



Your last resort options

Chair: Malcolm Hackett OAM

Panel members: Dr Justin Leonard

Dr Jim McLennan

Dr Rob Gordon OAM

Chair

The Victorian standard for bunkers was published after the Black Saturday fires in 2009, is there any data to show the effectiveness and safety of bunkers in bushfires since then?

Justin Leonard

In the most recent fires, what we call the Black Summer fires, there were a number of bunkers that followed the accreditation process in their design, and they pretty much had 100% success rate of people surviving. I think there were three or four examples and they all accounted that they worked effectively and did what they were meant to.

Chair

How much open space is adequate when you're sheltering in a car?

Jim McLennan

It depends very much on the amount of fuel that's adjacent. The work that we did after Black Saturday that I referred to with people sheltering in cars we found that the closest that vehicles were to sources of heat was 40m. So, it would seem that just simply based on that accounting and inspection of what happened in those four sports fields. The closest that a vehicle was to burning vegetation was 40m.

Justin Leonard

Vehicles aren't particularly tolerant of any what we call underburn. If you're going to park it on any amount of dry grass or debris or just that normal litter fuel that's beside a road that underburn is particularly difficult for any car to survive.

And then I guess the other one is the one Jim was alluding to is how much radiant heat a car can really put up with. And it really can't handle much more than about 10-12kW/m² on that scale Jim was talking about. Which turns out to be around that 30-40m mark from a significant area of unmanaged fuel where a sub canopy fire could come through.

Chair

Apparently there's personal oxygen canisters about the size of a fly spray can with a built-in mouthpiece. Are they useful in bunkers?

Justin Leonard

I'm not aware of them particularly and I'm not sure how long they last, I would have a word of warning about introducing excess oxygen into an enclosed environment. It's a pressure vessel so there's a bit of a pressure release issue with a very tight enclosure. And enriching oxygen in an enclosed space isn't a particularly good thing in a fire, I think one of the Apollo missions demonstrated that quite nicely. With the more oxygen in your environment if you push it above the ambient level things burn far more readily. So, I'd just be concerned about those implications.

And to also remind people that it's the CO₂ increase in the bunker, not the oxygen decrease that's the reason why the occupants will find it untenable at a point in time and why their respiratory systems are feeling more and more distressed. It's actually the fact that your blood is trying to

release CO2 through your lungs and bring oxygen in. And the higher the carbon dioxide levels the more difficult it is for your body to release the CO2 and what it's struggling with.

Chair

Is there merit in a group of neighbours deciding to shelter together in what they consider to be the safest house?

Jim McLennan

That certainly occurred in a number of instances on Black Saturday, but I can't recall whether there was any formal kind of agreement. But certainly in Kinglake there were several instances where neighbours were simply aware that a particular house construction was on a property that wasn't close to vegetation. And they relocated to what they perceived as being a safer structure. That's about the best I can offer from experience and knowledge.

Rob Gordon

And I just add a couple of points there Malcolm. Certainly at least one case I'm aware of in Kinglake where people were sent to what was supposed to be a safe house. That one burned down and the one they left didn't. I think there needs to be a bit of science in that decision about safety. But the second thing I'd say is that any preparatory planning that people do together is going to be enormously beneficial because there's always going to be more to do than people are able to do. And therefore, to have a group of people who try to survive together would seem to be a fantastic advantage than each family doing it in their own house.

Chair

I'm certainly aware of a house in Strathewen that sheltered a number of families. And certainly, working together they were able to stop the fire and protect the lives of the people that were there.

Jim McLennan

Just a follow up comment. It's certainly a better option for several people if the plan is to stay and defend a property. Or, if there's no alternative but to stay and defend. Certainly having multiple people rather than just a single person or a couple trying to defend the property. The rule of thumb is, I think, you should have a minimum four adults who are reasonably fit and healthy and not given to panicking.

Chair

Would a below ground empty concrete sewage area about 0.8m by 0.8m at a depth of 1.2m below ground with access via a ladder on the south facing low flammability garden be a safe place to shelter as a last resort without a lid on it?

Justin Leonard

That's a straight out no because it's not a sealed space and not a sealable space. It might tick the thermal conditions but during the event the poor quality air will mix down into that region and force the person out.

Rob Gordon

And carbon monoxide is heavier than air isn't it?

Justin Leonard

Yes, so carbon monoxide from an adjacent structure fire would be one of the things. And unfortunately, the carbon monoxide content isn't something that someone can perceive or detect. It is usually associated with lots of noxious gas which is the reason why you'd have to move out of that area quickly. But yes, with certainty, the air toxicity in that environment would quickly decline in a major fire event.

Chair

Any advice for getting council approval for a fire bunker quickly and cheaply for this person? This took two fire seasons to be approved.

Justin Leonard

That's not a scientific question so I'm struggling with it.

Chair

Is there any example or description of how intense the smoke can be? I've been in a few where you can't see anything or find your way to shelters and it was very easy to become disoriented.

Rob Gordon

Yes I think this is really important because we've got to build our plans on the basis that the sensory environment will be completely different. And I know that in Black Saturday it was as black as midnight at 5:00PM for about an hour where I live and the fire didn't come over our place. And so, it's that surreal violation of all that we feel is the common-sense world that we have to be ready for. One of the rehearsal issues is to be able to evacuate blindfold for instance, or to feel your way and to have some kind of landmarks about how you find your way. Because many people have described that they couldn't recognize the most basic features of their home environment in these conditions. So, I think it's a very good question.

Justin Leonard

Add the sensory and physical implications of acid gases making it impossible to even open your eyes or to take even a long breath at all because it's like catching and burning your airways. Think about the volatile organic compounds that are so fummy that they are affecting your level of consciousness because it's just this massive toxic overload. Think of the thermal implications of that smoke, the hotter and richer it is, the more thermally oppressive it is well above the ambient conditions. The compounding effects of all those things really drive you to a point where you're not only losing your bearings, your degree of decision making is heavily impaired and the compounding effects of all those things really mean that you just don't want to be directly exposed to those things at all.

Jim McLennan

Quite a number of the folks that I interviewed following Black Saturday and a couple of other fires one of the things that they were struck by was that their smoke detectors went off. And several of them said the noise was so great I just couldn't think.

Chair

Let's have a look at the poll. Rohan can you put up those results for us?

Justin Leonard

Well done everybody. Yes, definitely car in a cleared space. And great to see that evacuate in a car is the least or second least identified one. I'm glad people weren't thinking of getting in the car and racing off into the yonder because that obviously means that people are coming to grief quite readily on roadsides because of the disorientation and visual impairments of smoke and fire activity along the roadways. It's not a safe thing to do once you get in your car.

Rob Gordon

Remembering that car lights don't cut through black smoke. A lot of people have hit the stumps and totalled their cars.