



FIREGROUND RESPONSE

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In the lead-up to 7 February 2009 firefighters took precautionary measures, and when a response was required it was rapid and apt. The preparations of many brigades were exemplary. Some localities pre-positioned firefighting resources in readiness and others responded to nearby districts to support firefighting efforts. The Commission heard evidence of responsive and resourceful activity from firefighters on the day, and it commends their efforts.

Many operational systems worked well, particularly considering the weather conditions. There were, however, some areas—such as timely fireground warnings to firefighters and appointing safety officers to incident management teams—where systemic problems emerged. Communications also fell short and this affected the safety of some fire crews caught unexpectedly when the wind changed. Aerial firefighting preparations and dispatch systems did not always provide the required response and need review to make them more responsive. Essential requirements such as access to water and electricity also caused problems.

Successful response to a fire relies on a blend of personnel, resources and processes. These include systems for rapid fire detection, deployment of appropriate equipment and personnel to assist suppression, accurate and timely intelligence about fires and weather conditions, and good communication. In addition, robust systems are required to support firefighters on the ground and ensure their safety. Timely and precise information from the firefront is also critical to enable accurate warnings for the community.

Given its terms of reference, the Commission focused on Victorian fire management systems, agencies and structures, while recognising that in many cases these are not unique to Victoria. The Commission acknowledges that particular facets of this report will apply in the broader Australian fire management context and welcomes any action to adopt a national position in the interests of community and firefighter safety.

It should be noted that on 7 February many things worked well. For example, the Commission heard few complaints about firefighting equipment, which the Country Fire Authority has invested heavily in recently.¹ This chapter, however, focuses on areas where problems were identified. It explores the operational elements of firefighting and discusses the role they played on 7 February. It also points to areas where important changes need to be made.

3.1 INITIAL ATTACK

The best opportunity to bring a fire under control is at or near the point of ignition when the fire is small. The role of first attack is to contain the bushfire swiftly at this initial stage and minimise the risk to life and property.² Initial attack is successful when ground crews and/or aircraft can quickly gain access to and make an effective and safe attack on the fire to limit its size. Resources and systems, such as deployment of firefighters and equipment, communications and remote detection tools, are critical. Initial attack usually occurs before an incident management team has been established. In Victoria more than 80 per cent of fires are contained as small fires (less than 5 hectares); the remaining 20 per cent result in 90 per cent of areas burnt annually. In remote areas of Victoria aggressive first attack is very difficult.³

In the days leading up to 7 February senior fire officers planned for initial attack and had resources on standby.⁴ The CFA sent emails to its personnel the day before, outlining the extreme fire weather and the prediction that first attack was likely to be ineffective unless conducted soon after ignition.⁵ Pager messages were sent to CFA personnel the night before to ensure adequate crews would be on hand the following day and that relief crews would be available. Many fire stations had personnel on standby at the station on the day to respond to any reports of fire.⁶ Department of Sustainability and Environment staff were also at the ready to respond to incidents. DSE District Duty Officer Mr Stephen Grant observed, 'I don't recall ever having activated staff on standby to this extent before'.⁷

3.1.1 FACTORS THAT DETERMINE THE SUCCESS OF INITIAL ATTACK

A number of factors determine the success of initial attack, particularly once the fire danger indices reach the extreme range. These include the delay between ignition and when the fire is reported, the size of the fire when crews arrive, the fuel load, the resources committed, and adequate firefighter safety.⁸ The weight of the first attack is another factor. In addition to fire agency personnel, private units, industry brigades, aircraft and crews on foot can all improve the chances of success. Topography influences access to the fire and water sources and the spread of the fire during firefighting. Weather conditions also influence how quickly the fire spreads.⁹

Various vehicles are used on the ground to perform initial attack activities. The CFA has over 1,200 tankers, which come in two- and four-wheel-drive truck combinations and carry either 2,000 or 3,000 litres of water.¹⁰ Fire agency slip-on units (also referred to as ‘pigs’ and ‘one-fours’) are favoured by land management agencies; they carry 200–400 litres.¹¹ DSE and the Networked Emergency Organisations prefer these smaller vehicles for their mobility. During the 2008–09 fire season 359 four-wheel-drive slip-on units were used.¹² The State also has a fleet of aircraft for firefighting and related work.

Initial attack on 7 February

As noted, in the lead-up to 7 February fire agencies upgraded their levels of readiness in order to be able to respond at short notice.¹³ In many cases on the day, however, once resources arrived at the fire initial attack was either not possible or unsuccessful.

At Murrindindi, where initial attack failed, Glenburn CFA captain Mr David Webb Ware was on the scene 10 minutes after the first report. He noted the fire was a ‘very fast running grass fire that had already entered the blue-gum plantation to the west of the mill ... [the fire] activity was very, very intense’.¹⁴ When the Churchill fire was reported, Hancock Victorian Plantations sent a first-attack helicopter, followed by 21 firefighters on three tankers, five slip-on units and two bulldozers.¹⁵ DSE crews did not attempt initial attack as it appeared to be too dangerous.¹⁶ At Kilmore East five brigades responded simultaneously requesting another 20 tankers while en route to the fire.¹⁷ First attack commenced within 10 minutes of the initial pager call but the fire was out of control within 30 minutes of ignition.¹⁸ At Pomborneit crews arrived before officially being called out but they could not contain the initial grass fire.¹⁹

The difficulties for crews making a first attack were caused in some areas by severe weather conditions and high fuel loads. There were also system problems. For example, delays in members of the public being able to report the Bendigo fire via 000 meant that CFA resources did not arrive until 20 to 30 minutes after it had started. Despite crews being on standby at their station, the fire was already out of control by the time they arrived, making any initial attack impossible.²⁰

In contrast, the initial fast response to the Upper Ferntree Gully fire prevented widespread damage. This fire had the potential to spread to the Dandenongs, which could have had disastrous results.²¹

3.2 RESOURCES AND SYSTEMS

This section discusses the various resources, systems and tools required to respond to a fire effectively and, in particular, provide a successful initial attack. These include aerial firefighting equipment and processes, firefighting resources and personnel on the ground, tools to enable remote detection of fires, information technology, systems to track firefighting resources, communication tools, and independent sources of water and electricity.

3.2.1 AERIAL FIREFIGHTING

Aircraft are an integral part of initial attack and, together with ground crews, provide ongoing support during an extended fire. Depending on where they are stationed and their dispatch protocols, aircraft can often get to a fire and begin the initial attack before ground crews arrive. In addition to fire-bombing, aircraft can transport firefighting personnel and facilitate large-scale prescribed burning. Aircraft can also observe and report on the fire, which is critical to the success of initial attack. Aerial observation and reconnaissance provide intelligence on the fire location, size and path. This is achieved through regular patrols, maps, verbal situation reports, or more sophisticated means such as infrared line scans. Highly skilled personnel crewing aerial observation aircraft assist ground crews with related information. It should be noted that aircraft are not effective in extinguishing a fire without the ongoing suppression efforts and support of firefighting personnel on the ground.²² In some situations, such as during extreme weather conditions, aircraft are of little value in fighting fires.

Management of firefighting aircraft

In the 80 years since the first aerial reconnaissance aircraft was deployed in Victoria, aerial firefighting in Victoria has developed to include a mix of fixed- and rotary-wing aircraft. These are coordinated by the State Aircraft Unit, which is managed jointly by DSE and the CFA. Within the State Aircraft Unit the State Air Desk oversees preparedness, coordination and dispatch of aircraft.²³

In Victoria the majority of aircraft are contracted by the State, with supplementary aircraft contracted through the National Aerial Firefighting Centre, which was established in 2003 to provide a nationally coordinated approach to the procurement and regulation of firefighting aircraft. The states and territories are the 'owners' of NAFC and, with the Commonwealth, share the funding of aircraft contracted through NAFC.²⁴

Aerial firefighting in the 2009 bushfires

Aircraft played an important role in the response to the bushfires in late January and February 2009. On 2 February aircraft helped ground crews contain nine fires caused by lightning strikes in the Dandenongs and Bunyip State Park.²⁵ On 7 February aircraft helped crews protect some areas at Bendigo, Narre Warren and Ferntree Gully. At Bendigo a fire-bombing helicopter helped protect houses after the wind change.²⁶ Although no houses were destroyed in the Upper Ferntree Gully fire, it spread very rapidly among homes and, as noted, had the potential to spread into the Dandenongs. Aircraft caught the fire just in time, preventing damage to houses in Tremont and Ferny Creek.²⁷

One hundred and fifty aircraft were on the call-when-needed register; 17 of them were used on 7 February.²⁸ This register provides secondary aerial firefighting resources on an ad hoc basis. The following aircraft were actually contracted during the 2008–09 fire season:

- 10 type 3 helicopters—the smallest helicopters in the fleet, generally used for air attack supervision, air observations and support roles. One of these was contracted by Hancock Victorian Plantations and was used as an initial attack aircraft for fire-bombing
- five type 2 helicopters—medium-volume helicopters used for fire-bombing and crew transportation
- four type 1 helicopters—heavy volume helicopters used for fire-bombing
- 12 fixed-wing single-engine air tankers—small aircraft used for fire-bombing
- two infrared-mapping aircraft—for line scan operations
- an observation aircraft.²⁹

In the lead-up to 7 February plans were made to ensure that aircraft were on standby to respond to reports of fires. As the manager of the State Aircraft Unit, Mr Nicholas Ryan, noted in his email of 5 February, however, the conditions predicted for 7 February would impede or severely limit the ability of most types of aircraft to operate effectively.³⁰ Air attack supervisor Mr Shaun Lawlor said of the Murrindindi fire, 'On this occasion the retardant dispersed and blew away before reaching the tree canopy level due to the strength of the wind'.³¹ At the Churchill fire air attack supervisor Mr David O'Toole commented that the 'wind certainly impaired the effectiveness of the firebombing on the day'.³²

Notwithstanding the weather conditions at the Kilmore East fire, aircraft assisted in combating the southern flank of the blaze. Kilmore CFA captain Mr Gregory Murphy commented that without aerial firefighting more losses would have been sustained in and around Wandong.³³ The DSE Incident Controller at the Bunyip fire, Mr David Nugent, indicated he had six or seven aircraft available at various times and that he 'was very comfortable with the level of aircraft resources at that fire'.³⁴ Even when the aircraft were not able to help suppress the fires, some were able to provide intelligence to incident control centres.³⁵ Aircraft flew a total of 190 hours on 7 February, with over half of this time dedicated to fire-bombing activities.³⁶ Many more hours were flown on the days following 7 February to gather information on the extent of the damage and to capture aerial records of the fire path (see Table 3.1).³⁷

Table 3.1 Number of hours flown, by fire, by task, 7 February

Task	Beechworth—Library Road	Bunyip State Park—Bunyip Ridge Track	Churchill—Jeeralang	Kilmore East—Murrindindi Complex North	Kilmore East—Murrindindi Complex South	Redesdale—Colliban Park Road	Eaglehawk—Bracewell Street	Coleraine—Glenelg Highway	Weerite—Danedite Road	Horsham—Remlaw Road	Berwick	Ferntree Gully—Quarry Road	Grand total
Aerial detection				1.20									1.20
Aerial reconnaissance	9.68							5.97	0.22				15.87
Air attack supervision	1.58	16.50	4.41	2.42	15.61	1.52	1.50	2.50	2.13	1.72	2.31		52.20
Ferry—aircraft		2.31		1.50	1.99					0.82	0.17		6.79
Ferry—aircraft								0.15					0.15
Fire-bombing	1.43	43.94	9.82	4.23	29.48		2.20	3.28	2.08	5.37	2.18	1.90	105.91
Forward-looking infrared			1.40										1.40
Infrared line scan		2.96			2.05		1.68						6.69
Total	3.01	75.39	15.63	8.15	50.33	1.52	5.38	5.78	4.36	13.88	4.88	1.90	190.21

Source: Exhibit 859 – February 7 2009 – Numbers of hours flown.³⁸

Preparedness and dispatch of aircraft

During the Commission's hearings various concerns were raised about the use of aircraft on 7 February, particularly the dispatch process. This process occurs via a request-based system. Requests for aircraft pass through three layers of authority before they are actioned by the State Air Desk. A request for aircraft is made to, or by, the Incident Controller, then to the CFA operations staff or the DSE Area Duty Officer. The final stage of approval is made by the State Duty Officer.³⁹ At their highest state of readiness aircraft in Victoria are on standby to take off with 15 minutes' notice.⁴⁰ Approval to launch is given only when the request is actioned by the State Air Desk. This is a cumbersome system.

Evidence before the Commission shows that some firefighting aircraft were delayed in their response on 7 February. For example, the Murrindindi fire was reported from a fire lookout tower at 2.55 pm. The Incident Controller was aware of the fire within minutes of its detection, but two fixed-wing fire-bombing aircraft did not take off from the air base at Mansfield until 3.45 pm.⁴¹ This delay meant fire-bombing aircraft arrived too late to support the initial attack.

Two infrared line scanning aircraft were available on 7 February: the King Air and a second smaller aircraft. Only one aircraft was requested for use.⁴²

Comments from witnesses and post-incident debriefs also highlighted problems with aircraft communications, such as the following:

- overuse and poor discipline on radios by ground crews
- call-when-needed aircraft not always having the necessary infrastructure
- aircraft experiencing difficulties communicating with incident control centres. Some aircraft did not receive time-critical messages and warnings from ICCs about matters such as the timing of the wind change.⁴³

Aircraft dispatch in other jurisdictions

Alternative methods for rapid dispatch are used elsewhere in Australia and overseas. The Chief Officer of the South Australian Country Fire Service, Mr Euan Ferguson, explained that in high-risk bushfire zones in South Australia aircraft are dispatched to respond at the same time as ground crews. When a fire is reported to ground crews, pilots and air crews receive the same message via pager and enact a rapid response. In many cases aircraft are over the fire before the arrival of ground crews.⁴⁴ Fire-bombing aircraft are able to drop one load of suppressant on the fire. Subsequent bombing operations require authorisation by the Incident Controller or regional duty officer.⁴⁵

California has similar dispatch protocols: aircraft are dispatched on initial reports of a fire. Pilots are trained to make their own assessments and drop aerial suppressants before the ground crew arrives.⁴⁶ In a report produced from an international best-practice visit to the United States, France and Canada, a group of senior Australian aviation managers remarked:

There is a clear worldwide trend towards ensuring sufficient weight of initial aerial attack. Effective response by aerial resources can be achieved by directing sufficient weight of attack in the first instance and not relying upon the continued presence of aerial resources after the fire has grown.⁴⁷

The Bushfire Cooperative Research Centre reported on the cost-effectiveness of aerial firefighting in Australia. It determined that conventional approaches in conjunction with aerial suppression techniques are the most cost-effective means to fight fires. The arrival of aircraft prior to ground crews 'buys time for the ground forces to arrive and complete the containment. Rapid deployment of aerial suppression resources is important'.⁴⁸

The need for a different approach

On the basis of evidence provided to the Commission it appears that Victorian agencies have not considered the option of a faster response system for aircraft. They are also not eager to implement such a protocol, despite the evidence that other jurisdictions use 'automatic dispatch'.⁴⁹ The Commission considers that the current request-driven system has inherent delays and does not necessarily allocate aircraft to areas of greatest risk. The example of the infrared line scanning aircraft that remained on the ground on 7 February as it 'was not requested' is an obvious oversight.⁵⁰ This problem is much more likely in a system where request-based allocations are the only way to mobilise aerial resources. Protocols that enable the State Aircraft Unit to allocate aerial resources based on an assessment of risk are overdue, and the Commission considers that state policy should be changed. In addition, the State Air Desk should:

- identify and monitor fires at which aerial firefighting may be effective
- advise State Duty Officers on the allocation of aerial resources on the basis of where those resources would be most effective and in the light of the lives and assets threatened by each fire
- ensure that the State's infrared line scanning aircraft are deployed effectively.

RECOMMENDATION 20

The Country Fire Authority and the Department of Sustainability and Environment amend their policies on aerial preparedness and standby arrangements, their dispatch protocols and the management of aircraft in order to do the following:

- require that at locations that attract the risk assessment or preparedness level A on code red days all personnel needed for air operations must be on standby by 10.00 am
- establish a system that enables the dispatch of aircraft to fires in high-risk areas without requiring a request from an Incident Controller or the State Duty Officer.

Use of Commonwealth resources

A Commonwealth RAAF AP-3C Orion aircraft based at Edinburgh, South Australia, was not deployed until 9 February. It was then used to collect high-resolution infrared imagery over fire-damaged areas until 17 February.⁵¹ This type of aircraft can operate in conditions that preclude smaller aircraft and should be considered, along with other potentially suitable resources, as part of aerial firefighting preparedness at the state level.⁵²

The Defence Assistance to the Civil Community policy enables Commonwealth aerial resources to be used by the states. Under this policy resources are provided following a request from a state. The request, through Emergency Management Australia, can only be actioned when local resources are inadequate or have been exhausted.⁵³ In its interim report the Commission made the following recommendation:

The Commonwealth facilitate discussions between relevant Commonwealth agencies (including Emergency Management Australia, Defence, Defence Imagery Geospatial Organisation, and Geoscience Australia) and state and territory fire services to identify ways in which Commonwealth resources might be applied more rapidly and effectively during extremely dangerous bushfires, including investigating the potential for these resources to be used for detecting, tracking and suppressing bushfires.

The Victorian Bushfire Royal Commission Implementation Monitor—delivery report outlined the progress in implementing this recommendation.⁵⁴ It advised that a pre-season operational briefing, involving states and territories, was held at Parliament House, Canberra, on 25 September 2009 to share information on available resources and capabilities for fire agencies.⁵⁵ The Commission considers there is scope for the pre-emptive positioning of Commonwealth resources in the event of major emergencies like the fires in late January and February 2009.⁵⁶ In the light of the evidence presented, the Commission encourages ongoing collaboration between state and Commonwealth agencies where they are able to share resources for the early detection and management of fire. Fire detection is discussed later in this chapter.

RECOMMENDATION 21

The State, in conjunction with Emergency Management Australia and the Department of Defence, develop an agreement that allows Commonwealth aerial resources that are suitable for firefighting and support activities to be incorporated in preparedness plans and used on days of high fire risk.

Very large air tankers

During the summer of 2009–10 Victoria funded the trial of a very large air tanker to assess its fire-bombing suitability in Victoria. A DC-10 aircraft was contracted from the United States by the National Aerial Firefighting Centre and trials were assessed by the Bushfire Cooperative Research Centre, whose final report is due in late June 2010.⁵⁷ The total cost of the trial was about \$10 million.⁵⁸

There are practical constraints on using a very large air tanker in Victoria. Because of the weight and size of the DC-10, Avalon Airport (near Geelong) and Melbourne Airport (the main airport in Melbourne) are the only suitable air bases from which the aircraft can operate.⁵⁹ The DC-10 requires a smaller lead plane to fly ahead and provide assessments before aerial firefighting. The DC-10 might also have limitations during poor weather.⁶⁰ Once airborne, the aircraft must discharge its load of up to \$45,000 worth of aerial suppressant to enable a safe landing. This has economic and environmental costs if the suppressant is not used on the fire and needs to be jettisoned.⁶¹

The Commission notes that a number of witnesses were ambivalent about the very large air tanker. NAFC General Manager Mr Richard Alder stated that, given its limitations and requirements for operating in Australia, the DC-10 may not be a cost-effective option for Victoria. Reports from the very large air tanker trials are not complete, so the Commission has not formed a view about the suitability of the aircraft for Victorian conditions.⁶²

3.2.2 PRIVATE FIREFIGHTING RESOURCES

Private units

Although not well known, private units are a very important part of firefighting on the fireground in many parts of Victoria. Private units can form a rapid and effective attack on a fire prior to the arrival of larger CFA units and then work collaboratively to fight the fire with the CFA. With their knowledge of local conditions and terrain, private units can gain access to properties quickly and in some regions outnumber CFA resources by eight to one.⁶³ Private units are generally operated by farmers or landowners and usually consist of a multi-purpose small farm utility that has a portable tank and pump mounted on the rear. Operators may be members of the CFA but often this is not the case.⁶⁴

Historically, private unit operators have freely provided their units to protect not only their own properties but also those of others in their district.⁶⁵ To coordinate the safe and effective use of private fire units the CFA has developed detailed guidelines; the onus is on private unit operators to make sound decisions about their use.⁶⁶

Forest industry brigades

In November 1997 the Victorian Government introduced legislation requiring forest plantation companies to form fire brigades. The legislation applies to plantations with a combined size of more than 500 hectares within a radius of 25 kilometres. Forest industry brigades are only required to service a company's plantation assets for 'wildfire' response and fire management planning. If, however, the parent plantation company desires, the brigade can operate outside its designated area.⁶⁷ Hancock Victorian Plantations has seven forest industry brigades registered with the CFA. All HVP firefighters have completed CFA minimum skills training for firefighters and plantation firefighting training. HVP personnel participate in fire prevention committees and meet with local agencies to plan a coordinated approach to firefighting.⁶⁸

Involvement on 7 February

Private units and forest industry brigades featured in firefighting efforts on 7 February. During his evidence to the Commission, CFA lieutenant Mr Kenneth McKenzie, described the 'bonus factor' of private units: 'They don't carry much water, but they can nip off on the side of a hill or where a truck can't get to'.⁶⁹ The Commission notes the valuable contribution of private units to Victoria's firefighting efforts.

At the Horsham fire private units from the local area were plentiful. They were prevalent in the Wimmera region due to the open cropping and the desire of property owners to protect their crops.⁷⁰ Mr McKenzie and Mr Webb Ware also commented on the contribution private units made at the Murrindindi fire. Mr Webb Ware was in direct contact with the units via UHF radio.⁷¹ Some private units responded to the Kilmore East fire.⁷² HVP helped fight the Delburn complex of fires and provided a surveillance aircraft circling around the Latrobe Valley, staff at fire lookout towers, incident management personnel ready to respond, and heavy machinery and firefighting personnel on standby at various depots across HVP properties.⁷³

The Commission acknowledges the firefighting support provided by forest industry brigades. Continued cooperation between public and private operators is encouraged. It is a practical and valuable expression of mutuality that strengthens the state's overall firefighting capacity.

3.2.3 FIRE DETECTION AND INTELLIGENCE

The early and precise detection of fires enables firefighters and Incident Controllers to rapidly mobilise resources, inform the community, and mount a significant initial attack. In addition, effective firefighting requires ongoing timely and accurate intelligence. This allows fire managers to allocate resources and minimise the risk to human life. Fires pose unique and dynamic challenges for those collecting intelligence.

Fire reporting

Fires can be identified and reported to fire agencies by members of the public, fire surveillance aircraft, fire lookout tower personnel, or from satellite imagery. The response to the fire is dependent on the quality of the information about the size, location and intensity of the fire. Collecting and relaying information on the ground can be hindered by smoke, flames, vegetation and the priority of fighting the fire. A two-dimensional view from the fireground is often inadequate for assessing how best to respond to a fire or gaining an overall view of its size and direction.

Aircraft can assist with observations but have limitations, as discussed. Satellites can detect fires and report on their size; the time and number of passes they take over a specific area of land can, however, delay the capture and transfer of information. Satellite imagery can also be hampered by weather, vegetation canopy, cloud and smoke.⁷⁴ In the absence of alternative sources Incident Controllers need to rely on ground observers to obtain information about a fire.⁷⁵

Fire detection tools

A range of fire detection tools, including fire cameras, smoke detection and infrared systems, help incident managers suppress and monitor fires. Fire detection equipment can operate in dangerous conditions and cover 24-hour periods. Despite improvements in technology, however, fire lookout tower personnel continue to provide valuable intelligence once a fire is initially detected; this information can be used to warn the community about a fire in their area.

The options for, and capacity of, technology that can supplement lookout personnel are increasing. EYEfi-SPARC, for example, enables users logged into the system to identify the location of a fire quickly using a single camera. On 7 February camera equipment had been installed in four fire tower lookout sites and testing of SPARC was under way, but the system was not operational. The Commission heard evidence about potential SPARC applications such as linking the system to Telstra's Community Information Warning System. This is being explored by DSE and the Office of the Emergency Services Commissioner. The Commission also learned of a smoke detection system called FireWatch, which is automated and works by taking two photos six minutes apart and comparing the images.⁷⁶

Sentinel is a web interface available to the public. It shows the location of hot spots that generally indicate the presence of a fire. When a hot spot is detected it is mapped onto satellite imagery, referred to as MODIS images. MODIS images are updated daily. Satellites owned by the United States are equipped with thermal infrared sensors that detect elevated ground temperatures and send the data to Geoscience Australia for use in Sentinel. There is a maximum of four MODIS satellite overpasses each day, which limits their capability. For example, if a fire starts and is extinguished between satellite overpasses it might not be detected. Sentinel might also fail to detect fires where they are small or obscured by smoke, cloud or vegetation. Geoscience Australia staff do not support Sentinel out of hours and the system can fail if demand for the service is high. Sentinel is best suited for detecting and mapping large ongoing fires.⁷⁷

Line scanning is done from aircraft flying over the fire area. An infrared picture is taken of the fire then analysed for differences in the heat rising from the earth's surface to determine the fire edge. The electronic image can then be transposed onto a map. DSE owns two line scanners mounted in fixed-wing aircraft and can access the completed scan once it has been uploaded onto the DSE Fireweb system.⁷⁸ This can be achieved without the aircraft landing.

The Commonwealth Government provided to the Commission a summary of imagery functions that could be available to assist bushfire detection and tracking. For example, AP-C3 Orion aircraft have a range of capabilities including electro-optic and infrared imagery.⁷⁹ Defence also has geospatial survey and imagery capability within the Defence Imagery and Geospatial Organisation.⁸⁰

The Australian Customs and Border Protection Service conducts aerial surveillance along Australia's border. Aircraft have satellite capability and can provide live video footage to their command centre in Canberra. Most aircraft are fitted with infrared optical systems and would be able to send footage of a fire from a remote location, even in smoky conditions.⁸¹

The Australian Maritime Safety Authority has contracts with aircraft operators who provide search and rescue services over land and water. Aircraft are fitted with infrared sensing equipment which could potentially provide still and video footage of a firefront through smoke haze.⁸²

There was insufficient time to discuss the topic of remote detection in detail during the hearings but the Commission is aware of recent trials of FireWatch in several high-risk areas of Victoria. It is of the view that personnel in fire lookout towers should not be replaced with fire detection technology. The Commission encourages further exploration and testing of technology to improve intelligence gathering about fires. Fire detection technology and fire tower personnel complement each other.

Remote detection and sensing on 7 February

On 7 February Sentinel provided information about hot spots detected during the three satellite passes made over Victoria. These passes occurred at 2.10 am, 11.28 am and 3.49 pm, with hot spots displayed on the Sentinel web page within 20 to 40 minutes of each pass. Demand for Sentinel was unusually high between 7 and 9 February. On a normal hot summer day the site receives about 135,000 hits. On 7 February it received 1.8 million hits, mostly in the afternoon. The following day the site had 5.2 million hits and experienced some failures due to the high volume. Staff adjusted the site to provide only core features to users; it was fully restored on 13 February.⁸³ The Commission notes that Geoscience Australia, in collaboration with the Department of Defence, is considering options for increasing the number of satellite passes.⁸⁴

Only one line scanning aircraft flew over some of the fires on 7 February. It had to land at about 2.30 pm because weather conditions made it unsafe to fly. From the evidence provided to the Commission there were instances where line scanning images were not available to either Incident Controllers or fire behaviour analysts. For example, the Kilmore ICC could not access a line scan taken of the Kilmore East fire at 12.40 pm. In his evidence to the Commission integrated Emergency Coordination Centre situation unit leader Mr Joseph Nichols advised he did not get a copy of the Kilmore East fire line scan until late in the afternoon.⁸⁵

The Commission notes that although Commonwealth resources were not used on 7 February to detect and track fire—apart from Sentinel, as discussed—extensive mapping and imagery were produced after that date.⁸⁶ These Commonwealth products provided detailed aerial reports of the extent and location of the damage.

3.2.4 INFORMATION TECHNOLOGY

Remote detection tools are effective when combined with other systems used by fire agencies. On 7 February Incident Controllers had an array of technology available to assist them in managing the fires (see Box 3.1). This included radios, GPS units in firefighting vehicles, and sophisticated computer and satellite systems to capture and share intelligence.

Box 3.1 Fire management technology: an overview

IRIS is the DSE incident resource information system used to record and track resources and personnel allocated to an incident.

Firemap is a network-based system that enables users to view and create maps. It is used by DSE but can be accessed by CFA personnel in their regional offices and incident control centres.

Fireweb is an integrated fire management system used by DSE. It contains many services, such as fire mapping, weather reports, incident reporting, aircraft dispatch information, incident support, resources, training and accreditation, occupational health and safety, messages and contact lists. It also incorporates IRIS. It can be accessed by registered users via the internet. Particular data from Fireweb, such as fire dispatch information, can be accessed from the DSE public website, which is updated every five minutes.

The CFA Incident Management System holds information about resources dispatched from the Emergency Services Telecommunications Authority, and other information received from sources such as the Bureau of Meteorology. IMS is linked by a computer interface to ESTA's computer-aided dispatch system. The CFA manages its resources through a resource management system.

The CFA's Emergency Information Management System is under development and will eventually replace IMS. The Emergency Information Management System was not formally funded at the time evidence was provided to the Commission.

EIMS Mapper is part of EIMS and will assist incident management teams by making spatial data readily available for use in scenario modelling, tactical support and control of incidents. The emphasis is on providing a user-friendly system. Prior to EIMS Mapper, CFA operational mapping was cumbersome and required highly trained personnel. EIMS Mapper can be used online or offline (with reduced capabilities) and installed in vehicles, offices and incident control centres.⁸⁷

Use of technology on 7 February

On 7 February there were various problems with fire management technology at incident control centres. The CFA and DSE used different systems to do similar tasks. Access to the systems for all incident management team staff was not always possible. This made the use and transfer of information, such as warnings, maps, and situation reports, difficult. A detailed CFA investigation into communications and technology in 2008–09 was completed by independent consultants Mingara Services. It revealed the following about 7 February:

- The networks were too slow to run the applications required (like mapping) and were not coordinated between agencies. A lack of shared drives across the CFA and DSE for Incident Controllers and bottlenecks caused slow access.
- User profiles were not transferrable and personnel could only log on in their own region and were unable to add printers.
- CFA personnel did not have access to the internet (on their Telstra Next G™ cards) and were unable to access many relevant websites.
- Many ICCs and regional emergency coordination centres did not have high-speed colour printers.
- The CFA and DSE used different electronic incident and resource management systems and the reporting structure for the same incident was duplicated.⁸⁸

CFA Operations Manager in Region 14 Mr John Deering advised the Commission that having the CFA and DSE on separate IT systems caused problems. He stated that each agency's website had similar reporting and resource tracking, which resulted in duplication of work. He said, 'These issues did not particularly impact on our effectiveness as an IMT but it would have been ideal if we had a common IT system'.⁸⁹

Personnel arriving at some ICCs were not given a computer and many used their personal laptops. At the Bendigo ICC in Adam Street there was no access to the CFA IMS and only two computers and A4-size printing were available. Although the centre housed the local CFA Group, it was not planned to be used as a level 3 ICC.⁹⁰

But not all aspects of technology on 7 February were inadequate. In Cardinia Shire there was a ‘fully portable’ Municipal Emergency Coordination Centre alongside the Pakenham ICC. Wireless communications technology enabled the MECC to be set up in any location. If major utilities at a specific site failed, the MECC could be moved to another location.⁹¹

The Commission notes the work done by the CFA and DSE since February 2009 to rectify many of the shortcomings identified in the evidence. Such work includes an extensive level 3 ICC upgrade project to redress technology problems. The State allocated \$28 million to the CFA and DSE to upgrade equipment (including IT and transmission links) for level 3 ICCs in 2009–10. This includes upgrading command points to common minimum standards. The project began in July 2009 and the schedule for completion of these upgrades was as follows:

- 16 level 3 ICCs by 31 October 2009
- 21 level 3 ICCs by 31 December 2009
- the remaining six level 3 ICCs by 30 June 2010.

In relation to the 30 June 2010 time frame the *Bushfires Royal Commission Implementation Monitor—delivery report* provided information about potential difficulties with achieving the time frame, such as ICC relocations and technical challenges with cabling and broadband in remote areas.⁹² The Commission urges maintenance of original time lines where possible.

3.2.5 RESOURCE MANAGEMENT AND TRACKING

In order to safely and effectively manage a fire the Incident Controller needs to know where various resources are, including vehicles, personnel, plant and aircraft. An accurate resource summary ensures that information, such as red flag warnings or critical weather information, reaches the right people when needed.

Currently resource tracking is mostly a manual and time-consuming process. When CFA and DSE personnel respond to an incident they manually fill out a T-card (see Figure 3.1) with the names of crew members and resources. The T-card is then passed to a fireground supervisor and information goes to the IMT to collate resource summaries. This system can potentially occupy phone lines and radio air space for a lengthy period.⁹³

Figure 3.1 T-cards



Source: Exhibit 415 – Three examples of T-cards.⁹⁴

DSE and NEOs use the IRIS system (see Box 3.1) to manage and track resources during an incident. IRIS tracks the dispatch of people and vehicles and, in particular, which incident they are assigned to. It provides a real-time snapshot of resource allocation and the duration of a crew's deployment. Information added to the system can be viewed by others on the DSE network. It should be noted that this system is still partly reliant on T-cards. Information collected on T-cards is passed to the IMT to be added to IRIS because electronic tracking of vehicles is not a feature of IRIS.⁹⁵ The CFA uses its Incident Management System to keep track of dispatched resources; by its own admission, however, IMS has not kept up with emerging technology.⁹⁶ It is unclear why the CFA has not adopted IRIS, which is already used or being trialled by seven interstate agencies.⁹⁷ The Commission encourages the CFA to consider trialling or adopting IRIS.

Resource tracking on 7 February

Given events of 7 February, it is not surprising that the tracking of resources at fires was difficult. A large volume of firefighting resources were dispatched within a very short time to deal with rapidly developing fire activities. Incident Controllers often found themselves in a catch-up situation, trying to ascertain what resources were where. Many resources did not respond through staging areas, and there were examples of fire agency resources self-responding instead of being dispatched via the Emergency Services Telecommunications Authority.⁹⁸ Mr Geoff Kennedy, Operations Officer at the Churchill fire, told the Commission he did not see a summary of resources or a list compiled from T-cards about who was on the fireground and under his command.⁹⁹

There were widespread problems with radios and phones, making it difficult to collate and disseminate resource summaries. At the Kilmore East fire the ICC was unable to track fires or personnel because the CFA computer system was overloaded.¹⁰⁰ A serious burnover event highlighted the need to know where firefighters and equipment were. It appears the tanker involved was not fitted with a GPS or a vehicle locator device.¹⁰¹

To monitor the location of vehicles and personnel and use that information to plan and respond to incidents fire agencies need to provide appropriate technology for firefighters in the field. Computer systems must also be in place to monitor information and make it available to the Incident Controller, regional office and state coordinator. The Commission encourages fire agencies to give all components of this system priority.

Global positioning systems and automatic vehicle locators

The CFA was unable to tell the Commission how many GPS units have been fitted to its vehicles and the types or models of units in use.¹⁰² GPS units have been fitted where the individual brigade has funded and purchased the unit.¹⁰³ The Commission is concerned that GPS units are not fitted to all CFA and DSE vehicles as a matter of course. The units should be compulsory and standardised across and within the agencies. The CFA was also unable to tell the Commission how many CFA vehicles have automatic vehicle locators installed to enable real-time tracking of a vehicle by an incident management team or dispatch centre.

DSE has GPS units in many vehicles, heavy plant and aircraft, but is yet to fit them to all other firefighting vehicles.¹⁰⁴ It has been trialling a resource-tracking system, RATS, which uses a combination of Telstra Next G™ mobile phone technologies, satellite and radio networks.¹⁰⁵ Over the next two years DSE will be rolling out a new radio system into all the vehicles it uses for firefighting. The system will incorporate GPS technology.¹⁰⁶ The Commission notes that in response to a serious workplace accident in 2007 the Hancock Victorian Plantations industry brigade installed GPS tracking systems in all 64 of its vehicles. This cost \$500,000 over two years.¹⁰⁷

The CFA has been trialling several systems that might be incorporated in its new Emergency Information Management System in the future.¹⁰⁸ The CFA would benefit from standardising many of its operational systems and technologies. The lack of consistency between CFA and DSE systems also needs to be dealt with. Improved interoperability would ensure better resource tracking during incidents.

RECOMMENDATION 22

The Country Fire Authority and the Department of Sustainability and Environment standardise their operating systems and information and communications technologies with the aim of achieving greater efficiency and interoperability between agencies.

3.2.6 COMMUNICATION TOOLS

Communication is another key element of effective emergency management and is critical for safe firefighting.¹⁰⁹ Communication tools include radios, mobile and landline phones, pagers, computers and mobile data networks. These systems are often dependent on complex technical infrastructure.

Background

The Victorian Government and emergency services have long recognised the need for robust and reliable communications systems to ensure good communication between emergency services and with the public. Traditionally, each emergency agency has been responsible for its own communication systems and has used different systems and equipment. This has created challenges such as poor communications coverage, lack of interoperability between emergency service agencies, and insufficient investment in new technologies. To remedy this, the State developed the Statewide Integrated Public Safety Communications Strategy, which became Victorian government policy in 2001.¹¹⁰ The strategy aimed to maximise the benefit of investment in multi-agency communications systems by coordinating technology planning and procurement and sharing common infrastructure and resources.¹¹¹ The State has implemented a number of multi-agency communications initiatives under the strategy:¹¹²

- the Emergency Services Telecommunications Agency's centralised call taking and dispatch for the CFA, the Metropolitan Fire and Emergency Services Board, Victoria Police (metropolitan) and Ambulance Victoria
- the Metropolitan Mobile Radio network used by Victoria Police (metropolitan), Ambulance Victoria and the MFB (costing \$261 million)
- the Mobile Data Network, which links Ambulance Victoria and Victoria Police (metropolitan) in-vehicle computers to operational databases and dispatchers (costing \$187 million)
- the statewide paging system, known as the Emergency Alerting System.

DSE, rural police, Ambulance Victoria and the CFA have continued to use StateNet Mobile Radio, a VHF trunked radio network. On 7 February the main components of Victoria's emergency services communications infrastructure were the State Managed Radio and Metropolitan Mobile Radio networks, the Emergency Alerting System, the Mobile Data Network and the Emergency Services Telecommunications Agency's centralised call taking and dispatch.

The Commission made a number of recommendations in its interim report about improving the operation of the emergency call system on days of extreme demand, such as during bushfires. The State has largely implemented those recommendations. There has also been work to rectify problems with national emergency call service arrangements, including the interface between 000, the Emergency Services Telecommunications Agency, and other emergency service answering points. This work is progressing and the Commission is satisfied the State is improving emergency call services.¹¹³

The State has also developed a new strategic framework to guide the delivery of emergency services communications projects; this is discussed at the end of this section.

The statewide paging system

A high-priority project under the Statewide Integrated Public Safety Communications Strategy was establishing a reliable statewide paging system; the emergency alerting system. The EAS became operational in 2006 at a cost of \$212 million. It provides coverage to about 96 per cent of Victoria through more than 220 remote transmitter sites. The system is managed by the Emergency Services Telecommunications Agency on behalf of the State and is used by the CFA, VICSES and Ambulance Victoria (rural) to alert approximately 37,400 personnel, mostly volunteers, to an incident. It has recently been extended to a small number of DSE and MFB staff.¹¹⁴

Under the EAS there are three levels of message priority: emergency, non-emergency, and administrative. Within each category the system sends messages on a first-in, first-out basis. This means queued emergency messages are sent before any other message type and non-emergency messages have priority over administrative messages.¹¹⁵

A problem with the transmission speed and coverage of messages was identified in 2006. The CFA expressed concern that areas already experiencing marginal coverage would suffer additional message loss when the system reached its limits during peak events.¹¹⁶ To ensure statewide coverage for all pagers, in November 2006 EAS users decided to restrict transmission speed and respond to the capacity problems by upgrading the system.

An additional problem with the EAS was caused by linking. The EAS can be configured to link messages by automatically sending a copy of a message to another pager address. If multiple copies of a message are sent the overall load on the system increases.¹¹⁷ By February 2008 linking had increased by 25 per cent.¹¹⁸ During the 2008 windstorm in Victoria the EAS was significantly short of delivery targets for non-emergency and administrative messages. The Emergency Services Telecommunications Agency subsequently reviewed how different agencies were using the system, including their message type selection and message linking. It recommended that the agencies establish business rules about the use of linking and processes for authorising and monitoring de-linking.¹¹⁹

The planned upgrade was designed to ensure the EAS could cope better with more messages without the use of linking.¹²⁰ The upgrade was delayed several times and rescheduled for February 2009; it had not been rolled out by the time of Black Saturday. Unfortunately this affected the system on that day, after which the upgrade was postponed indefinitely.¹²¹

The Commission does not criticise the decision to restrict transmission speed, which was made on the basis of a detailed analysis of various options. The decision was, however, predicated on concurrent works to reduce linking and therefore EAS message volume. Efforts to de-link the system were insufficient and a range of problems were experienced on 7 February as a result. The Commission finds it troubling that the Minister for Police and Emergency Services was not briefed about the decision to restrict the EAS transmission speed and subsequent delays in implementation. At the very least the Minister should have been briefed on the fact that this might result in the system being unable to deliver messages without delay during major emergencies.¹²² On the contrary, the Minister was assured on 5 February 2009 at the Victorian Emergency Management Council Coordination Group meeting that the State and all agencies would be at their highest level of preparation on 7 February.¹²³

Table 3.2 shows the message delivery performance of the EAS on 7 February. Message volumes exceeded all records and there were extensive delivery delays, particularly for non-emergency and administrative messages. Emergency messages were delivered well: 93.3 per cent were delivered within 30 seconds (76 seconds was the longest delay). However, only 26.7 per cent of non-emergency messages were delivered within 120 seconds, with delays of up to 161 minutes. Only 69.7 per cent of administrative messages were delivered within five minutes, and the longest delay was 12 hours.¹²⁴ This was problematic because the slower administrative and non-emergency message categories were being used to broadcast urgent information in some instances.¹²⁵ It demonstrated a lack of understanding and awareness at an operational level of the implications of the restriction in transmission speed, and a lack of discipline in the failure to manage the linked traffic to avoid the congestion that was inevitably created. Non-emergency and administrative message levels in EAS were not designed for use during peak activity periods.¹²⁶

Table 3.2 Message delivery performance of the Emergency Alerting System, 7 February

	Time (seconds)	Pages (no.)	Percentage of total
Emergency	0–30	4,053	93.19
	30–40	173	3.98
	40–50	76	1.75
	50–60	31	0.71
	60–70	11	0.25
	70–80	5	0.11
			0.00
	Total	4,349	100
	Time (minutes)	Pages (no.)	Percentage of total
Non-emergency	Up to 2	757	9.90
	2–30	767	10.03
	30–60	1,476	19.30
	60–90	1,055	13.79
	90–120	1,077	14.08
	120–150	2,504	32.74
	150–161	13	0.17
	Total	7,649	100
	Time (minutes)	Pages (no.)	Percentage of total
Administration	Up to 5	817	42.98
	5–40	58	3.05
	40–120	0	0.00
	120–180	8	0.42
	180–240	5	0.26
	240–300	75	3.95
	300–360	59	3.10
	360–420	56	2.95
	420–480	116	6.10
	480–540	222	11.68
	540–600	96	5.05
	600–720	389	20.46
Total	1,901	100	

The CFA uses about 29,400 EAS pagers to dispatch brigades and provide information to field personnel.¹²⁸ It engaged Mingara Services to assess the performance of its radio and communications systems during the fires in late January and February 2009. Mingara's report identifies the shortcomings that significantly contributed to the very high EAS message volume on 7 February. Message linking and the sending of duplicate non-emergency messages for each emergency message were among them.¹²⁹ Mingara recommended that the CFA revise its notification messages and collaborate with ESTA and the system provider, to rationalise and reduce linking in the EAS database.¹³⁰

Work to implement Mingara's recommendations has largely removed linking and no new linking is permitted. The EAS contractor stated that if this de-linking work had been done before 7 February delivery delays for all message categories would have reduced considerably.¹³¹ The Commission considers the CFA should have achieved substantial de-linking well before February 2009. Inadequate steps were taken before 7 February to respond to the known risk that the system might not cope with multiple incidents or a single very large incident.

The 2009–10 Victorian Budget allocated \$21.5 million to increase EAS network coverage and reduce transmission delays during peak events. The Government's preferred solution is to increase the permanent transmission rate to 1,200 bits per second and commission extra transmitter sites to prevent an ensuing reduction in coverage.¹³² Because the State has identified, funded and started implementing a solution to the problem of EAS message overload, the Commission does not consider it necessary to make recommendations in this regard.¹³³

Agency communications systems

The CFA and DSE use a range of methods and technologies to communicate during an emergency.

Country Fire Authority

The CFA radio communication system has three different layers: dispatch, incident management and fireground.¹³⁴ Dispatch covers emergency call taking through ESTA (for fire agencies this is known as VicFire) and brigade alerting and dispatch through the EAS. Once ESTA has dispatched brigades to respond to a reported fire it maintains contact with responding brigades. Metropolitan brigades maintain contact via Telstra's VHF network. This is a wide-area open-channel network that allows one-to-many communications. Rural and regional brigades maintain contact via the 'Country CAD' (computer-aided dispatch) system.¹³⁵

During an incident the CFA uses incident management channels, or IMCs, which provide open channel communications between management personnel on the fireground and the ICC. The CFA owned and operated 24 sites on 7 February. It now has 33 sites, and 30 more are planned, subject to funding. CFA radios are also programmed to access DSE incident management channels and IMC sites are strategically positioned to avoid coverage duplication.¹³⁶

Fireground communications use open-channel simplex radio transmission, which relies on line of sight for successful transmission. This can facilitate one-to-one and one-to-many communications.¹³⁷ The CFA has a range of transportable equipment to extend radio coverage and support incident communications—for example, transportable repeaters that can be positioned to remedy known radio black spots, where there is very poor or no radio coverage.¹³⁸

The CFA has default communication plans that identify the dispatch and command channels to be used in each region until alternative channels are allocated for a specific incident. All CFA firefighters are trained in radio network operation, standard operating procedures for equipment use, and transmission of information during an incident. More advanced training is provided to crew leaders, strike team leaders and sector commanders. Some CFA personnel also attend DSE's communications planner courses.¹³⁹

The CFA radio fleet is nearing the end of its life, and the CFA has begun a radio replacement project, due for completion by June 2012.¹⁴⁰ The aim is to ensure radio compatibility with other agencies and the statewide radio network envisaged by the new Emergency Services Communications Strategic Framework, discussed shortly.

The CFA does not advocate using mobile phones as a primary incident communications tool, but the standard operating procedures contemplate using mobile phones in certain limited circumstances.¹⁴¹

Department of Sustainability and Environment

DSE fire personnel use three radio networks. The StateNet Mobile Radio network is used only for day-to-day operations, back-up, and some dispatch and fire-spotting coordination. It is not used for operational communications during a fire because it is unmanageable in heavy traffic loads (the CFA does not use the trunking feature of the SMR network as it too does not cope with very heavy traffic loads).¹⁴² There are 81 Telstra-managed Incident Channel Network sites (76 as at 7 February 2009). These sites provide open-channel communications for command and control.¹⁴³ There are also 36 DSE-owned Fire Contingency Network sites for infill coverage and redundancy.¹⁴⁴ Operational personnel also use non-networked simplex radio-to-radio communications to talk with one another on the fireground. DSE personnel can access the CFA's IMCs and monitor the CFA's dispatch radio network.¹⁴⁵

DSE has funding for a radio replacement project, to commence in 2010–11. The replacement radios will continue to be compatible with radios purchased under the CFA radio replacement project.¹⁴⁶ DSE personnel communicate between offices and with other agencies and ICCs by telephone and fax. In 2009–10 DSE started providing EAS pagers to operational staff so that they would be notified of all fire incidents reported by the public. DSE intends to deliver further pagers to fire crews over the next two years.¹⁴⁷

Interoperability

CFA and DSE radio communications systems are technically interoperable. Bringing the systems together during an incident, however, relies on good communications training and planning. DSE and the CFA have documented joint default plans for command and initial fireground communications for each area or region. As an incident escalates the IMT's communications planner develops and implements a communications plan.¹⁴⁸

The CFA and DSE also have arrangements to ensure practical interoperability with other agencies. For example, CFA radios are installed in all MFB appliances and CFA vehicles operating on the urban fringe have been provided with portable Metropolitan Mobile Radio equipment (used by the MFB). DSE maintains a cache of radios that it provides to other agencies and has access to Victoria Police's secure radio network in Melbourne. Radios used by the New South Wales and South Australian fire services in border areas are programmed with CFA and DSE radio channels.¹⁴⁹

Communication problems on 7 February

The evidence highlighted a number of communication difficulties encountered by CFA personnel and Victoria Police on 7 February. These include paging performance (as discussed above), radio black spots, radio channel congestion, insufficient channel availability, radio transmission failures attributed to smoke effects, and fire-damaged or -destroyed radio communications infrastructure.¹⁵⁰

Radio

The CFA's radio systems are affected by black spots (where radio coverage is unavailable) and brown spots (where coverage is unreliable). Coverage is influenced by a range of factors, including atmospheric conditions, terrain, vegetation, buildings, the number of base sites and system design. The CFA's IMCs are particularly vulnerable to coverage deficiencies because they operate from stand-alone, rather than networked, transmitter sites.¹⁵¹

Black and brown spots can be dealt with in a number of ways, and these solutions are often documented in regional default communication plans.¹⁵² A 1999 to 2001 coverage review mapped black and brown spots in the CFA's IMCs. Those maps were used to improve coverage but they did not eliminate the problem. The CFA now has mapping software (the Statewide Coverage Mapping Application) that enables it to predict radio coverage for an area, but it still has no program to identify radio black spots systematically and implement technical solutions.¹⁵³ Until the statewide communications system envisaged by the new Strategic Framework becomes a reality, the CFA should continue to improve its existing communications system systematically, including by making efforts to resolve coverage deficiencies.

RECOMMENDATION 23

The Country Fire Authority review and improve its communications strategy as a matter of priority and develop a program for identifying and responding to black spots in radio coverage.

Radio congestion means firefighters have to wait until others finish before they can use the radio system. According to Mingara Services channel congestion may be exacerbated by users not using the channel efficiently, taking too long to get their message across, or not moving to the allocated channel.¹⁵⁴ Mr Ian Powell, Manager, Planning and Strategy, CFA Technology Services, stated that congestion on open radio channels is typically the result of inadequate communications planning and poor radio discipline.¹⁵⁵ According to the joint CFA–DSE *Operational Debrief Report*, the expanding coverage of mobile phones freed up radio by less use of trunk radio but complicated communications planning.¹⁵⁶ There were also instances of too few portable radios for crews away from vehicles.¹⁵⁷

The CFA reinforced the need for radio discipline in briefings before the 2009–10 fire season. The Commission urges the CFA and DSE to repeat this practice for future fire seasons.¹⁵⁸ The CFA is implementing Mingara's recommendation to establish key performance indicators with ESTA for the CFA dispatch radio channels. This will enable them to monitor performance and implement strategies to reduce congestion as required.¹⁵⁹

Evidence from senior CFA staff suggested there were too few radio channels available to each region on 7 February. Mr Powell disagreed, seeing the problem as a lack of proper communications planning. On the day there were 10 CFA fireground channels available in each region and additional DSE channels. Mr Powell's analysis of the Kilmore and Traralgon ICCs demonstrated that a number of the available CFA channels were not allocated.¹⁶⁰ The Commission accepts that there were sufficient fireground channels on 7 February. There are now three additional fireground channels available for each region, which will provide valuable redundancy capacity. It is the communications planner's responsibility to assign these channels properly in an emergency. Agencies should ensure that management teams for significant incidents include experienced communications planners.¹⁶¹

The Commission heard anecdotal reports that fire and smoke interfered with radio communications. This was confirmed by the Mingara report. Past studies have suggested several explanations about smoke interference but the matter is not properly understood so a technical solution cannot be developed. It is a matter of grave concern that fire agencies' radio systems might not function reliably in the presence of smoke. The Commission considers that the Emergency Services Heads of Agency Committee should further investigate why the smoke has this effect.¹⁶² Any research on this should consider whether there are technical solutions. The findings of this work should be specifically taken account of in communications planner training conducted by the CFA and DSE.

Until a technical solution is identified, fire agencies must work around smoke interference to maintain radio communications during an incident. A strategically located relay point, such as a temporary repeater, is a readily available alternative. The CFA and DSE should include in their communications planner training courses information about the potential for, and operational solutions to, smoke interference with radio communications.¹⁶³ The Commission suggests that further research be conducted into the effects of smoke on radio communications.

Telephones

The Commission was informed of various instances where communications to, from and between ICCs was hampered by problems with fixed-line telephones. For example, at Kilmore ICC 339 of 530 incoming calls went unanswered.¹⁶⁴ This contributed to the Kangaroo Ground ICC being unable to release a number of public information messages: personnel were unable to contact Kilmore ICC to obtain authorisation for the messages' release.¹⁶⁵

Telstra's fixed-line network proved to be robust, and there was little evidence of it being unable to carry calls. Most witnesses identified the engaged signal as 'congestion'. In many cases this was due to operational, rather than infrastructure, problems and the sheer volume of incoming calls. The significant problems at the Kilmore ICC were caused by a lack of personnel available to answer telephones. There was also a failure to program the Commander™ telephone system properly, which would have cascaded phone calls to an alternative line if the primary line was in use.¹⁶⁶ This was rectified on 9 February 2009.

Victoria Police

Police in metropolitan Melbourne use the Metropolitan Mobile Radio digital network. It suits their operational requirements better than the StateNet Mobile Radio analogue network because it facilitates encrypted communications and 'private chat' channels. The SMR network is still used by rural and regional police because MMR has no coverage outside the metropolitan area.¹⁶⁷ Police also use the Mobile Data Network managed by ESTA. This network enables data to be directly downloaded to terminals in police vehicles from the Victoria Police law enforcement and ESTA call-taking and dispatch databases.¹⁶⁸

The Commission heard evidence of communications difficulties because the MMR and SMR networks are not intra-operable. On the metropolitan fringe police vehicles are equipped with radios for both the analogue and digital networks, and officers are trained to operate both systems. Metropolitan police members deployed to rural areas on 7 February were, however, often without a means of communication. Some police had vehicles with only digital equipment. Even when they were given a radio compatible with the rural SMR network, many did not know how to operate it. Similarly, rural police deployed to urban areas serviced by the MMR network did not have radio coverage or where there was coverage it was often intermittent and prone to frequent drop-outs.¹⁶⁹ A further communications problem experienced by some police was congestion on regional D24 dispatch channels: this occurred during the Redesdale, Bendigo and Murrindindi fires.¹⁷⁰

The Strategic Framework discussed in the following paragraphs aims to rectify these difficulties. In the interim, Victoria Police will need to ensure its members are provided with radio handsets compatible with the network for the area to which they are deployed. Appropriate training—as well as back-up communications systems such as mobile phones and CFA radios—is also required.

Emergency Services Communications Strategic Framework

In April 2009 the Department of Justice's Emergency Services Policy and Support Unit began a review of the Statewide Integrated Public Safety Communications Strategy. The review identified six priorities: seamless statewide communication, call taking and dispatch, consistent statewide quality of service, improved data services, location-based services, and community communication.¹⁷¹

In April 2010 the State adopted the Emergency Services Communications Strategic Framework to replace SIPSaCS. The framework covers communication from and to the public and communication within and between emergency services organisations. Communication to the public is a new addition since SIPSaCS. The Commission welcomes the framework and its focus on 'a much higher level of integration' of community warning systems with operational communications systems.¹⁷²

By March 2010 the State had identified the future high-level technical needs of Victoria's emergency services communications. It will now examine what products and technologies exist to meet those requirements.¹⁷³ For Victoria Police the framework will ultimately lead to intra-operability between metropolitan and rural radio networks. Technical solutions to the current lack of intra-operability, and the timing of their implementation, have not been determined.¹⁷⁴ It is also unclear whether the CFA will continue to maintain its own incident management radio channels or move to a new statewide radio network. The design of the statewide radio communications system will take into account the CFA's requirements. It is therefore crucial that the CFA clearly identifies those requirements. The CFA began a review of its communications strategy and now that the framework is in place this review should proceed.¹⁷⁵

The framework contains a clear and comprehensive vision for the future of emergency services communications. If implemented, it would improve or resolve the communications challenges identified in evidence before the Commission. For this reason, no recommendation is proposed on the framework's subject matter. The Commission urges those responsible for implementing the framework to bear in mind the EAS message overload experienced on 7 February 2009. Emergency services communications systems must be designed and built with capacity to operate in large-scale emergencies involving multiple agencies. This capacity must be maintained throughout the life of the system. Implementation of the framework will require significant public funds and take time. The Commission notes the State's commitment to this task and considers there is the potential for the State to deliver an integrated, flexible and reliable emergency services communications system.

3.2.7 WATER AND ELECTRICITY

The Commission heard evidence about the failure of fire plans because of loss of power and subsequent loss of water, loss of mains pressure, and pumps catching fire. There was also evidence about the effect of fire on hoses and water storage sources.¹⁷⁶ Firefighters are reliant on ready access to water in order to fight fires, and water access can be affected by drought, as well as interruptions to electricity, during a fire.

Water for firefighting

CFA and DSE firefighters have the legislative power to take water from any waterway or water source for firefighting purposes. Where water is taken for firefighting, the water owner can request water replacement under the Victorian Government's Essential Water Replacement Scheme.¹⁷⁷ The array of domestic water supplies potentially available for firefighting can vary from large static water tanks holding a few thousand litres to swimming pools, dams and rainwater tanks. Although over 90 per cent of households in Australia are connected to mains or town water, the water supply to semi-rural or rural areas is likely to come from sources other than reticulated water. Local water sources such as dams, rivers, bores and rainwater tanks provide water to homes where mains water is not available or not provided.

The CFA recommends that households have a minimum of 10,000 litres of water (independent of mains water) specifically for firefighting. It also recommends water pumps for firefighting able to operate without mains power and hoses long enough to reach around the home.¹⁷⁸

Water points are established and maintained on public land to assist with fire suppression, including aerial firefighting. DSE is required to ensure adequate signage and access for firefighting vehicles and aircraft to these water points.¹⁷⁹

Some municipal fire prevention plans currently set out objectives to ensure access to and provision of water supplies for firefighting in rural areas.¹⁸⁰ These are linked to township protection plans, which provide greater detail on the locations and types of static water supplies available for firefighting.¹⁸¹ Mr Darryl Farmer, a municipal fire prevention officer with Alpine Shire, emphasised the problem of the decreasing supply of water for firefighting:

With the drought we've had over numerous years, the rivers have been slowed up and a lot of the springs have slowed up. Therefore farmers' dams don't have as much water in them, so that's an issue we have been looking at and we have actually been putting in static water supply systems in certain areas that we believe are required for firefighting purposes.¹⁸²

The impact of interruptions to power and water supplies on 7 February

Instances where water supply failed at critical times on 7 February are described elsewhere in this report. There are examples of loss of pressure in the water supply system and fire damage to pipework in Marysville and the closure of the control valve on the Buxton pipeline.¹⁸³

Once power was lost at the Beechworth DSE office, the incident management team struggled without lighting, air conditioning and the Commander™ phone system; a back-up generator was obtained but it was barely able to support computers and other systems. At Murrindindi the local radio station, UGFM, lost transmission once the power at the main transmitter site went off.¹⁸⁴ Loss of power also affected community water supplies and delivery systems at Buxton.¹⁸⁵

Past inquiries and fire inquests have clearly demonstrated the importance of independent water and power supplies. Poor planning and lack of preparedness for interruptions to electricity or water supply were highlighted after the Canberra bushfires of 2003.¹⁸⁶ Despite this, the Commission heard that on 7 February reliance on mains power and water was again a concern for fire agencies and those who stayed to defend their properties. This is worrying. Although land-use regulation (discussed in Chapter 6) can help to redress this problem, more effort is obviously required to ensure that houses in bushfire-prone areas have independent access to water and electricity.

3.3 PEOPLE

It is impossible to respond to a fire effectively without personnel who are appropriately trained in how to fight fires safely. This section discusses firefighter safety and the long-term psychological impact of fighting fires. It also celebrates the enormous contribution made by firefighters—particularly CFA volunteers—to the Victorian community.

3.3.1 FIREFIGHTERS' SAFETY AND WELFARE

Improving firefighters' safety has been a clear focus for the CFA and DSE, especially since the Linton inquiry into the deaths of five firefighters in 1998.¹⁸⁷ Both agencies are to be commended on the wide range of safety initiatives that have been introduced and maintained. Additional developments to improve firefighter safety have also been implemented since 7 February.¹⁸⁸

Safety in February 2009

In the days before 7 February there was a strong emphasis on the safety of firefighters.¹⁸⁹ Crews were given safety briefings in person and via pager messages the day before and on the morning of 7 February.¹⁹⁰ Despite this, the Commission heard from numerous witnesses that there is scope to improve firefighter safety. Regrettably, two firefighters died in February 2009. The first, Mr Joe Shepherd, a CFA member, left his crew to help a relative on 7 February. He was subsequently caught by the fire as he tried to leave. Although Mr Shepherd did not die responding as a CFA firefighter, the CFA have recognised his death for the purposes of compensation. The second fatality occurred on 17 February, when Mr David Balfour, a firefighter with the ACT Fire Brigade, was struck by a falling tree while working in the Cambarville area.¹⁹¹

There were numerous occasions when firefighters were in extreme danger in February 2009. Some of the most dangerous situations occurred during burnovers. AFAC (the Australasian Fire and Emergency Service Authorities Council) defines a burnover as a 'section of fire that overruns personnel and/or equipment'.¹⁹² More than 20 burnover incidents occurred on 7 February, many of them being a result of the wind change that occurred in the late afternoon.¹⁹³

A number of crews praised the equipment and safety measures available to them during the burnovers.¹⁹⁴ The Commission heard of the considerable investment by the CFA since the Linton inquiry to improve firefighting safety policies, procedures and equipment.¹⁹⁵ CFA investigations into the burnovers were also generally positive about the operation of safety equipment and procedures. A central concern, however, was why firefighters were caught in burnovers. There is evidence that if firefighters had had accurate and timely information, they might have been able to avoid the risk.¹⁹⁶ Inadequate briefings, communication, maps and weather information were common concerns raised in many of the burnover incident investigations. The poor performance of intercoms between the rear crew haven area and tanker cabins was also a problem for many of the tankers caught in burnovers.¹⁹⁷ Crew in Mirboo East Tanker 1 were involved in a burnover when the wind changed as they were trying to protect homes. They did not receive the red flag warning provided to other crews in the area because they were not on the resource list. They were also not attached to a strike team and, like others in the Glendonald Road area, were acting as a single resource.¹⁹⁸ Communications problems were confirmed in other evidence before the Commission, there being problems in several fundamental areas.

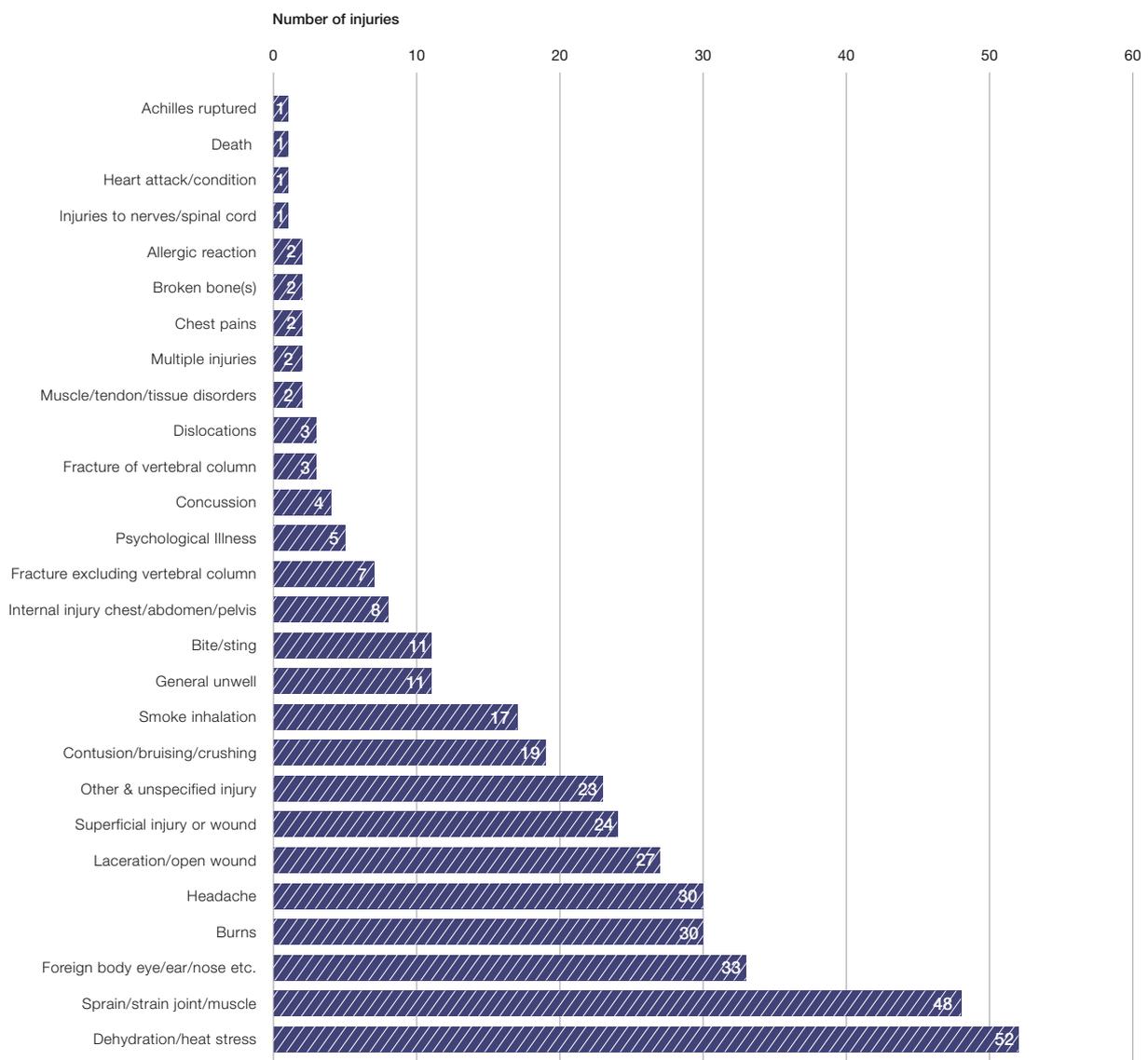
The Commission identified several deficiencies in the investigation of safety incidents such as burnovers. Feedback loops following CFA investigations of burnover events were not completed in the case of the Churchill fire. Members of the relevant IMT were not consulted about the incident; nor were they given a copy of the

investigation report.¹⁹⁹ The failure to inform people whose actions are criticised in the reports of internal CFA investigations deprives those individuals of the opportunity to comment. It also deprives the CFA of the opportunity to learn all it might from the event.

Recommendations from the Linton inquiry sought to strengthen fire agencies' occupational health and safety incident and near-miss investigations, but there appears to be scope for further improvement.²⁰⁰ The Commission notes that the CFA is considering a method of investigation and review. This new method must ensure that all contributing factors—at both the management and the crew level—are properly identified and taken into account.²⁰¹

CFA statistics show that from 7 February to 20 March 2009 there were 369 injuries to CFA personnel. Figure 3.2 shows the main injuries people sustained.

Figure 3.2 CFA injuries, 7 February to 20 March 2009



Source: Exhibit 810 – Statement of Esnouf.²⁰²

DSE recorded 64 injuries to firefighters on 7 February. Nearly half of those injuries were sustained at the Bunyip fire, many in the early hours of the morning.²⁰³ Three of the injuries to DSE firefighters were serious. CFA firefighters also suffered serious injuries. A Wollert brigade firefighter at the Kilmore East fire sustained serious burns when he was separated from his crew during asset protection. Erratic fire behaviour coupled with the wind change surprised the crew and, as they took shelter, one of the firefighters went to the pump, where he was badly burnt.²⁰⁴ A member of the Warrandyte North Tanker 1 was seriously injured after he removed his seatbelt to activate the crew protection system during a burnover and the tanker struck a culvert after the crew made a wrong turn on the way to St Andrews. The crew became disoriented in thick smoke, and issued a mayday message but were unable to provide their location to rescuers.²⁰⁵ At the Upper Ferntree Gully fire a firefighter sustained three crushed vertebrae when a branch fell on him during strong winds and fire activity. Crews had been on the point of relocating because of their hazardous position when the firefighter was struck by the branch.²⁰⁶

Back-burns

Evidence before the Commission identified a number of safety concerns about back-burns lit by DSE and Parks Victoria personnel at Kinglake West and Marysville. This was a dangerous fire-suppression tactic at both locations. Despite their experience and good intentions, those in charge did not have all the relevant information and did not know their back-burns would be affected by a wind change. Evidence before the Commission showed, however, that the back-burns had little or no effect on overall fire behaviour. Of concern is that in both cases approval to conduct the back-burn was not specifically sought from the Incident Controller, which is a contravention of DSE fire management procedures.²⁰⁷ Following 7 February DSE has reinforced the requirement with personnel responsible for lighting back-burns to seek approval from the Incident Controller.²⁰⁸

After thorough examination and consideration of the evidence relating to the back-burn lit in Kinglake National Park, the Commission finds that this back-burn did not contribute to the deaths of people in Pine Ridge Road, Kinglake West.

The Commission considers that fire agencies should focus on ensuring they have thorough processes for identifying and approving particularly dangerous activities such as back-burns.

RECOMMENDATION 24

The Country Fire Authority and the Department of Sustainability and Environment amend their procedures for investigating safety incidents and 'near-misses' to ensure that all dangerous incidents, including back-burns, are fully investigated and that all relevant people are consulted and informed of the results.

RECOMMENDATION 25

The Country Fire Authority and the Department of Sustainability and Environment require without exception that all relevant staff be trained in the need for Incident Controller approval to be obtained before a back-burn is lit.

Safety advisers

Safety advisers provide advice, guidance and support to the incident management team in identifying and dealing with safety concerns. They also provide strategic safety and risk management advice, monitor the development of the incident action plan, ensure safety inputs into operational briefings, review red flag warnings, and conduct risk assessments on elements of the incident. The role involves reporting on all aspects of potential and current safety and risk management present at a level 2 or level 3 incident. Safety advisers must also ensure that safety is promoted as a priority within the IMT and in incident operations.²⁰⁹

On 7 February there were about 200 trained DSE and CFA safety advisers but only two were appointed to IMTs.²¹⁰ The CFA and DSE joint standard operating procedures require safety advisers to be appointed for level 3 incidents. The low priority given to the appointment of safety advisers within IMTs on 7 February is of concern. The Commission is disappointed that despite the appointment of safety advisers being mandatory for level 3 incidents, on 7 February this standard operating procedure was largely ignored. In addition, CFA debrief report summaries did not raise the question of the absence of safety advisers.²¹¹ CFA updates produced to brief personnel before the 2009–10 fire season also did not reinforce the requirement for safety advisers.²¹² Safety advisers are an important aspect of the way the CFA and DSE cope with and mitigate occupational health and safety risks. Given the role of safety advisers was largely ignored on 7 February, further work is required in this area.

The Linton report sought to raise the profile and priority of safety at bushfires and recommended that safety officers (not advisers) be appointed for all fires. The inquiry heard that the AIIMS structure allowed for the appointment of safety officers but that none had been appointed at Linton or at any bushfires in Australia. The CFA and DSE did not support the appointment of safety officers: they felt that appointment of such officers would shift the focus of safety from being everyone's responsibility to one role. They were also concerned that if safety officers were able to veto decisions made by other incident managers it could undermine the capacity of the Incident Controller and the operations section of the IMT to manage the fire.²¹³

During evidence to the Commission, the CFA and DSE reiterated their view that a safety officer should not have a power of veto over decisions made by the Incident Controller.²¹⁴

In view of the evidence on firefighter safety, the lack of safety advisers, and the breach of fire agency standard operating procedures that require the appointment of safety advisers to all level 3 incidents, the Commission considers it imperative that an officer responsible for safety be appointed to all level 3 incidents. In addition, safety advisers should be re-named safety officers—consistent with the recommendations from the Linton inquiry. The use of 'officer' is also consistent with the title given to other key managers within an IMT.

The recommended new title underscores the importance of the safety officer role within the IMT. The Commission notes, however, that the safety officer should not have the power to veto decisions made by the Incident Controller, who should continue to retain ultimate responsibility for safety. The Commission is conscious that the make-up of IMTs under the AIIMS structure has been adopted following national consideration. At present in Victoria the safety adviser does not have a veto power. Although it is understood that practice varies between the states, the Commission does not recommend any change to this position. Should the national position change in the future, it is expected that Victoria would follow suit to maintain national consistency.

RECOMMENDATION 26

The Country Fire Authority and the Department of Sustainability and Environment adopt the title 'safety officer' (as opposed to 'safety adviser') and require without exception that a safety officer be appointed to every level 3 incident management team.

Red flag warnings

A red flag warning is issued to firefighters when there is a major change to critical information that might affect the safety of personnel. The warning is usually issued by radio to fire crew leaders down the chain of command. This allows the message to be passed quickly to all personnel and acknowledgment recorded. A red flag warning can be issued by a range of senior operational and incident management personnel.²¹⁵

On 7 February red flag warnings were mainly used to advise crews of changes to weather conditions—in particular, a wind change. Evidence presented to the Commission showed that on many occasions red flag warnings did not reach fire crews due to communication problems, as discussed. Given the number of crews caught in burnovers or who were unaware of the imminent wind change, the importance of red flag warnings requires more attention on the part of Incident Controllers. The introduction of electronic resource tracking, combined with new mapping initiatives, would provide an achievable and accountable method of ensuring that all crews are warned in a timely manner.

Taken as a whole, the performance of the CFA and DSE in managing the safety of their personnel deserves commendation. The number of fires that needed to be tackled at the same time, and their intensity, created enormous challenges and risks for firefighters. At times conditions were chaotic on the fireground, communications were difficult, and large numbers of supervisors and crew leaders with responsibility for others were required to manage under extreme conditions.

The fact that there were no deaths during firefighting on 7 February, when conditions were at their worst and when thousands of personnel were deployed, speaks volumes for the prior emphasis given by the CFA and DSE to training and safety awareness. Although this report deals with some shortcomings and the lessons that can be learned, overall the attention the agencies paid to safety and the protection of their crews warrants recognition.

The psychological impacts of 7 February

The physical injuries sustained on 7 February are easy to quantify, but the long-term psychological impacts are not. People affected by disasters can face serious risks to their mental health. The Commission received differing statistics on the proportion of emergency responders who develop mental health problems, but there is agreement that the rates of mental illness increase after such an event.²¹⁶ Among the kinds of mental health problems firefighters can encounter as a result of exposure to bushfires are the following:

- post-traumatic stress disorder
- major depressive disorder
- anxiety disorders such as panic disorder and agoraphobia.²¹⁷

Two mental health experts wrote after the 2009 bushfires, ‘Members of the emergency services ... deserve particular attention because of the prolonged intensity of their exposure, particularly in light of the high number of fatalities’.²¹⁸

As well as the impact of responding to the fires on 7 February, many emergency service personnel lost family, friends, colleagues and their homes. Over 30 DSE staff lost loved ones or homes.²¹⁹ Almost 300 CFA volunteers and their families were affected by the fires.²²⁰

During February 2009 a range of services were provided to assist members in the aftermath of the fires. From February 2009 to March 2010 the CFA provided extensive additional support and education to its members. In the affected areas psychologists have spent over 2,000 hours developing and delivering ongoing welfare plans. Chaplains have provided 3,900 hours of pastoral care, and peers have spent about 4,500 hours supporting CFA members and their families.²²¹

DSE established a staff resilience program. It includes activities aimed at supporting staff, recognising the effects of the fires on local communities, and counselling and awareness of the impacts of such an event.²²² Counsellors were deployed to affected areas on and following 7 February. Post-fire welfare sessions, pre-fire season education briefings, and increased counselling and support at the first anniversary of the fires were implemented for firefighters and IMTs.²²³

Professor Alexander McFarlane told the Commission about the importance of continuing support for fire agency personnel:

I think the critical issue is that there are proper quality assurance networks in place within their organisations because these are people who don't easily complain; by their nature people who ignore danger don't make good patients. You can't expect these people necessarily to come forward because they will put up with their suffering often at considerable personal cost.²²⁴

The Commission strongly encourages fire agencies to continue their efforts in providing support for the psychological welfare of personnel.

3.3.2 VOLUNTEERS

Throughout its inquiry the Commission was often told of the commitment and loyalty of CFA volunteers. The majority of CFA services are provided by people who volunteer to support or respond to fires across Victoria. Nearly 60,000 volunteers are part of the CFA. Along with paid staff, they attend emergencies in all country areas and 60 per cent of Greater Metropolitan Melbourne.²²⁵

The CFA has 1,211 brigades; all but 31 are volunteer brigades. The others are a combination of career staff and volunteers. Consistent with CFA board policy, there are no brigades consisting solely of career staff.²²⁶ CFA volunteers are recruited from their local community into non-operational and operational roles. Tasks performed include brigade administration, finance, training, maintenance, catering, communications, firefighting, peer support, community education, and people management.²²⁷ Over the past 10 years volunteer membership numbers within the CFA have remained steady. Despite the events of 7 February, the number of resignations has been comparable with previous years. A report by the Bushfire Cooperative Research Centre found that CFA volunteer retention rates were the highest in Australia when compared with other volunteer fire agencies.²²⁸ During an emergency CFA volunteers fill a range of roles, such as firefighter and crew leader on the fireground, information officer and Incident Controller in the incident control centre. They may also be deployed as fire investigators, air observers, fire weather planners and ground observers.²²⁹ In addition, CFA volunteers are involved in brigade administration, equipment maintenance, training, educating the local community and fund raising. These are often the unseen activities that keep the CFA running.²³⁰

In his evidence to the Commission CFA volunteer and staff member Mr Philip Hawkey said the 'CFA is almost like a family'. The connectedness of the CFA in the community was highlighted by Mr Hawkey and other witnesses, who described how community minded volunteers are. Their diversity of background, socio-economic status and occupation brings experience and depth to the CFA.²³¹ The CFA General Manager of the Yarra Area, Mr Lex de Man, explained that generalisations about CFA volunteers are difficult to make as the CFA is a very diverse organisation. CFA volunteers do not fit a particular profile or demographic. At 31 March 2010 there were 47,836 male and 11,836 female CFA volunteers.²³²

Information collected by a survey in 2007 showed the following:

- CFA members were more likely to be married when compared with the general community.
- About one in four CFA members surveyed lived on a farm property.
- Compared with the general community, CFA members were more likely to have lived at their current address for more than five years.
- Seventy per cent of CFA members were working full time, as opposed to 39 per cent of the general community. This is linked with the higher percentage of males in the CFA as compared with the general population.
- Thirteen per cent of CFA members were not in paid work, as opposed to 41 per cent of the general population. Of those not in paid work, 68 per cent were retired, 15 per cent were performing home duties, 8 per cent were actively looking for work and 9 per cent were students.
- CFA members were more likely to work in the agriculture, forestry and fishing sector, with 44 per cent of surveyed members who were in paid employment working in this sector.

- Forty-eight per cent of surveyed CFA volunteers owned their own business.²³³

A number of submissions argued that CFA volunteers should not be paid for their services. Mr David Ackland, a lieutenant with the Seymour CFA brigade, commented on the commitment of volunteers.

Volunteers feel strongly about their role and the fact that they are voluntarily contributing to their community. Paying volunteers will represent a significant shift away from the values associated with volunteerism and will significantly change the culture of the CFA. This is an issue I feel very strongly about.²³⁴

Other CFA members conveyed similar sentiments in their evidence to the Commission:

Since joining the CFA as a volunteer I have not looked back. My 32 years in the CFA have given me great satisfaction and pride, particularly in being a member of a voluntary organisation, one that is respected throughout Victoria, in both rural and city areas and throughout Australia.²³⁵

Being a CFA volunteer is about being passionate about your community and wanting to look after your friends, family and neighbours. I believe strongly in that if you are passionate about your community you will naturally want to protect it. I hold this belief strongly and expect this from members of my brigade. I am proud that all of our members share that passion.²³⁶

Mr Rodney Holland, a CFA Group Officer with the Whittlesea – Diamond Valley Fire Brigades Group, said the ‘CFA can be the central focus point of the local community’.²³⁷ Volunteer Fire Brigades Victoria also summarised the influence the CFA and its members have on their local communities:

In many local communities the CFA is at the heart of the community; the CFA station is the local meeting place and CFA volunteers are often deeply involved in community activities and leadership roles beyond their fire and emergency function. These cultural aspects exemplify the identity of an organisation that is strongly supported within the State of Victoria and is deserving of recognition and respect.²³⁸

The Commission also heard of the impact of volunteering on the family members of CFA volunteers. On 7 February many were left to wonder if their partner, son, daughter, mother or father would return home.²³⁹ Family members supported CFA volunteers by freeing them to protect the community while they stayed to defend the family home. Further support was provided with catering for brigades, maintaining households, or running the family business. The Commission acknowledges the essential role played by the families of CFA volunteers in enabling the volunteers to give priority to their communities during emergencies.

It is difficult to quantify the benefit for the State of CFA volunteers. In 2001 an in-depth analysis of the value of CFA volunteers was conducted by economist Ms Margaret Hourigan. She estimated CFA volunteers contributed about \$621 million a year to the Victorian community. This equates to almost \$840 million today.²⁴⁰

Recognition of volunteers

Some of the strengths of the CFA volunteer base were evident on 7 February. These include its surge capacity, the local knowledge of its members, and the rapid response. The Commission heard of volunteers preparing for the day, warning local residents, and assisting with the confronting task of locating and identifying the deceased. It was told that on 7 February over 20,000 CFA volunteers responded to 632 operational incidents in Victoria.²⁴¹ Countless more volunteers took support roles. During the weekend of 7 February, some volunteers were already fatigued because of fires burning in their areas earlier in the week.²⁴² Volunteer with the Walhalla CFA brigade Mr Simon Seear told the Commission how he and another brigade member doorknocked Walhalla residents the night before, and again on the morning of 7 February, delivering CFA pamphlets and CDs: ‘I also advised anyone I spoke to if they felt they were not prepared they may wish to consider leaving’.²⁴³ Mr Seear visited camping sites to warn campers of the fire danger. He also went to a meeting at the local hotel and advised people to shelter in a local underground mine. The Erica brigade canvassed the entire area of Erica, Rawson and Walhalla.²⁴⁴

Mr Peter Wiltshire and his wife, Mrs Felicity Wiltshire, are volunteer members of the St Andrews CFA brigade and their home was destroyed on 7 February. They telephoned everyone who was a member of their CFA Fireguard Group telephone tree and ‘virtually begged them to depart the area that ... Saturday morning’.²⁴⁵ Kinglake West CFA brigade lieutenant Ms Karen Barrow told the Commission she was operational for six weeks following 7 February and worked shifts of up to 12 hours a day during this time. Her brigade remained operational and members were putting out hot spots and assisting the community with their immediate needs.²⁴⁶

The efforts of volunteers in dealing with the hundreds of fires in February 2009 and helping out in their local communities during the recovery process were outstanding. Victoria should be proud of the CFA’s commitment to its community. The Commission pays tribute to those CFA volunteers who distinguished themselves in trying to deal with some of the most intense fires the state has experienced. Volunteers are a vital part of Victoria’s firefighting response, and all Victorians owe them gratitude.

The Commission agrees with Mr David McGahy, Captain of the Arthurs Creek CFA brigade. Although he was referring to his own brigade, the sentiment is equally true of the entire state:

I never cease to be amazed to this day at the absolute bravery and professionalism of the men and women of my brigade. There were people in charge of trucks that had no idea—they were from Strathewen—whether their houses were there, they had no idea if their families were alive, and they continued to do what was requested of them. They stayed on the line and helped other people. My admiration for the bravery, as I said, of the members of my brigade knows no bounds.²⁴⁷

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- 1 Exhibit 810 – Statement of Esnouf (WIT.3004.037.0348) [115]
 - 2 Exhibit 862 – Statement of Alder, Attachment 8 (WIT.7541.001.0200_R) at 0220_R; Exhibit 679 – Statement of Gilmore, Attachment 28 (WIT.3018.001.0356) at 0414
 - 3 Exhibit 11 – Statement of Esplin, Attachment 21 (WIT.005.001.1776) at 1786
 - 4 Exhibit 456 – Statement of Smith (WIT.3004.020.0219) [8]–[9], [11]; Exhibit 458 – Statement of Gilmore (WIT.3004.019.0001) [12]; Exhibit 196 – Statement of Haynes (WIT.3004.011.0058) [18]; Hendrie T855:19–T855:30, T880:20–T881:11
 - 5 Exhibit 508 – Statement of Armstrong, Annexure 2 (WIT.3004.008.0282)
 - 6 Jones T8627:11–T8627:23
 - 7 Exhibit 667 – Statement of Grant (VPO.001.041.0107) at 0109
 - 8 Waller T104:17–T104:22
 - 9 Exhibit 733 – Bradstock Report (EXP.012.001.0001) at 0010
 - 10 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0143
 - 11 Exhibit 254 – Statement of Farrell, Annexure 11 (DSE.HDD.0012.1044) at 1086
 - 12 Exhibit 130 – Statement of Waller, Annexure 8 (DSE.HDD.0012.2764)
 - 13 Murphy T1260:21–T1260:30; Russell T7316:1–T7316:5; Court T10960:19–T10960:23
 - 14 Webb Ware T8226:7–T8226:13, T8227:29–T8228:2
 - 15 Exhibit 425 – Statement of Sewell (WIT.7519.001.0001) [57]–[59]
 - 16 Exhibit 400 – Statement of Kennedy (WIT.3024.003.0294) [47]
 - 17 Exhibit 505 – Further Statement of Murphy (WIT.3004.021.0001) [9]–[10], [13], [17]; Exhibit 513 – Statement of Court (WIT.3004.021.0292) [34]
 - 18 Exhibit 652 – Statement of Dixon (WIT.3004.021.0348) [72.1]
 - 19 Exhibit 309 – Statement of Fallon (WIT.3004.015.0001) [69]–[72]; Place T7868:29–T7870:12, T7872:4–T7872:13
 - 20 Exhibit 460 – Statement of Cutting (WIT.3004.020.0001) [47]; Cutting T10322:16–T10323:1
 - 21 Submissions of Counsel Assisting – Narre Warren, Cranbourne & Upper Ferntree Gully Fires (SUBM.202.003.0001) [1.4]–[1.5]
 - 22 Exhibit 862 – Statement of Alder, Attachment 8 (WIT.7541.001.0200_R) at 0206_R, 0211_R–0212_R
 - 23 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [13], [19]–[25], [32]; Exhibit 254 – Statement of Farrell, Annexure 11 (DSE.HDD.0012.1044) at 1064
 - 24 Exhibit 862 – Statement of Alder (WIT.7541.001.0001) [31]–[34]
 - 25 Nugent T12729:29–T12730:7
 - 26 Exhibit 456 – Statement of Smith (WIT.3004.020.0219) [27]; Smith T10235:14–T10235:31
 - 27 Brown T13062:11–T13062:17

- 28 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [34]
- 29 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [30]; Sewell T9723:25–T9723:30
- 30 Exhibit 470 – Statement of Manning, Annexure 3 (DSE.HDD.0052.0875) at 0876
- 31 Exhibit 337 – Statement of Lawlor (WIT.3024.003.0190) [17]
- 32 O’Toole T9565:12–T9565:14
- 33 Exhibit 505 – Further Statement of Murphy (WIT.3004.021.0001) [22]
- 34 Nugent T12778:27–T12778:28
- 35 Exhibit 337 – Statement of Lawlor (WIT.3024.003.0190) [16]
- 36 Exhibit 859 – February 7th 2009 – Number of Hours Flown (TEN.262.001.0002)
- 37 Exhibit 859 – Major Fires Summary – Number of Hours Flown on Selected 2008/2009 Fires by Date (TEN.262.001.0004)
- 38 Exhibit 859 – February 7 2009 – Number of Hours Flown (TEN.262.001.0002)
- 39 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [26]–[27]; Ryan T17982:21–T17982:24
- 40 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [85]; Ryan T17980:15–T17980:29
- 41 Exhibit 347 – Statement of Farrell (WIT.3024.003.0154) [25]; Exhibit 337 – Statement of Lawlor (WIT.3024.003.0190) [8]
- 42 Ryan T17989:17–T17989:26
- 43 Exhibit 859 – State Aircraft Unit Victoria Aviation Debriefs 2008–2009 Fire Season (DSE.HDD.0158.0043) at 0059–0060; Exhibit 271 – Statement of Coulthard (WIT.088.001.0001_R) [19], [23], [25]; Exhibit 413 – Statement of O’Toole (WIT.3024.004.0165) [34], [50], [71]; O’Toole T9567:14–T9568:25
- 44 Ferguson T10462:20–T10463:15
- 45 Ferguson T10463:15–T10463:20
- 46 Streblow T18698:1–T18698:15, T18708:6–T18708:8, T18734:25–T18735:14
- 47 Exhibit 862 – Statement of Alder, Attachment 5 (WIT.7541.001.0117) at 0137
- 48 Exhibit 859 – The Cost-Effectiveness of Aerial Fire-Fighting in Australia (RSCH.001.001.0782) at 0786
- 49 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [182]–[187]; Exhibit 862 – Statement of Alder (WIT.7541.001.0001) [90], Attachment 5 (WIT.7541.001.0117) at 0134–0137; Ferguson T10462:17–T10463:22
- 50 Ryan T17989:22
- 51 Exhibit 845 – Commonwealth Response and Recovery Assistance Following the 2009 Victorian Bushfires (RESP.6007.001.0001) at 0009
- 52 Power T10818:12–T10819:3
- 53 Exhibit 845 – Commonwealth Response and Recovery Assistance Following the 2009 Victorian Bushfires (RESP.6007.001.0001) at 0006
- 54 Exhibit 840 – Statement of Comrie, Annexure 1 (WIT.3031.001.0004)
- 55 Exhibit 840 – Statement of Comrie, Annexure 1 (WIT.3031.001.0004) at 0118
- 56 Exhibit 847 – Second Supplementary Statement of Haynes, Annexure 35 (WIT.3004.036.0146)
- 57 Exhibit 861 – Statement of Ryan (WIT.3024.006.0001) [209]–[214]
- 58 Ryan T18006:1–T18006:9; Alder T18036:31–T18037:14
- 59 Ryan T18006:23–T18006:29
- 60 Ryan T18007:7–T18007:31
- 61 Ryan T18008:1–T18008:6
- 62 Alder T18041:3–T18041:30
- 63 Exhibit 269 – Statement of Russell (WIT.3004.013.0001) [14]; Russell T7449:10–T7449:29; McGennisken T7482:21–T7482:30
- 64 Exhibit 914 – Statement of Beer (WIT.7551.001.0001_R) [20]
- 65 Exhibit 269 – Statement of Russell, Annexure 1 (WIT.3004.013.0021) at 0026
- 66 Exhibit 3 – Statement of Rees, Annexure 2 (WIT.004.001.0141) at 0150–0158
- 67 Exhibit 425 – Statement of Sewell, Appendix 2 (WIT.7519.001.0028) at 0030
- 68 Exhibit 425 – Statement of Sewell (WIT.7519.001.0001) [4], [9], [14], [16]–[18]
- 69 McKenzie T8618:2–T8618:30
- 70 Russell T7449:10–T7450:5
- 71 Webb Ware T8234:1–T8234:4
- 72 Murphy T1260:30–T1261:1
- 73 Exhibit 425 – Statement of Sewell (WIT.7519.001.0001) [56]
- 74 Exhibit 503 – Statement of Barr (WIT.6003.001.0001) [16]
- 75 Rees T2632:17–T2632:22
- 76 Exhibit 31 – Statement of Langdon (WIT.016.001.0001) [17], [19], [46]; Exhibit 24 – Statement of Griffiths (WIT.018.001.0001) [49]–[52]
- 77 Exhibit 503 – Statement of Barr (WIT.6003.001.0001) [9]–[16]

- 78 Exhibit 24 – Statement of Griffiths (WIT.018.001.0001) [34]–[36]; Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) [86(f)]; Slijepcevic T6363:1–T6363:12
- 79 Exhibit 502 – Statement of Power (WIT.6002.001.0001) [23]
- 80 Exhibit 502 – Statement of Power (WIT.6002.001.0001) [19]
- 81 Exhibit 676 – The Imaging Capabilities of the Commonwealth of Australia (AGD.912.0001) at 0001–0002
- 82 Exhibit 676 – The Imaging Capabilities of the Commonwealth of Australia (AGD.912.0001) at 0002–0003
- 83 Exhibit 503 – Statement of Barr (WIT.6003.001.0001) [24], [26]–[28]
- 84 Exhibit 502 – Statement of Power (WIT.6002.001.0001); Exhibit 503 – Statement of Barr (WIT.6003.001.0001) [32]–[33]; Power T10821:3–T10821:29
- 85 Nichols T6601:9–T6601:12
- 86 Exhibit 502 – Statement of Power, Attachment B (WIT.6002.001.0073)
- 87 Exhibit 820 – Statement of Garvey (WIT.3004.034.0153) [33]–[51]; Exhibit 874 – Statement of Corbett (WIT.3004.043.0298) [10]–[22]; Exhibit 3 – Statement of Rees (WIT.004.001.0001) [120]–[126]
- 88 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060)
- 89 Exhibit 452 – Statement of Deering (WIT.3004.019.0192) [110]
- 90 Exhibit 457 – Statement of Rogasch (WIT.3004.019.0362) [12], [36]–[39]; Rogasch T10257:20–T10258:19
- 91 Exhibit 593 – Statement of Dickson (WIT.4018.001.0001) [50]
- 92 Exhibit 840 – Statement of Comrie, Annexure 1 (WIT.3031.001.0004) at 0095
- 93 Exhibit 254 – Statement of Farrell, Annexure 11 (DSE.HDD.0012.1044) at 1098; Exhibit 874 – Statement of Corbett (WIT.3004.043.0298) [37]–[40]; Slijepcevic T18185:12–T18185:28
- 94 Exhibit 415 – Three Examples of T-cards (EXH.415.0001)
- 95 Exhibit 24 – Statement of Griffiths (WIT.018.001.0001) [18]–[27]; Exhibit 872 – Third Supplementary Statement of Slijepcevic (WIT.3024.006.0113) [25]
- 96 Exhibit 874 – Statement of Corbett (WIT.3004.043.0298) [29]
- 97 Exhibit 872 – Third Supplementary Statement of Slijepcevic (WIT.3024.006.0113) [12]
- 98 Place T7869:4–T7869:11, T7870:5–T7870:18, T7871:4–T7871:13
- 99 Kennedy T9485:1–T9485:18
- 100 Exhibit 640 – Statement of Butera (WIT.3010.001.0098) [38]
- 101 Exhibit 548 – Report of the Investigation Team – North Warrandyte Tanker 1 – 7 February 2009 – Kinglake Fire Complex (CFA.001.027.0235) at 0244–0245
- 102 Exhibit 874 – 2009 Victorian Bushfires Royal Commission – Systemic Issues: Resource Management and Tracking (CORR.0902.0005); Corbett T18232:22–T18232:31
- 103 Corbett T18232:22–T18232:31
- 104 Exhibit 875 – Statement of Davis (WIT.7540.001.0001) [10]; Exhibit 872 – Third Supplementary Statement of Slijepcevic (WIT.3024.006.0113) [59]–[62]; Slijepcevic T18192:1–T18193:15
- 105 Exhibit 872 – Third Supplementary Statement of Slijepcevic (WIT.3024.006.0113) [51]
- 106 Exhibit 872 – Third Supplementary Statement of Slijepcevic (WIT.3024.006.0113) [69]; Slijepcevic T18192:18–T18192:23, T18193:2–T18193:15
- 107 Sewell T9717:10–T9719:9
- 108 Exhibit 874 – Statement of Corbett (WIT.3004.043.0298) [75]–[78]
- 109 Overland T10093:21–T10093:26
- 110 Exhibit 868 – Statement of Lloyd (WIT.3028.001.0001) [13]
- 111 Exhibit 867 – SIPSaCS Phase 8 Report – The Strategy 2001 (DOJ.001.004.0134) at 0150
- 112 Exhibit 868 – Statement of Lloyd (WIT.3028.001.0001) [16]; Lloyd T18121:19–T18125:4
- 113 Exhibit 840 – Statement of Comrie, Annexure 1 (WIT.3031.001.0004) at 0118–0122
- 114 Exhibit 868 – Statement of Lloyd (WIT.3028.001.0001) [16(d)]; Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0072–0073; Lloyd T18661:28–T18662:18
- 115 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [33]–[33], Annexure 10 (WIT.3004.045.0060) at 0073
- 116 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0073; Exhibit 867 – Coverage Commissioning – 2400 Bits Per Second (DOJ.001.005.0017_R); Exhibit 867 – Coverage Commissioning – 2400 Bits Per Second (DOJ.001.005.0072_R); Lloyd T18663:22–T18664:4, T18664:25–T18664:28
- 117 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [32], Annexure 10 (WIT.3004.045.0060) at 0073–0076; Powell T18167:17–T18167:27
- 118 Exhibit 867 – EAS Contract Director's Report February 2008 (ESPS.001.001.0048) at 0056; Lloyd T18672:6–T18672:9
- 119 Exhibit 867 – Impact of Victoria's Storm Activity 2nd April 2008 to CFA Operations Statewide (DOJ.001.004.0117) at 0119, 0127; Exhibit 867 – Message Type Use Review (DOJ.001.003.0267) 0270–0272, 0275
- 120 Exhibit 867 – EAS Data Rate Options Meeting #4 (ESPS.001.001.0015) at 0019; Exhibit 867 – EAS CMG Meeting #2 (ESPS.001.001.0064) at 0067; Lloyd T18669:13–T18670:31, T18666:22–T18666:31, T18667:7–T18667:25
- 121 Lloyd T18673:21–T18675:1

- 122 Cameron T19747:10–T19747:30; Lloyd T18670:23–T18670:26; Judd T20386:2–T20386:4
- 123 Cameron T19709:28–T10709:31, T19715:10–T19715:27, T19716:31–T19717:8
- 124 Exhibit 867 – EAS Performance to CFA Operations Statewide on Saturday 7 February and Sunday 8 February 2009 (DOJ.001.005.0140) at 0142
- 125 Exhibit 653 – Statement of Holland (WIT.3004.021.0209) [30]; Exhibit 595 – Statement of Owen (WIT.3004.031.0001) [191]–[193]
- 126 Exhibit 653 – Statement of Holland (WIT.3004.021.0209) [30]; Lloyd T18676:22–T18676:28
- 127 Exhibit 867 – Percentage of Messages and Time Delay for February 7 (TEN.279.001.0002)
- 128 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [31]
- 129 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0074–0076
- 130 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0076–0083, 0091
- 131 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [52]–[57], Annexure 25 (CFA.600.005.0188); Powell T18172:8–T18172:31
- 132 Exhibit 868 – Statement of Lloyd (WIT.3028.001.0001) [17]; Lloyd T18123:17–T18124:1, T18680:8–T18680:22
- 133 Lloyd T18680:23–T18680:30, T18682:11–T18682:14
- 134 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [9]–[15]; Powell T18145:20–T18145:28
- 135 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [19]–[24], Annexure 8 (WIT.3004.045.0050); Exhibit 113 – Statement of Cowan (WIT.5001.001.0001) [34]–[35]; Powell T18145:29–T18147:4
- 136 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [12]–[14], [25], [27]; Exhibit 113 – Statement of Cowan (WIT.5001.001.0001) [55(a)]
- 137 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [15], [16.1]
- 138 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [37]; Powell T18163:28–T18164:19
- 139 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [71]–[86], Annexure 13 (WIT.3004.045.0352); Powell T18147:17–T18147:28. As to Default Communications Plans see for example: Exhibit 870 – Statement of Powell, Annexure 19 (WIT.3004.046.0101), Annexure 20 (WIT.3004.046.0122)
- 140 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [113]
- 141 Exhibit 127 – Statement of Paterson, Annexure 3 (WIT.3004.010.0281) at 0519–0520; Exhibit 867 – Emergency Services Communications Strategic Framework (DOJ.001.005.0159) at 0178
- 142 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [17]–[19]; Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) [176]; Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [42]
- 143 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [17]–[19], [21]–[22], [26]–[27], Annexure 7 (DSE.HDD.0157.0011); Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) [176]; Exhibit 113 – Statement of Cowan (WIT.5001.001.0001) [54]–[55]
- 144 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [29]–[36]; Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) [177]
- 145 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [10]–[12], [16]; Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) [176]–[177]
- 146 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [132]
- 147 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [6], [99]–[101]; Lloyd T18662:19–T18662:22
- 148 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [44]–[52], [105]–[112], [115]–[123]; Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [38]–[42]; Exhibit 828 – Statement of Duckmanton, Annexure 14 (WIT.3004.041.0171_R); Powell T18149:16–T18150:10
- 149 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic (WIT.3024.006.0067) [113]–[114]; Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [43]–[45]; Walshe T672:16–T672:24
- 150 Exhibit 533 – Statement of Barrow (WIT.121.001.0001_R) [123]–[126]; Exhibit 439 – Statement of Brittain (WIT.3004.020.0251) [60], [62]–[64]; Exhibit 462 – Pastoria RFB De-Briefing Report Redesdale Fire 7th February 2009 (CFA.001.011.0043) at 0044; Exhibit 462 – Redesdale Fire Debrief – Kyneton Fire Station (CFA.001.011.0033) at 0034; Exhibit 269 – Statement of Russell (WIT.3004.013.0001) [100]; Exhibit 272 – Statement of McGennissen (WIT.089.001.0001_R) [53]–[58]; Exhibit 587 – Statement of Smith (WIT.3004.030.0001) [210]; Exhibit 389 – Statement of Lockwood (WIT.7520.001.0001) [63]; Exhibit 417 – Statement of Mongan (WIT.3004.018.0216) [67]; Exhibit 460 – Statement of Cutting (WIT.3004.020.0001) [83]; Exhibit 113 – Statement of Cowan (WIT.5001.001.0001) [77]–[101]; Brittain T9980:25–T9982:2; Williamson T4473:30–T4474:29; Barrow T11555:6–T11555:10, T11568:4–T11569:27; Sigmund T898:8–T898:17; Webb Ware T8228:14–T8228:21; Gilmore T10273:12–T10274:11; Rogasch T10260:6–T10260:18; McGennissen T7491:15–T7491:18
- 151 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0103–0104
- 152 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [64], Annexure 10 (WIT.3004.045.0060) at 0105–0106
- 153 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [64]; Powell T18162:8–T18162:10
- 154 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0107
- 155 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [69]–[70], Annexure 12 (WIT.3004.045.0338) at 0338; Powell T18157:3–T18157:16
- 156 Exhibit 192 – DSE and CFA – Operational Debrief Report – 2008/09 Fire Season (DSE.HDD.0030.0102) at 0121
- 157 Exhibit 192 – DSE and CFA – Operational Debrief Report – 2008/09 Fire Season (DSE.HDD.0030.0102) at 0121, 0129
- 158 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [69]–[70], Annexure 12 (WIT.3004.045.0338) at 0338; Powell T18157:3–T18157:16

- 159 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [66], Annexure 10 (WIT.3004.045.0060) at 0121; Powell T18163:2–T18163:11
- 160 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [88], Annexure 10 (WIT.3004.045.0060) at 0107; Exhibit 460 – Statement of Cutting (WIT.3004.020.0001) [83]; Powell T18156:8–T18156:20
- 161 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [85]; Powell T18156:28–T18157:2
- 162 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0111, Annexure 23 (WIT.3004.046.0171) at 0180–0188; Exhibit 868 – Statement of Lloyd, Annexure 4 (WIT.3028.001.0059) at 0066–0067; Submissions of the State of Victoria – Communications (RESP.3000.006.0196) [49]
- 163 Exhibit 870 – Statement of Powell, Annexure 10 (WIT.3004.045.0060) at 0111, Annexure 23 (WIT.3004.046.0171) at 0189–0190; Powell T18159:19–T18160:14
- 164 Exhibit 592 – Statement of Smith (WIT.3010.006.0001) [24]; Exhibit 245 – Statement of McKenzie (WIT.3024.002.0144) [20], [46]; Exhibit 269 – Statement of Russell (WIT.3004.013.0001) [80]
- 165 Exhibit 504 – Second Supplementary Statement of Creak (WIT.3004.021.0148) [175]–[176]; Exhibit 50 – Statement of Lawrence (WIT.3004.001.0197) [20], [37]–[42]
- 166 Exhibit 112 – Statement of Beresford (WIT.5002.001.0001) [49]–[51]; Exhibit 504 – Second Supplementary Statement of Creak (WIT.3004.021.0148) [175]–[176]; Exhibit 52 – Statement of Caughey (WIT.3004.001.0154) [19]; Exhibit 245 – Statement of McKenzie (WIT.3024.002.0144) [20], [46]; Caughey T1706:14–T1706:24; Creak T10892:17–T10893:3
- 167 Exhibit 868 – Statement of Lloyd (WIT.3028.001.0001) [16(b)], Annexure 3 (WIT.3028.001.0056); Walshe T669:20–T670:16, T1239:5–T1239:19
- 168 Exhibit 62 – Statement of Foster (WIT.012.001.0001) [21], [25]
- 169 Exhibit 19 – Statement of Walshe (WIT.003.002.0001) [115]–[117]; Exhibit 592 – Statement of Smith (WIT.3010.006.0001) [30]; Exhibit 365 – Statement of Billing (WIT.3010.005.0018) [48]; Billing T8912:16–T8913:19, T8914:24–T8915:1, T8934:12–T8934:24; Barton T8881:19–T8881:25; Hamill T8596:8–T8596:21; Thompson T10527:8–T10527:9
- 170 Exhibit 473 – Statement of Brundell (WIT.3010.006.0215) [17]; Exhibit 454 – Statement of Bull (WIT.3010.009.0001) [38]–[40], Attachment 12 (WIT.3010.009.0129), Attachment 13 (WIT.3010.009.0134) at 0137; Bull T10175:12–T10176:28; Hamill T8596:8–T8596:21
- 171 Exhibit 867 – Review of Emergency Services Communications (DOJ.001.004.0001) at 0003
- 172 Exhibit 867 – Emergency Services Communications Strategic Framework (DOJ.001.005.0159) at 0167, 0170; B Teague, R McLeod, S Pascoe, 2009 *Victorian Bushfires Royal Commission: Interim Report*, Parliament of Victoria, Melbourne, August 2009, Chapters 4 (Warnings), 5 (Information), 9 (Incident Management)
- 173 Exhibit 867 – Emergency Services Communications Strategic Framework (DOJ.001.005.0159) at 0194; Exhibit 867 – Emergency Services Heads of Agencies – Part 1: High Level Technical Requirements and Standards (DOJ.001.003.0342); Lloyd T18659:9–T18659:17, T18130:12–T18130:15
- 174 Lloyd T18661:5–T18661:12, T18133:28–T18134:24
- 175 Exhibit 870 – Statement of Powell (WIT.3004.045.0001) [63], Annexure 10 (WIT.3004.045.0060) at 0119; Powell T18160:21–T18161:1; Lloyd T18661:13–T18661:26
- 176 Exhibit 672 – Human Behaviour & Community Safety (CRC.300.007.0082) at 0119
- 177 *Country Fire Authority Act 1958*, s. 30(1)(e); Exhibit 838 – VIC Government Policy – Replacement of Essential Water Used During Bushfire Fighting Operations – 2009–10 Bushfire Season (TEN.250.004.0001)
- 178 Exhibit 831 – Defending Your Property – Prepare and Act Early to Survive (RESP.3001.001.0083) at 0088–0091
- 179 Exhibit 679 – Statement of Gilmore, Attachment 28 (WIT.3018.001.0356) at 0389
- 180 Exhibit 832 – Statement of Thompson, Annexure 5 (WIT.3004.040.0306_R) at 0335_R; Exhibit 594 – Statement of Venville, Attachment 4 (WIT.4022.001.0351) at 0365, 0381
- 181 Exhibit 614 – Statement of Hayes, Annexure 16 (WIT.3004.032.0469) at 0472, 0489, 0490, 0493
- 182 Farmer T17199:15–T17199:22
- 183 Exhibit 361 – Statement of Anderson (WIT.3032.001.0001) at 0007–0008
- 184 Exhibit 370 – Statement of Weeks (WIT.105.001.0001_R) [22]
- 185 Exhibit 348 – Statement of Rice (WIT.3004.016.0091) [89]; Exhibit 556 – Statement of Creighton (VPO.001.040.0177) at 0183; Exhibit 361 – Statement of Anderson (WIT.3032.001.0001) [33]; Exhibit 555 – Statement of Ackerman (VPO.001.034.0294) at 0297; Rice T8533:15–T8534:15; Jones T8640:13–T8641:8; Anderson T8793:6–T8793:28, T8795:5–T8795:27, T8798:11–T8800:3
- 186 Exhibit 9 – Chapter 6 – Prepare, Stay and Defend or Leave Early – Evidence for the Australian Approach (TEN.001.001.0151) at 0160–0161
- 187 Exhibit 546 – Linton Report (TEN.132.001.0001)
- 188 Exhibit 811 – Statement of Edgar (WIT.3024.005.0353) [165]–[184]; Exhibit 810 – Statement of Esnouf (WIT.3004.037.0348) at [292]–[300]
- 189 Exhibit 202 – Statement of Slijepcevic, Annexure 4 (DSE.HDD.0006.3020); Exhibit 408 – Statement of Tainsh, Annexure 2 (DSE.HDD.0012.1560) at 1560; Exhibit 6 – Revised Statement of Waller (WIT.002.002.0001) at 0041; Exhibit 269 – Statement of Russell, Annexure 7 (WIT.3004.013.0227) at 0229
- 190 Exhibit 41 – Statement of Murphy (WIT.3004.001.0001) at 0004; Exhibit 508 – Statement of Armstrong (WIT.3004.008.0255) at 0257–0258
- 191 Exhibit 574 – Statement of Incoll (WIT.7546.001.0001)
- 192 Exhibit 127 – Statement of Paterson, Annexure 3 (WIT.3004.010.0281) at 0587–0594
- 193 Exhibit 548 – Summary of Burn Over Incidents on 7 February 2009 (TEN.143.001.0001); Haynes T12046:5–T12046:6; Edgar T16757:29–T16758:11

- 194 Exhibit 353 – Investigation Report Burn Overs of Yarck Tankers 1 and 2 (CFA.001.028.0001) at 0012; Exhibit 418 – Statement of Chesterton (WIT.3004.018.0353) at 0357
- 195 Exhibit 810 – Statement of Esnouf (WIT.3004.037.0348) [42]
- 196 Exhibit 389 – Investigation Report Hazelwood North Tanker 1 (CFA.001.026.0153) at 0165; Exhibit 389 – Investigation Report Glengarry West Tanker 1 (CFA.001.026.0138) at 0149
- 197 Exhibit 548 – Report of the Investigation Team – Sunbury Tanker 2 – 7 February 2009 – Kilmore East Fire (CFA.001.027.0355) at 0359, 0364–0365, 0369; Exhibit 548 – Report of the Investigation Team – Epping Tanker 1 Burn Over – 7 February 2009 – Kilmore East Fire (CFA.001.027.0128) at 0132, 0135, 0137–0138; Exhibit 548 – Report of the Investigation Team – Greenvale Tanker 1 Burn Over – 7 February 2009 – Kilmore East Fire (CFA.001.027.0147) at 0151, 0154–0157, 0159; Exhibit 548 – Report of the Investigation – Whittlesea Tanker 2 Burn Over – 7 February 2009 – Kilmore East Fire (CFA.001.027.0421) at 0425, 0429–0431
- 198 Exhibit 548 – Investigation Report – Mirboo East Tanker 1 – 7 February 2009 – Churchill Fire (CFA.001.027.0208) at 0220–0221
- 199 Lockwood T9245:26–T9246:6
- 200 Exhibit 546 – Linton Report (TEN.132.001.0001) at 0655–0663
- 201 Exhibit 810 – Statement of Esnouf (WIT.3004.037.0348) [292]–[293]
- 202 Exhibit 810 – Statement of Esnouf, Annexure 63 (WIT.3004.040.0167)
- 203 Exhibit 811 – Statement of Edgar (WIT.3024.005.0353) [153]
- 204 Exhibit 548 – Investigation Report – Incident at 55 Hilliers Road, Whittlesea (Wollert Fire Brigade) – 7 February 2009 (CFA.600.001.0107) at 0110–0111, 0119
- 205 Exhibit 548 – Investigation Report – North Warrandyte Tanker 1 – 7 February 2009 (CFA.001.027.0235) at 0244–0245
- 206 Exhibit 548 – Investigation Report V1 – 21 May 2009 (CFA.600.001.0304) at 0306
- 207 Exhibit 254 – Statement of Farrell, Annexure 11 (DSE.HDD.0012.1044) at 1085–1086; Fitzgerald T16901:3–T16901:15
- 208 Edgar T16762:1–T16762:28; Williamson T10505:23–T10505:26; Lovick T8392:17–T8393:1
- 209 Exhibit 811 – Statement of Edgar, Annexure 6 (DSE.HDD.0153.0522)
- 210 Exhibit 811 – Statement of Edgar (WIT.3024.005.0353) [41], [44]; Exhibit 810 – Statement of Esnouf (WIT.3004.037.0348) [208]; Esnouf T16708:27–T16709:3
- 211 Exhibit 192 – DSE and CFA – Operational Debrief Report – 2009/08 Fire Season (DSE.HDD.0030.0102); Exhibit 811 – Statement of Edgar, Annexure 4 (DSE.HDD.0153.0363); Exhibit 548 – 2009 Victorian Bushfires Commission – Safety Advisors (CORR.0911.0107_R)
- 212 Exhibit 871 – Fourth Supplementary Statement of Slijepcevic, Annexure 16 (DSE.HDD.0157.0056)
- 213 Exhibit 546 – Linton Report (TEN.132.001.0001) at 0078, 0571–0573
- 214 Esnouf T16695:5–T16696:6; Edgar T16751:25–T16752:24
- 215 Exhibit 127 – Statement of Paterson, Annexure 3 (WIT.3004.010.0281) at 0771–0772
- 216 Exhibit 538 – Statement of Grigg, Annexure 4 (WIT.3001.001.0123) at 0128, 0131, Annexure 16 (WIT.3001.001.0304) at 0306
- 217 Exhibit 535 – McFarlane Report (EXP.007.002.0005) at 0022
- 218 Exhibit 535 – After the Fires: Looking to the Future Using the Lessons from the Past (EXP.007.001.0082) at 0082
- 219 Exhibit 857 – Department of Sustainability and Environment – Annual Report 2009 (TEN.201.001.0001) at 0024
- 220 Exhibit 986 – Volunteer Fire Brigades Victoria – Annual Report 2008–2009 (TEN.304.001.0001) at 0014
- 221 Exhibit 813 – Statement of Seach (WIT.3004.037.0250) [66]
- 222 Exhibit 857 – Department of Sustainability and Environment – Annual Report 2009 (TEN.201.001.0001) 0024
- 223 Exhibit 811 – Statement of Edgar (WIT.3024.005.0353) [130]–[148]
- 224 McFarlane T11641:7–T11641:14
- 225 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [25]
- 226 Exhibit 931 – Statement of Armytage, Attachment 4 (WIT.3003.002.0085) at 0122; Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [72]
- 227 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [31]; Rees T19:4–T19:16
- 228 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [47], [53], [55]
- 229 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [127]; Exhibit 127 – Statement of Paterson, Annexure 3 (WIT.3004.010.0281) at 0707, 0713, 0835, 0857; Paterson T4277:9–T4277:25
- 230 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [31], [81]
- 231 Exhibit 923 – Statement of Hawkey (WIT.7554.001.0001_R) [13]–[14]; de Man T19147:6–T19147:13
- 232 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [62], [68]
- 233 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [69]
- 234 Exhibit 912 – Statement of Ackland (WIT.7550.001.0001_R) [22]
- 235 Exhibit 914 – Statement of Beer (WIT.7551.001.0001_R) [10]
- 236 Exhibit 913 – Statement of Jones (WIT.7552.001.0001_R) [11]
- 237 Exhibit 911 – Statement of Holland (WIT.7553.001.0001_R) [11]
- 238 Exhibit 910 – Submission of Volunteer Fire Brigade Victoria (VFBV.002.001.0001) [32]

- 239 Jewell T16776:2–T16776:26
- 240 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [34]
- 241 Exhibit 909 – Statement of de Man (WIT.3004.046.0240) [43]
- 242 Owen T12922:18–T12922:26
- 243 Exhibit 88 – Statement of Seear (WIT.042.001.0001) [32]
- 244 Seear T2800:13–T2800:15, T2804:1–T2804:7
- 245 Wiltshire T5403:7–T5403:18
- 246 Exhibit 533 – Statement of Barrow (WIT.121.001.0001_R) [109], [117]; Barrow T11558:18–T11558:22
- 247 McGahy T2256:9–T2256:17

