoholic Men in Melbourne knocked over a heater in his room on the third floor. The fire smouldered for several hours and exploded after another resident opened the room's door. Fire and smoke engulfed the third and fourth floors. Salvation Army staff delayed their call to the Metropolitan Fire Brigade in the mistaken belief they could control the fire. Thirty men were killed. Geoff Plunkett has chronicled the shocking story in his new book *Let the Burns Burn*, available now from online booksellers and selected good book stores. A condensed extract from the book's introduction follows.

Opium dens, prostitution, slums, crime, poverty and larrikinism—this neighbourhood was in desperate need for the hand of God.¹ Spiritual enlightenment came to the Little Lon district of Melbourne in 1916 in the form of a Salvation Army home for destitute men: society's rejects, those pitied but ignored, those described at their funeral as 'nobodies'.²

Was this an attempt to proselytise, to bring God's word to a heathen cesspit, a notorious slum and red light precinct?

There is a simpler reason—the soldiers of God simply cared. It was—and is—in the Salvation Army's ('the Salvos') DNA to give practical social service and this group of men needed a home, if only for a day. The home was located with the residents in mind—handy to the train station, close to the docks and not too far from the markets. Originally, they charged a penny for soup and bread, butter or cakes and scones; threepence for a meal including meat and vegetables. Fifty years later, the cost of a room was still less than a dollar a day.

The building was erected as a memorial to William Booth, the founder and first General of the Salvation Army. It was thus named the William Booth Memorial Home but to the residents it was simply the William Booth. A few of the men worked but most were pensioners, some invalids. The penniless were not forgotten either. In the early decades up to 200 meals and 30 beds were made available for free.³ Some stayed a day, others for more than 50 years. All were troubled. Fifty years of continuous service was shattered on 13 August 1966 by a catastrophic fire. The William Booth never fully recovered and closed its doors to lodgers on 16 December 1967.

At the time of the great fire half of the lodgers were 'heavy' drinkers and another one-quarter drank. Two-thirds

of those who died had alcohol in their systems, up to a death-defying blood alcohol level of 0.433. The residents reflected the general populace in that alcoholism was a symptom of greater problems, not the cause itself.

A staggering variety of personalities passed through its doors, from the World War I diggers down on their luck to the tragic victims of the depression years, the unemployed men (mainly young) who would doss down for the night, after another fruitless day looking for work.⁴

Ask any Australian which building fire was Australia's deadliest and they may mention the Whiskey Au Go Go Nightclub or one of the several backpackers fires but none will have heard of the 30 deaths in the William Booth in 1966. A search of Google reveals little and it would appear that the reason is that the death of a group of alcoholic rejects is neither noteworthy nor memorable.⁵ The fire made the headlines briefly but quickly faded from consciousness to the point where the only ones who remember are the firefighters who attended the tragedy.

They do not forget the makeshift morgue in the ground floor dining room, the terrified, mainly elderly men wandering like zombies throughout the building. They remember the death stares, eyes and mouths open, faces blackened by soot. They cannot forget. ■

References

1. http://en.wikipedia.org/wiki/little_Lon_district, quoting Justin McCarthy, *The Commonwealth Block, Melbourne*, Archaeological Investigation Report, Volume 1; Historical and Archaeological Report, Australian Construction Services prepared for The Department of Administrative Services and Telecom Australia, 1989, p 55.
2. 'Nobodies', *The Age*, 24 August 1966.
3. Ibid
4. Ibid
5. For example it is not mentioned in *The Australian Book of Disasters* by Larry Writer, Murdoch Books, 2011.

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Fire Australia 2015 Conference and Exhibition **Delivering a Fire Safe Future: the right choices for product compliance and approval**

25–26 March 2015, Gold Coast Convention and Exhibition Centre

Fire Australia 2015 is the premier fire protection industry conference, attracting a wide range of representation from businesses, government and fire safety practitioners.

Regular attendees of the conference will notice it has moved from a November schedule to March. This is to move away from peak conference season, thus providing the opportunity to attend to more industry personnel.

Building on the success of the last conference and exhibition, Fire Australia 2015 will once again provide delegates the option of attending multiple streams over two days. The streams will provide a mix of presentations focusing on industry-wide and industry-specific topics and cover the key industry sectors of early warning and detection, fire suppression, passive fire protection, evacuation and emergency management and bushfire.

Presentations will address current issues, industry direction and challenges, and technical content relevant to those with an involvement in the fire protection industry.

The exhibition will once again be a main feature of the event, located centrally at the conference. Sponsors and exhibitors have the opportunity to present their products and services within the exhibition hall. These presentations will occur during breaks in the plenary sessions.

With speakers from across Australia and overseas, the organisers aim to ensure all presentations are topical and current, affording attendees across all roles in the fire protection industry additional knowledge and information.

Who should attend? Fire consultants, engineers and technicians; Fire service personnel; Fire equipment manufacturers, distributors and installers; Regulatory authorities and legislators; Insurance professionals; Facility managers, property developers and building owners; Architects, building designers and specifiers; Building surveyors; and Environmental engineers and sustainability managers.

For more information about Fire Australia 2015, see the keynote speaker profiles on pages 28 and 29 of this magazine or visit the conference website at www.fireaustralia.com.au.

Australian & New Zealand Disaster and Emergency Management Conference **Earth, Fire and Rain**

4–5 May 2015, Gold Coast Convention and Exhibition Centre

The Bushfire and Natural Hazards CRC is a partner in this all-hazards conference, this year themed Earth, Fire and Rain. The conference will include a focus on research, while maintaining an interest in showcasing contemporary innovation and approaches to disaster and emergency management, and is applicable to a wide range of people in the disaster and emergency management community.

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

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1–4 September 2015, Adelaide Convention Centre

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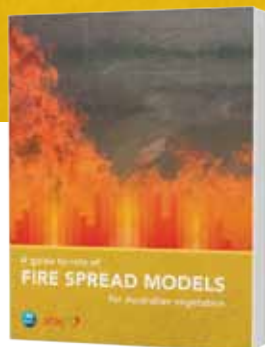
14–17 April—South Australia; 14–17 April—Queensland;
21–24 April—NSW; 5–8 May—Tasmania;
12–15 May—Northern Territory; 19–22 May—Queensland;
26–29 May—Western Australia.

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– Euan Ferguson AFSM, Chief Officer,
Country Fire Authority, Victoria



By Ian Findlay

Technical Coordinator, FPA Australia

TAC/1 Maintenance of fire protection systems and equipment

TAC/1 discussed the Victorian Regulations (which are currently in review) and the adoption of AS 1851-2012 in South Australia's Minister's Specification SA 76 (which will require the Good Practice Guide GPG-03 on adoption and use of AS 1851-2012 to be updated accordingly).

The current FP-001 project to amend AS 1851-2012 and a draft Technical Advisory Note on the maintenance of aspirating smoke detectors were also discussed as were issues relating to baseline data (a possible topic for a future Good Practice Guide).

TAC/2 Fire detection and alarm systems

TAC/2 continues to work on a document of frequently asked questions about smoke alarms. Another document on fire stopping is being worked on in conjunction with TAC/18 and TAC/19. TAC/2 also continues to contribute to the ongoing work of FP-002.

TAC/3/7 Portable and mobile equipment

Standards Australia has approved project

proposals for a revision of AS 2444 and AS/NZS 1850. However, because AS 2444 is also referenced by the Australian Buildings Code Board and they require further information, FPA Australia has withdrawn these projects while TAC/3/7 re-works the AS 2444 proposal to better demonstrate the net benefit of the proposed revision.

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

TAC/4/8/9 continues to work on a number of documents (water tanks, isolation valves and hydrant testing). The TAC is also contributing to the ongoing work of FP-004 and FP-009.

TAC/11/22 Special hazards fire protection systems

TAC/11/22 is also working on documents including on oxygen reduction fire prevention systems, cylinder hydrostatic testing and several others. TAC 11 is also heavily involved in the revision of AS 5062.

TAC/17 Emergency planning

The Information Bulletins on evacuation diagrams and consideration of the emergency response in alternative solutions

have now been endorsed by TAC/17. These bulletins will be released shortly.

TAC/18 Fire safety

TAC/19 Passive fire protection

TAC/18 and TAC/19 have worked hard to get FPA Australia's public comment in for the AS 1905.1 revision and to identify how FPA Australia responds to the full public comment. The TACs also continue to work on technical documents including a Good Practice Guide on fire stopping systems in conjunction with TAC/2.

TAC/20 Bushfire safety

FPA Australia and TAC/20 continue to contribute to a variety of bushfire-related forums including to the current revision of AS 3959. TAC/20 is working on technical documents on sarking, water spray systems and shelters.

TAC/T

FPA Australia and TAC/T continue to engage with industry stakeholders, like the Construction & Property Services Industry Skills Council, to keep abreast of and (where applicable) contribute to potential changes to fire protection related qualifications and RTO requirements.

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By Ian Findlay

Technical Coordinator, FPA Australia

FP-001 Maintenance of fire protection equipment

Following a project kick-off meeting late last year, FP-001 continues to work on amendment 1 to AS 1851-2012. The next meeting is scheduled for April to review all proposed changes.

FP-002 Fire detection and alarm systems

Direct text adoptions of the ISO standards for audible alarm devices (ISO 7240-3) and visual alarm devices (ISO 7240-23) were published in December 2014. AS 3786-2015 *Smoke Alarms* was published in early February 2015.

Meanwhile FP-002 continues to work on many standards, in particular the revisions of AS 1670.1 and AS 1670.4.

FP-004 Automatic fire sprinkler installations

Work on the revision of AS 2118.1 *Automatic fire sprinkler systems – General systems* continues.

FP-009 Fire hydrant installations

FP-009 has completed its review of the public comment and is currently

updating the draft before releasing it as a Combined Procedure. In a Combined Procedure, public comment is sought and the Standards committee votes on whether it supports the publication of the draft (noting that any further comments from the public comment will still need to be addressed).

FP-011 Special hazard fire protection systems

FP-011 met in February to review the removal of the electrical and control system content from various special hazard standards and the inclusion of this content in the new Special Hazards section in AS 1670.1.

FP-018 Fire safety

Public comment on draft new standard AS 5637.1 *Determination of fire hazard properties – wall and ceiling linings* closed in late January 2015. Work on the revision of AS 1530.8.1 and AS 1530.8.2 (testing of elements of construction for buildings to simulate bushfire attack) continues with discussions held with FP-020.

FP-019 Passive fire protection

Public comment on the draft revision of AS 1905.1 *Components for the protection of openings in fire-resistant walls – Fire-*

resistant doorsets closed in late January. This comment was reviewed at a meeting in early February and FP-019 is now working to make the appropriate changes.

FP-020 Construction in bushfire-prone areas

FP-020 continues to work on the revision of AS 3959 *Construction of buildings in bushfire-prone areas* with further work being undertaken to confirm the scope of the project. Working groups have been formed to explore the division of this standard into two parts—one on assessment and the other on construction—as well as to identify what changes are required.

FP-022 Fire protection of mobile and transportable equipment

Work on the revision of AS 5062 *Fire protection for mobile and transportable equipment* continues, with TAC/11/22 providing much input.

LG-007 Emergency lighting in buildings

LG-007 continues to revise the AS 2293 suite of standards for emergency escape lighting and exit signs. These revised standards are nearing public comment stage.



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