South Australian Country Fire Service Project Pinery

Findings of the Project Pinery Review including the Lessons and Action Plan

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Distribution

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Revision Log

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19 Feb 2016	1	Steering Group Circulation Draft
2 March 2016	2	Draft Report for Validation Workshop
22 March 2016	3	Draft Action Plan incorporating the results of the Validation Workshop
8 April 2016	4	Project Pinery Action Plan
19 May 2016	5	Project Pinery Draft Final Report
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TABLE OF CONTENTS

Executive Summary

On 25 November 2015, the Pinery fire burnt more than 82,500 hectares across South Australia's mid-north. Insurance losses from the fire exceeded $75 million, with 91 homes, more than 400 farm structures and thousands of livestock destroyed. During the fire, two people lost their lives.

Noetic was engaged by the South Australian Country Fire Service (SACFS) to deliver a lessons learnt review of the fire. This review, Project Pinery, included the collection of observations from SACFS personnel and other relevant stakeholders, the processing of those observations into validated lessons, and the development of an Action Plan.

All response agencies are resourced, trained, and equipped to cope with a range of 'normal' emergencies, which comprise the vast majority of its response. Occasionally, extreme events emerge which stretch the agency and test its ability to respond close to the limits of its capacity. On 25 November 2015, the SACFS was faced with such an emergency.

Conditions on the afternoon of 25 November 2015 meant that there could be no expectation of containing this fire until a forecast improvement in weather conditions late in the evening. The extreme weather, the high fuel loads presented by both standing crops and retained stubble, the terrain and large paddocks all contributed to create a fire that escalated with extraordinary rapidity and which could not be fought. This report is therefore an acknowledgement that SACFS responded appropriately, and in order to support SACFS' continuous improvement strategy, provides key lessons to inform SACFS' self-improvement.

The incident increased in size and complexity exponentially, stretching established incident management processes, which is the key observation of the review and reinforces the important understanding that the entire SACFS chain of command shares responsibility for effective management of incidents and the problem does not simply reside with the appointed incident controller.

It is important to note, however, that changed behaviour by responders would, in this case, not have reduced the total damage. This fire was beyond control until late on 25 November and it is apparent that no actions taken by the SACFS could have altered its course. Nonetheless, as a large, fast, intense grassfire, Pinery presents an opportunity to learn and to improve.

To this end, a number of other lessons have also been identified. They are discussed in the report and detailed at Annex C. For the most part the lessons reflect the maturity of the SACFS processes for learning from experience and identify refinements of existing approaches. SACFS has a highly developed and active Lessons Learned process which was demonstrated by the high level of engagement from SACFS' leadership, staff and volunteers; by their openness; and by their willingness to share their experience and knowledge.

INTRODUCTION

Background and Context

On 25 November 2015, the Pinery fire burnt more than 82,500 hectares across South Australia's mid-north. Insurance losses from the fire exceeded $75 million, with 91 homes, more than 400 farm structures and thousands of livestock destroyed. During the fire, two people lost their lives.

The size and intensity of this fire and its impact on the community, including the loss of life, necessitated the SACFS undertake a formal, external and impartial review of the response. Accordingly Project Pinery was initiated to both develop a comprehensive understanding of what happened and to shape a deliberate and structured approach to learn from this experience.

The project also provided an important opportunity to confirm that lessons from previous incidents have actually been learnt. The Terms of Reference for the review are at Annex A.

Aim

The aim of this review is to identify key lessons and actions to help SACFS improve its performance and address mitigation of those lessons learned from the Pinery fire.

Structure

The report is structured in the following sections:

+ A description of Noetic's approach to lessons learnt reviews,

+ the project methodology,

+ previous reviews and status against previous recommendations,

+ our observations on incident management at the Pinery fire,

+ detailed responses to the Terms of Reference including the identification of any lessons.

OBSERVATIONS ON INCIDENT MANAGEMENT AT THE PINERY FIRE

Narrative – 25 November 2015, Pinery

Weather conditions on 25 November 2015 were extreme, with maximum temperatures in excess of 38 degrees Celsius and north-westerly winds gusting up to 90 kilometres per hour. The Grass Fire Danger Index (GFDI) on the day peaked in excess of 200. A stronger south-westerly wind change together with cooler more humid conditions was expected in mid-afternoon at about 1500 hours.

The Pinery fire was reported at 1205 on 25 November 2015 by mobile phone to 000. The first arriving officer on the day was a Group Officer. On arrival, he assessed the fire was beyond suppression. It already covered an estimated 200 hectares with flame heights exceeding 10 metres and was moving downwind at high speed. The

Group Officer immediately escalated the incident to a third alarm, triggering a response from twelve appliances in total. His assessments and actions were, in retrospect, both accurate and timely and demonstrated the benefits of his experiences as a SACFS volunteer.

The fire ran in a south-easterly direction and covered nearly 50 kilometres before the forecast wind change, at which time its northern flank became a 40 kilometre long fire-front driven by winds gusting in excess of 50 kilometres per hour. During its south-easterly run, it was reported as spotting one to two kilometres ahead of the fire-front. By about 1800 hours - after the weather change - winds had eased and the GFDI had dropped to around 35, at which time suppression became practical and the fire was contained. During the fire two fatalities occurred and are subject to a coronial investigation. The total area burnt was about 82,500 hectares, nearly all of it within the first six hours. Property damage and stock losses were extensive.

Once this fire started, it was inevitable there would be property and crops destroyed and livestock lost or injured. The conditions on the afternoon of 25 November 2015 meant there could be no expectation of containing this fire until weather conditions improved late in the evening. As well as the extreme weather, the high fuel loads presented by both standing crops and retained stubble and large paddocks all contributed to create an out of scale event that could not be fought. The speed of the fire's spread bears testimony to the challenges faced by the response agencies.

SACFS' response to the Pinery Fire

The first arriving officer was the Level 1 Incident Controller; he recognised the scale of the fire required an immediate escalation beyond third alarm. While a large fire burning under extreme weather conditions with the potential to impact on communities, even on a fire ban day, does not always meet the criteria for a Level 3 incident, this one did. Rather than identifying this as an out of scale event and attempting to manage it as such, normal SACFS processes for escalation were followed. Initially control was supported by the Regional Coordinator of Region 2 who immediately requested reinforcing strike teams and the stand-by Level 2 Incident Management Team (IMT) from Region 1, which, according to the CRIIMSON log began moving at around 1300 hours, although not all members were moving until about 1400 hours. [1]

It should be noted that this was a standard procedural response (bringing in the Level 2 IMT from a neighbouring Region) but it was not appropriate to the situation being faced. SACFS extant systems of work did not identify this. Control of the incident response was clearly beyond the capacity of the first arriving officer, although he remained the nominal Incident Controller. It was unrealistic to expect that, working out of a vehicle with inadequate communications and with no supporting staff, he could exercise anything approaching effective control. Similarly, the deploying Region 2 Level 2 IMT was too small for a Level 3 incident and was, in any event, not going to be postured to operate effectively for at least a couple of hours.

Until the Region 1 IMT assumed control, the Region 2 Acting Regional Commander undertook some incident control responsibilities without assuming the role of Incident Controller. RCCs are not intended to manage incidents and are not staffed to do so, In this case the RCC had no means of establishing the level of situational awareness necessary for good decision making in such an out of scale event, had (for an IMT) poor ICT and communications, and was only staffed for its normal functions. In the absence of any other means of

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[1] The stand-by Level 2 IMT from Region 2 had already been deployed to a fire and was unavailable to be committed to this incident.

managing the incident, the RCC necessarily performed some of the functions which would have been the purview of an IMThad one been in place.

At 1330 hours, the on-call State Level 3 IMT was activated and directed to Balaklava. At 1600 hours, the Level 3 Incident Controller was briefed and assumed control. At that time, the IMT was incomplete but had functional managers operating. It worked from inadequate facilities at Balaklava, was also plagued by poor connectivity and communications and, beyond the reports of the fire's impacts, had little means of establishing situational awareness. The challenges faced by incident controllers meant that independent action by strike teams and fire crews was widespread and direction by the IMT was sometimes based on a mis-appreciation of the actual situation.

The facilities at Balaklava were not suitable for a Level 3 IMT. There was inadequate office space, limited life support for IMT members, poor connectivity and most people going there had to move through or around the fireground. Balaklava is not a designated Level 3 ICC, however it seems to have been chosen as the presence of the Incident Controller at the venue enabled the opportunity for incoming IMT members to gain tacit information regarding the fire. The facilities at the subsequent location of the Level 3 IMT at Angaston were better but the IMT was split over two levels, which was still not ideal. There was still inadequate IT connectivity and communications remained difficult.

The severity of this fire presented quandaries to those preparing community warnings. A Fire Danger Index (FDI) of 75 is the upper limit at which well designed and constructed houses may provide shelter from fire. At an FDI of greater than 100, leaving early is the safest option. The forecast GFDI for the mid-North on 25 November 2015 was 148 – the top end of 'Extreme'. During the fire, the GFDI peaked at 200. During times of extreme or catastrophic GFDIs SACFS should consider a pre-emptive call to action to the community. For the communities first impacted by the fire, it was clearly already too late to 'leave early' but, for those communities that were expected to be impacted later, timely relocation of particularly vulnerable people from schools etc. may have been possible through early warnings. The issue here is not the decisions that were made but the lack of a capability to decide if a decision was needed. As discussed above, at the time at which these considerations would have been timely, there was effectively a gap in incident control and there was certainly very little capacity to think further down the timeline of the development of the fire and how its impacts could be managed and mitigated.

While this was going on, the SCC continued to conduct its normal role, which focused on responding to requests and passing information upwards. The 2009 Black Saturday fires in Victoria offer an interesting parallel. The VBRC criticised incident management at the state level noting that:

> *'A number of relatively simple practices would have greatly assisted in identifying shortcomings in warnings and in the composition and effectiveness of incident management teams:*
> * *once a fire had been reported, requiring the responsible incident management team to provide to the iECC [an SCC equivalent] as soon as practical an incident action plan summary, which should have been used to ascertain whether critical matters such as warnings, resourcing and firefighter safety were being factored into the strategy for the fire requiring provision of predictive maps, either by the IMT or*

by the fire behaviour analysis unit within the iECC itself, and a list of all warnings issued for an incident (and updated as required)

• *on the basis of the predictive map and the list of warnings, confirming that communities in the probable path of the fire had been warned, ensuring that the warnings took adequate account of known weather information, such as forecast wind changes and issuing additional warnings as required.*[2]

These VBRC findings highlight the concept of command and its associated responsibilities. The SACFS SCC is structured and staffed to perform its coordination tasks and provide defined products to a range of stakeholders. The SCC has no capacity to support the more abstract considerations that underpin the effective functioning of the chain of command and this manifested on 25 Nov 2015 in a succession of 'non-'or missing decisions such as; sending the Level 2 and 3 IMTs to Balaklava, sending a Level 2 IMT to an very large and fast Level 3 incident, establishing the airbase for the fire at Gawler for technical aviation operations reasons seemingly without consideration of the possibility that it would be impacted by the fire.

Command rests on decision-making. Decision making has a number of stages the first two of which are identifying that a decision needs to be made and identifying available alternatives. At present the SCC does not have the role to identify when decisions need to be made or to develop alternative courses of action. In addition, its layout and facilities do not support the types of interactions that typically underpin these functions. As a result, it is able to service the control and coordination aspects of command, but can provide little material support to the more abstract aspects of the command function. Because of this, it creates a risk of replicating the errors highlighted in the VBRC excerpt quoted above.

Comments on SACFS Capabilities

Although not the subject of specific ToR, during the review a number of issues relating to SACFS capabilities either emerged from workshop discussions or were raised in interviews. They are summarised below.

+ **Burnovers**. Three burnovers occurred on the afternoon of 25 November. These were the subject of separate critical incident reviews which were not available in time to be included in this review. They should be subjected to a separate lessons learnt process. It is clear from a number of AARs that appliances that had layered safety systems provided good protection to crews during burnovers. At present, not all SACFS appliances have these systems.

+ **Group Officers Training**. During interviews it was emphasised a number of times that not all group officers are fully prepared or equipped to undertake their required roles in large scale multi-division and sector fires. It was suggested that there is a need to provide appropriate training for group officers to meet this need.

+ **Automatic Vehicle Location**. The size and speed of development of this fire combined with the difficulties experienced in precisely fixing its head and flanks created great challenges for effective distribution of resources and for the assurance of firefighter safety. Automatic Vehicle Location systems, that report the location of the vehicle with a predetermined regularity, would have provided controllers with an important tool for understanding and control during this fire.

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[2]Victorian Bushfires Royal Commission Final Report Volume II: Fire Preparation, Response and Recovery p. 82.

DETAILED RESPONSE TO THE TERMS OF REFERENCE

The following section outlines Noetic's observations. A list of lessons is captured at Annex C of this report.

Adequacy and Timeliness of the Initial Response (ToR 1.1)

The initial response to the incident was prompt, appropriate and in accordance with Standard Operating Procedure (SOP) 2.1. Key timings are shown in Table 1. In the first 60 minutes of the incident, 38 appliances turned out. Response times were satisfactory and reduced as groups and regions increased their readiness throughout the afternoon.

Total aviation commitment between first alarm and last light on 25 November 2015 comprised eight Single Engine Air Tankers (SEAT), a Very Large Air Tanker (VLAT), a large air tanker (LAT), two air attack helicopters, an air observation helicopter; and a fixed wing observation aircraft.

Time	Event	Comments
1205	000 Call received by SA Metropolitan Fire Service (SAMFS)	
1205	First alarm	Four appliances dispatched Three turned out Average response time: eight minutes
1211	Alarm upgraded through second alarm to third alarm	11 additional appliances dispatched 10 turned out Average response time: six minutes
1216	Air support was requested by the Incident Controller	SACFS Air Desk aware at 1217 hours
1220	First aircraft dispatched	Bomber 584/585 ex Hoyleton Helicopter FB507 ex Parafield
1225	Region 2 requests strike teams and indicates an IMT will likely be required	

1230	Region 1 and 3 strike teams directed to form up	
1332	State Level 3 IMT responded	
1233	Region 1 Level 2 IMT activated and directed to Balaklava	Initially just the Incident Controller. The rest of IMT followed from 1310 hours. It took most of the afternoon to fully establish the IMT.
1234	First aircraft at the fire	Bombers 584/584 arrive at fire. B584 provides arrival message.
1235	Region 1 Incident Controller begins move to Balaklava	Remainder of IMT follow – all en route by 1400 hours
1253	First Air attack arrives at fire	FB507 reports multiple assets under threat.
1253	Further two SEATs at the fire	Bombers 586/587 ex Parafield
1256	Further two SEATs at the fire	Bombers 588/589 ex Woodside
1311	Dedicated Air Observer arrives	FB502 ex Woodside
1402	Further two bombers arrive	Bombers 580/581 ex Pt Lincoln
1405	Gumeracha strike team burn over	
1420	Level 2 Incident Controller arrives at Balaklava	(from CRIIMSON log)
1423	2nd Air Attack Supervisor arrives	FB501 ex Gawler
1440	VLATs requested	
1440	Approximate R2 Bravo 24 burn over	

1500	Approximate Hamley Bridge 24 burn over	
1505	Wind change at fire head	
1600	Level 3 Incident Controller assumes control	
1636	Large Air Tanker over fire	B132 one drop of 15,000 litres
1743	Very Large Air Tanker over fire	B910 two drops of 16,000 litres each

Table 1: Key Timings of the Initial Response

The overall resourcing of the response has not emerged as an issue. It is not clear that an expanded flow of resources could have been effectively employed given the challenging conditions faced by Incident Controllers with a number of After Action Reviews (AARs) mentioning long delays between arrival and deployment and widespread independent action by strike teams.

Adequacy and timeliness of Call Receipt & Despatch Centre response and support to requests (ToR 1.2)

The Call Receipt and Despatch Centre (CRDC) response and support to requests was satisfactory. The fire was reported to 000 by mobile phone at 1205 hours and the first alarm response was dispatched at 1205 hours. Subsequent responses to second and third alarms were similarly timely.

The CRDC was advised of the fire danger indices at about 1630 hours on 24November 2015 for the following day. This information was used to determine a required staffing level comprising both on-duty and personnel on 45 minute stand-by. The required staffing level for 25 November 2015 was Red, which comprises three Officers and ten Operators. The forecast FDI was achieved with this staffing level in place at approximately 1130 hours.

An emergency recall of further staff (three further Operators and two Communications Centre Managers) was initiated at approximately 1330 hours in order to meet demand. This heightened level was maintained until around 1800 hours when the volume of calls reduced to manageable levels.

The SAMFS did not participate in the 24 November 2015 teleconference that put in place preparations for the extreme fire weather of 25 November 2015.The SAMFS are not listed as participants in the fire weather teleconference described in the SCC Operations Manual. The Manual should be amended to include them.

Information from the Fire Ground to Inform Warnings and Messages (ToR 1.3)

This was a large and fast moving fire which escalated faster than the incident management arrangements put in place for it. The extreme fire behaviour, smoke and marginal flying conditions, made it difficult to accurately

track the head and spread of the fire. Incident Controllers and others were therefore unable to establish sufficient situational awareness to definitively describe the extent of the fire or accurately predict its impact on communities. Until mid-afternoon, Incident Controllers were apparently tracking the spread of the fire as least partly on the basis of reports of its impacts. This problem was exacerbated by the poor communications difficulties experienced by IMTs and strike teams.

The following is an edited extract from the CRIIMSON log which illustrates the challenges faced by those preparing warnings:

> *1401 hours: Emergency Alert ID – 15099530 Sent*
>
> *1420 hours: Phone call to SCC from Region 2–have not enough staff to do any more Emergency Alerts (EA)…An EA needs to be sent including Hewitt, Willaston and Concordia areas. SCC responded that an EA had just been sent and these areas were not of concern. Region 2 stated that they had info that the fire was already at these areas. SCC agreed that a new campaign needed to be created including these areas.*
>
> *1423 hours Emergency Alert ID – 15099550 Sent.*

The Pinery fire covered 82,500 hectares and developed a perimeter of nearly 250 kilometres in about six hours. This meant that it expanded on average about 200 hectares a minute. However, this reported spread was uneven and the fire expanded in very fast spurts depending on the fuel loads and the localised conditions. In this situation, it is probably illusory to talk of a single fire ground as a source of information and unrealistic to expect that community warnings can usefully be informed by information arising there. In circumstances such as these, community warnings need to be based overwhelmingly on predictions of fire behaviour.

Initial Community Warnings and Messages (ToR 1.4)

Warnings were issued in accordance with existing procedures but were generally not sufficiently informative and nor were they sufficiently forward looking to enable communities to develop appropriate responses. On the first afternoon, community messaging kept only marginally ahead of the fire.

Within the State Coordination Centre strategies were implemented to increase public information in real time. A media spokesperson was appointed which enabled live crosses to occur across both television and radio. Within the State Coordination Centre facilities that enable SACFS to broadcast direct with the ABC network optimises public information and support the standard warning messages.

The method of allocating names to fires (the pin drop) is reasonable but needs to be augmented to ensure messaging to the public contains information intelligible to them. The mention of Pinery, although a gazetted location, apparently failed to trigger alertness in communities 50 kilometres away. This is another example of applying normal procedures in abnormal circumstances. If this had been a normal Level 1 or 2 Incident, its impact would have been limited to communities to which Pinery was a recognisable area. In a fire that was destined to be as large as this one, the procedures for providing geographical descriptions to the public need to encompass the areas likely to be affected.

Because of the challenges presented to incident management, warnings were too focused on the short term and paid insufficient attention to the future development of the fire, especially during its initial stages. An example is the first Emergency Warning Message sent at 1227hours, which only referred to Mallala as being threatened. This was true, and the Mallala area was impacted from about 1245hours. However, there were a number of other locations and communities that would be impacted within the next couple of hours that needed to be warned and others that could be expected to be impacted subsequently that should have been warned. A number of other debriefs mention confusion about warning messages and decisions to evacuate.

As discussed above, there was no decision to evacuate communities ahead of the fire, yet a number of SACFS debriefs mention evacuations. Communication of the SACFS policies on evacuations and relocations could be enhanced to ensure a better member and community understanding.

Changes in the media environment are also important. Although Emergency Warning Messages are broadcast by the ABC and others as intended, they are also taken up by other media outlets. For example, the Barossa Herald published a succession of Emergency Warning Messages on its website with delays between issue and publication of between a couple of minutes and half an hour. The Emergency Warning Message at 1227 hours mentioned above was published online at 1306 hours and would have been retrospective to anyone north of Mallala. It is not desirable or sensible to try to limit the dissemination of information about emergencies and therefore the different latencies of publication by various sources needs to be accommodated. The necessary response seems to be to make warnings as forward looking as possible.

Rural addressing including the naming of roads creates uncertainty in messaging in some areas and this can be further exacerbated by local usages and naming. Generally, the current practice of using a succession of road names to outline the location of a fire does not always adequately inform the intended audience. Ultimately, there is a need to proliferate the dissemination of graphical information including through the Emergency Alert system. Using the Emergency Alert system will require that the National Framework for Scaled Advice and Warnings be adapted, which is beyond the direct control of the SACFS. In the meantime, the graphical content of other warning media should be reviewed and optimised.

Deployment and Actions of the Incident Management Team(s) including the Integration of Key Stakeholders (ToR 1.5)

Deployment and Actions of the Incident Management Team(s)

As well as the first arriving officer, there were four IMTs involved managing this fire:

+ the Region 2 staff and support brigade members, who were obliged to perform some IMT functions and managed the incident through the first part of the afternoon. This is not part of the role of an RCC and it is not established for this purpose,

+ the Region 1 standby Level 2 IMT comprising an Incident Controller, an Operations Officer, a Logistics Officer and a Planning Officer, which augmented the Region 2 staff and assumed control from mid-afternoon,

+ the on-call state Level 3 IMT which began to activate and deploy at around 1330 hours, which was established and working at Balaklava from about 1600hours, and which was fully staffed by about 1800, controlled the incident from then through to the following day shift,

+ a second state Level 3 IMT that deployed directly to Angaston, assumed control at around 0700hours on 26 November 2015 and maintained control until handing responsibility back to Region 2 on 2 December.

It is noteworthy that by the time Level 3 control was fully in place, conditions had begun to moderate and the most acute phase of the incident was nearing its conclusion. As described above, during the most acute phase of the fire, incident management facilities and staffing arrangements were inadequate.

Throughout the event, incident management and public messaging were hampered by an inability to develop adequate situational awareness. Situational awareness comprises perception of the situation, development of an understanding of it; and being able to project the further development of the situation. It is the fundamental underpinning of effective control. Poor communications prevented the ready exchange of information between firefighters on the ground and those attempting to exercise control. Smoke and dust meant that aircraft and firefighters were unable to fix the fire's head. The rapidity of the fire's development meant that these limitations were particularly serious.

The difficulties facing Incident Controllers and their IMTs on the first afternoon have already been discussed but it is worth reiterating that these automatic deployments were mostly nugatory. Better solutions are needed to manage large scale, fast moving incidents. These incidents require that an IMT is actually in place and working when the fire starts.

SACFS policy does not define the requirement of a written IAP until shift changeover; this may constrain an understanding of the action plan by higher level of command. IMTs working under extreme pressure can find it difficult to find time to produce Incident Action Plans (IAPs) and Situation Reports (SITREPs) and they are sometimes seen as bureaucratic overheads. Both IAPs and SITREPs provide important mechanisms to share information and coordinate action. The discipline of producing them also causes IMT staff to structure their thoughts which can have beneficial effects on subsequent decision making.

INTEGRATION OF KEY STAKEHOLDERS

The relationship between the IMT, the RCC and the Zone Emergency Centre (ZEC) is not clear in SACFS doctrine. During early stages of the fire, several liaison officers were embedded within the IMT. This continued to be built upon through the efforts of the IMT throughout the following days. This supported more direct communications between agencies and shared understanding of the situation.

By contrast the functioning of the ZEC is not well defined - particularly its activation and engagement with the IMT during the early stages of an incident. In this case, liaison officers in the IMT partially filled this gap and meant that the role of the ZEC was vestigial with direct liaison during the critical phase of the fire between the IMT and a number of agencies; SAPOL, SAAS, and local councils. On the second day of the fire, the ZEC was well established and well-coordinated but had little to do because the IMT was performing most of the ZEC functions. The interactions of the ZEC and IMT should be described in doctrine including definition of how communication is established between the IMT and the ZEC.

SAMFS Strike Team Assistance and Integration/Liaison at the IMT (ToR 1.6)

Two SAMFS strike teams were dispatched to the fire: the first at 1318hours,following a telephone request at 1305hours,and the second at 1518hours. A third SAMFS strike team was also dispatched to another fire during

the afternoon. SAMFS appliances do not currently have VHF radios. When congestion limited the utility of the SAGRN, they had no effective means of communicating with SACFS appliances on the fire ground.

When SAMFS strike teams are deployed to a SACFS controlled incident, a Liaison Officer is also despatched to the relevant IMT. The exchange of Liaison Officers is a good practice that improves interagency communication and reduces the likelihood of misunderstandings and errors in coordination. This is especially true of fast developing incidents such as the Pinery fire. The pre-emptive exchange of Liaison Officers may be a desirable aspect of preparing for particularly challenging fire conditions. There is potential advantage to be gained by the early inclusion of Liaison Officers in IMTs or the SCC from agencies responsible for aspects of recovery and those that are particularly important from a resilience perspective. The exchange of Liaison Officers with all relevant agencies (which should also account for the role and functions of the ZEC) should be explored and codified.

Incident Resourcing and Transition to Relief/Recovery (ToR 1.7)

The incident was adequately resourced. Although a number of requests for assistance on 25 November 2015 could not be met because the Incident Controller did not have resources at hand to apply to them, there was also a number of reports of underutilisation of available resources leading either to freelancing or long pauses between arrival and commitment. Given the difficulties of developing reasonable situational awareness, the problems of communications and the speed of development of the fire, it seems that there were as many resources available as could be usefully applied. After the acute phase of the fire on the afternoon and evening of 25 November 2015, there were sufficient resources and adequate resource flows to meet incident needs.

Later in the fire, effort was required to continue to source suitably qualified personnel to fill IMT positions but there is no indication that this was not manageable.

At the Validation Workshop it emerged that a number of SACFS crews had been approached by community members seeking relief information and support. SACFS crews are not trained to provide these services and it places them under some personal strain. There is a need for Recovery agencies to provide SACFS volunteers with appropriate tools to respond to this situation.

Initial Interstate Assistance (ToR 1.8)

Interstate assistance to the fire was provided by the Country Fire Authority(CFA)of Victoria, the Victorian State Emergency Service (SES) and the Victorian Department of Land, Water and Planning (DELWP). A total of around 350 personnel from these agencies, primarily organised into strike teams, were deployed including 311 personnel and 89 vehicles on 26 November 2015.

SACFS and the CFA Victoria maintain a close working relationship and cross border cooperation appears to work smoothly. In this case, preliminary discussions were conducted on the evening of 24 November 2015 in anticipation of the expected severe fire weather the next day. There are no lessons apparent.

Initial request and deployment of the Large Air Tanker (LAT) and Very Large Air Tanker (VLAT) (ToR 1.9)

The Pinery fire was the first time that the VLAT was employed in South Australia and a number of coordination points emerged. They include:

The Air Desk at the SCC was not notified that a request for VLAT (DC-10) and LAT (C-130) had been made until the State Air Response Coordinator (SARC) advised that these aircraft were already en route. The request and approval appears to have been managed through the chain of command, which made for a very prompt response but presented some practical challenges for its integration into the air plan.

Demobilisation of Resources and the Restoration of Control Facilities, Staging and Base Camps (ToR 1.10)

Overall, the management and working of the staging areas and base camps appears to have been satisfactory and comments in Group AARs have been minor. Large staging areas need location maps to enable arriving crews to find their way around. There would be benefit in placing a knowledge wall in staging areas to begin the development of situational awareness in crews between formal operations briefs. There appears to have been times at shift changeover when there were long queues for meals. The availability of fuel was mentioned as were occasional long delays between arriving at the staging area and moving forward to the fire ground. The timing of closure of the base camp may have meant that crews with long return road trips exceeded their allowed shift lengths.

Taken as a whole, there do not appear to be systemic problems with base camps or staging areas but there is apparently scope for refinement. Doctrine for base camps and staging areas should be reviewed to support this refinement. This doctrine should clarify the relationships between base camps, staging areas and operations points, provide clear standards for location, set-up and operation and identify any need for subordinate doctrine, for example on T-cards, that might need to be prepared for other agencies.

The establishment of base camps and staging areas is easily practiced through desktop exercises and should be incorporated into the annual training cycle.

Rapid Damage Assessment Deployment, Coordination and Data Collection (ToR 1.11)

There were problems of coordination of Rapid Damage Assessment (RDA), which seem to have delayed the start of systematic assessment of the fire ground. RDA capacity exists in a number of agencies, each of which has differing levels of capability that suit them to particular aspects of the RDA process. In a fire such as this, RDA can begin early in those parts of the fire ground that have been burnt over. The types of hazards potentially presented can also be broadly anticipated and categorised, for example rural land, farmsteads, rural settlements, towns, industrial sites etc. In such a situation, it should be possible to apply the full array of RDA capabilities more or less simultaneously with a view to the earliest possible transition to the recovery phase.

Information Technology and Communications Infrastructure (ToR 2.1)

Information technology and communications (ICT) presented major challenges to the management of the incident and increased the risk faced by firefighters and the community.

+ The ICC at Balaklava did not have the connectivity necessary for the function it was required to perform on 25 November 2015. CRIIMSON was unable to be accessed for the first 30 minutes after the Level 2 IC arrived and after that time there was very limited connectivity. Similarly, when the Level IMT eventually established there, the ICT infrastructure was not adequate for effective functioning, which was one of the reasons it was forced to relocate. To ensure that IMTs are provided with adequate connectivity, a number of potential ICCs should be identified and developed as part of the preparation for emergencies.

+ **SAGRN**: The performance of the SAGRN was affected by congestion associated with the number of users during the afternoon of 25 November 2015.This meant that for most of the acute phase of the fire, the IMT was limited in its ability to develop an up-to-date understanding of what was happening, to report upwards; or to coordinate strike teams in order to influence events. As noted earlier, there was no important shortage of firefighting resources but there was a constrained ability to apply them to best effect. This constrained ability was partially due to confusion and lack of agility among operational components of SACFS during a fast paced fire such as Pinery, but primarily rested on the difficulties of communicating with strike teams, divisions and sectors. Communications difficulties meant that some crews did not receive notification when the forecast wind-change swept over the fire ground which increased the risk faced by them. SAGRN is the subject of a separate SA Government report.

+ **VHF fire ground communications**: SACFS appliances are equipped with VHF radios for intercommunication on the fire ground. These are intended as short-range line-of-sight communicators and cannot cover gaps in communication created by the SAGRN. On the day, despite what appears to be terrain that is beneficial to line-of-sight communications, communications were also hampered by some other environmental factor, possibly smoke but more likely ionisation caused by flames that can attenuate radio signals in some wavelengths. The effect of this attenuation was apparently exacerbated by high levels of on-air chatter between fire crews which threatened to clog working channels. As noted earlier, SAMFS strike teams do not have VHF radios and were unable to communicate with SACFS crews on the fire ground when the SAGRN was congested.

+ **Mobile phone coverage**: The area around Pinery is not well served by mobile phone infrastructure and includes a number of recognised mobile phone blackspots.[3] By mid-afternoon on 25 Nov, a number of landline and mobile telecommunications difficulties were encountered and the IMT requested a number of mobile telecommunications facilities to enhance communications. In large scale emergencies, it is not uncommon for mobile phone networks to become overloaded. This is because they are primarily designed to meet the normal demand that exists from day to day and not for the extreme demands of emergencies. For this reason, response agencies will ideally retain independence from the mobile phone network for critical incident management traffic. On this occasion, the congestion of the SAGRN meant that additional critical traffic was directed onto the mobile phone network further overloading it and causing long delays and frequent drop-outs. The congestion of the mobile phone

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[3]https://data.gov.au/dataset/community-reports-of-poor-or-no-mobile-coverage

network can lead to delays and the possible delays of dissemination of emergency alerts. SACFS ordered satellite facilities during the peak of the fire to support mobile connectivity.

+ **Common Operating Picture (COP)**: Developing and sharing situational awareness is fundamental for the type of devolved decision making that underpins responses to fast developing fires. A COP is intended to assemble and present a single source of truth available to all relevant decision makers and from which they draw that information which is important for the decisions they need to make at any time. This idea of a single source of truth is intended to enhance the alignment of decisions made by different people in different locations. Although the COP should not be seen as a technology platform, ultimately it needs to be assembled and shared via some technological means. At present, the SACFS has no technological means of developing or distributing a COP.

Incident Control Centres, the Regional Coordination Centre and the State Coordination Centre (ToR 2.2)

The facilities housing the SCC, the ICC at Balaklava and the ICC at Angaston were in different ways unsatisfactory and, in the case of the ICC at Balaklava, had a detrimental effect on the management of the incident.

The SCC is office space that has been minimally adapted to the needs of its role in command, control, coordination and communication. Its size and layout are not conducive to the shared situational awareness and close collaboration required in a major incident. The specific needs of the State Coordinator are not well supported. There is little scope in the layout for the State Coordinator to manage across functions or to gain a comprehensive view of the situation.

The ICC at Balaklava was too small for the Level 3 IMT that deployed there, had inadequate office space, poor ICT infrastructure, inadequate communications, no maps, no up-to-date contact lists / Group operations Management Plans (GOMPs) /Regional Operations Management Plans (ROMPs) and no capacity to meet the needs of the IMT members information and intelligence requirements. In the event, the ICC at Balaklava was so deficient that the Incident Controller decided to move it to Angaston in time for the nightshift on 25 November 2015. Clearly, such a shift in the middle of the incident is undesirable but was considered as the lesser of two evils.

On 25 November 2015, the Region 2 RCC became a Level 3 ICC, a role for which it was neither intended nor prepared. However, it is not apparent that there is a clear statement of the functionality required in an RCC during a major emergency. Therefore, it is hard to assess whether the RCC was overstretched simply because it was doing something not intended or if this overstretch masked an underlying deficiency in the facility itself. Clearly given its role, the RCC should share the COP and be able to provide life support to its staff for protracted periods. Both of these suggest a level of amenity that the Region 2 RCC could not meet. A functional analysis of RCCs should be completed with a view to defining their facilities requirements.

The ICC at Angaston was better, but still had limited ICT infrastructure and the physical layout – with the IMT split over two floors of the building - was not ideal.

A facility designed to meets the needs of an RCC will generally not meet the needs of a Level 3 IMT because the two organisations are different in scale, activities and their associated requirements for space, connectivity

etc. If Level 3 IMTs are deployed, they need to go to locations that meet their defined requirements. While Level 3 ICCs are identified currently by SACFS, more rigid auditing and exercising need to be undertaken to ensure adequate capability.

Decision Making Processes and Supporting Intelligence Capabilities (ToR. 2.3)

All response agencies are prepared (resourced, trained, and equipped) to cope with a range of 'normal' emergencies which comprise the vast majority of its response. Extreme events are considered within this scope of preparedness, however, few agencies are resourced to deal with them. Occasionally, extreme events emerge which stretch any agency and test its ability to respond at or beyond the limits of its capacity. These occasions test all of an agency's preparations but most of all, they test its leaders. This is because the depth and intensity of the preparations made by the agency create a kind of institutional momentum that can lead it to attempt to conduct its normal business in abnormal circumstances. On 25 November 2015, the chain-of-command of the SACFS did this: it tried to manage an abnormal emergency as it would a 'normal' emergency. This is another symptom of the SCC's lack of capacity to support the abstract aspects of the command function which was discussed above.

Decision making in emergencies can be characterised as comprising three steps: deciding that a decision is necessary, searching for a range of alternatives and choosing between those alternatives. On 25 November 2015, the first of these proved to be the most problematic. This was particularly true at the SCC level. By treating the Pinery fire as though it was a normal event, and allowing normal procedures for escalation to proceed, a succession of Incident Controllers were left to face a problem that could not be managed with the capability provided. The result was that, until weather conditions moderated, the higher management of the incident – which establishes the framework within which IMTs work - was unable to catch up with reality. Rather than allowing management of the incident to run along established channels (that were designed for generic circumstances), the SACFS chain of command needed to assess the situation and engineer and put in place procedures that were appropriate to the specific circumstances on the day. This is not a comment on the minutiae of AIIMS but relates to the need for the chain of command to set a problem that is potentially amenable to control by IMTs. In extreme emergencies at least some of the default settings and processes that underpin any response organisation will be more or less inappropriate and will need to be re-engineered in real time.

The intelligence function in AIIMS is relatively new and is not yet fully developed. At present, the intelligence function within the SACFS SCC is focused on the scheduled production of a few defined products, which are primarily aimed to inform 'upwards'. These products are necessary and important but a mature intelligence capability would also meet other needs.

There is a critical relationship between the intelligence function and the Plans Officer in an IMT. For most regional Level 2 IMTs, there will be no dedicated intelligence officer. Even a Level 3 IMT will have an incomplete capacity to develop a comprehensive intelligence picture, a deficiency that will be particularly pronounced early in an incident. Intelligence exchange between IMTs and SCC should be based on established channels and defined products. SACFS should tailor the SCC intelligence function to include IMT needs and vice versa for IMTs.

Internal SCC and IMT processes also require intelligence support. For example, accurate fire behaviour analysis requires feedback on actual fire behaviour and warnings need to be informed by accurate predictions of fire impacts. The intelligence function needs to meet these needs as well.

Determined attempts to develop good situational awareness will consume staff effort and physical resources. Having made this investment, it is important that the knowledge gained is shared with the audience that can benefit from it. This sharing is normally achieved through the establishment of a COP.

To meet these needs, the intelligence capability should develop the ability to:

+ conduct intelligence appreciations that identify the information requirements of decision makers in advance

+ produce collection plans to provide the information identified in the appreciation

+ push intelligence to inform Regions and Incident Controllers of current situations and expected future developments

+ contribute to the establishment and maintenance of a COP that incorporates that of regions and active IMTs.

The intelligence function needs to be alert to opportunities to gather information. For example, social media can sometimes provide a reasonable indicator of the fire front. Reports to 000 can provide another indicator of the fire front. The Department of Water and Natural Resources (DEWNR) embedded Fire Behaviour Analyst can produce detailed timings for projected fire impacts and can provide advice on when the fire is likely to become suppressible. None of these represents a 'silver bullet' but each is an example of a source of situational awareness that is not being fully or systematically exploited through the intelligence process. The existing SITREP format does not support the intelligence function and it should.

Coordination, Monitoring, and Management of Supporting Functions (ToR 2.4)

Mention has been already been made of the need for a COP, an expanded set of arrangements for the exchange of Liaison Officers and for robust communications.

Management of major fires rests on the cooperation of a number of agencies, which are coordinated through the state's emergency management arrangements described in the State Emergency Management Plan. For this fire, South Australian based agencies with a direct role in response included the Bureau of Metrology (BOM), SAPOL, DEWNR, the SASES, the Australian Red Cross, the Salvation Army and affected local governments. In this case a number of other agencies with responsibilities within the fire ground (health, power, education, water etc.) also needed to be engaged. A number of pertinent lessons have been identified and are discussed below.

Bureau of Meteorology

As well as providing specialised fire weather forecasts to inform SACFS preparations, BOM provides a meteorologist to the SCC when it is activated. An embedded Meteorologist works within the SCC intelligence cell and provides detailed data to the DEWNR Fire Behaviour Analyst and to the wider incident management effort through defined intelligence products. At present, the intelligence process in the SCC is not sufficiently mature to make full use of the information and intelligence produced by the embedded Meteorologist. For

example, on the 25 November 2015, thick smoke and the rapid development of the fire prevented clear identification of its head and actual extent. Under some conditions, the BOM weather radar, accessed through the embedded Meteorologist, was able to identify both the head and lateral extent of the fire.

The embedded Meteorologist is required to provide input to a number of SACFS scheduled intelligence products but the existing products and processes are complex and time consuming, the absence of process for the embedded Meteorologist to contribute outside formal products is not well developed. As the intelligence capability matures, optimising the balance between analysis and production of products is one of the critical judgements that will need to be made.

No new lessons emerge from BOM's involvement. However, the role of the embedded Meteorologist in the SCC will be central to the maturation of the intelligence capability and the definition of the COP.

South Australian Department of Water and Natural Resources

DEWNR provides a number of critical capabilities to incident managers including mapping support, fire behaviour analysis; and ground observers.

MAPPING

There were a number of minor errors in coordination between DEWNR and SACFS, which led to delays in deploying the Mapping Support Team to the ICC. The need to review and formalise the system of exchanging Liaison Officers was identified above and this may provide a partial solution. The speed of development of this fire presented particular challenges for interagency coordination from the SCC downwards through the chain of command and therefore presented a reasonable worst case for further study. There is a need for a review of the mechanisms for interagency coordination at the SCC and below to ensure they can cope with fast developing emergencies such as this one.

A review of Group AARs suggests that initially the maps produced were too crowded and the cross-hatched fire overlay limited the readability of place and street names by crews. These shortcomings were apparently rapidly overcome and, from 26 November onwards, it seems that mapping products were satisfactory and well received by crews.

As a result of the evolution of rural addressing, there were also reported differences between road names on fire ground maps and the names contained in some of the SACFS map books.

FIRE BEHAVIOUR ANALYSIS

Accurate predictions of fire behaviour are central to effective management of large fires and, in the specific circumstances faced on 25 November 2015, they provided the best available basis for planning and community warnings. There is an apparent difference in perspective between SCC staff and the DEWNR Fire Behaviour Analysts located there. The fire behaviour models performed quite well on the day but early model runs are partially informed by approximations made by the analysts and, to increase confidence in their accuracy, need to be verified by comparison with actual fire behaviour. DEWNR analysts are unwilling to publish the results of early runs until a reasonable degree of confidence has been developed. However, SCC staff are working in something of an information vacuum and are hungry for the earliest possible model output. This is particularly true of fast developing fires such as the Pinery fire. While both approaches are valid, SACFS and DEWNR need

to develop an agreement to resolve these different positions and establish procedures that make explicit the uncertainty attached to the first runs of a model and determine when the output is functionally useable by incident managers.

GROUND OBSERVERS

DEWNR and SACFS ground observers presented extremely useful information to IMTs when they were present on the fire ground. Although they are there to assess the environmental impacts of the fire, it is important that clear protocols are in place to make the information they gather available to IMTs. At the same time, the employment of SACFS ground observers is not mentioned in SACFS doctrine but would, in some circumstances, provide an important source of situational awareness.

SACFS ADHERENCE TO OPERATIONAL PROTOCOLS AND SYSTEMS OF WORK (TOR 3.1)

TOR 3.1 sought an assessment of adherence to operational protocols and systems of work (Doctrine). Generally, except as noted specifically in the discussion of the other ToR, SACFS personnel understand and comply with the organisation's published doctrine.

The need to train group officers to prepare them for their roles in large scale complex incidents was mentioned earlier. This was in response to a perceived unevenness in the abilities of group officers to comply with operational protocols in these situations.

REVIEW OF THE IMPLEMENTATION OF RECOMMENDATIONS FROM PREVIOUS REVIEWS (TOR 4)

This section examines the implementation of recommendations from the following reviews:

+ Australasian Fire Authorities Council (AFAC) Independent Operational Audit of South Australian Fires (January 2015)

+ The South Australian position on the recommendations made by the Royal Commission into the 2009 Black Saturday Bushfires in Victoria (VBRC)

+ Wangary Coronial Inquiry (December 2007)

+ Dr Bob Smith's Independent Review of the 2005 Wangary Fires

+ SACFS Project Phoenix lessons learnt review of the 2005 Wangary Fire.

AFAC Independent Operational Audit of South Australian Fires

Following two major fires, at Tantanoola and Sampson's Flat in January 2015, the SACFS engaged AFAC to conduct an operational audit of the response. The audit made 18 recommendations. Table 2 below reviews these recommendations and notes their current status.

Number	Recommendation	Discussion

Number	Recommendation	Discussion
1.	Incorporate the ability for the State Controller to determine the operational readiness levels of the state or regions in operational doctrine, based on either the predicted and/or actual risk and/or activity to some or all of the Regions.	Complete.
2.	Incorporating 'triggers' within the Chief Officer's Standing Orders No. 17, which requires the escalation of the State Controller role to the rank of Assistant Chief Officer or greater, depending on the increased risk or activity.	Complete.
3.	Reviewing how regional resources are managed and tracked and incorporate into the Chief Officer's Standing Orders to ensure that there is complete situational awareness as to the location and tasking of SACFS resources.	Incomplete. This is a recurring theme from a number of reviews including this one.
4.	That the Emergency Management Australia's 'Arrangements for Interstate Assistance (Fire and Emergency Services)' be applied to all future requests for assistance by the SACFS, SASAMFS and SA SES.	Complete. Arrangements for Interstate Assistance was followed in this fire.
5.	Noting the implementation of Common Incident Command and Control System (CICCS) in South Australia that fire and emergency services together with police (including through AFAC and Australia New Zealand Policing Advisory Agency (ANZPAA)), continue to liaise regarding the development of a national incident management system.	Complete.
6.	That a complete review of current naming conventions of personnel and centres, in accordance with the outcomes of the Victorian Bushfire Royal Commission is undertaken, to ensure clarity around command, control and coordination within South Australia.	Incomplete.
7.	That future declarations be undertaken to ensure	Understood to be

Number	Recommendation	Discussion
	that the areas affected by the declaration are clear and concise.	complete. No declaration was made for this incident.
8.	That SACFS conduct a review of IMTs with a view to increasing the number of teams from four to six, aligning them with each of the six regions within South Australia.	This was considered to be infeasible given the level of resourcing available to the SACFS. This report identified a similar need but proposes an approach where ICCs would be prepared in each Region and, in response to defined triggers, be staffed with the core of an IMT that would enable rapid build up to a comprehensive IMT capability.
9.	Plan the establishment of one multi-agency Coordination Centre with sufficient capacity and capability to deal with all incidents in South Australia.	Study proceeding under the auspices of SAFECOM.
10.	Review all current SACFS operational facilities (Group, ICC, RCC and SCC) to provide more effective communications, connectivity and resource management.	Incomplete. Reiterated in this report.
11.	Review the communication and request procedures within SACFS to ensure that the most effective chain of command and line of communications are established between the IMT, region and state.	Incomplete. The clarification of the meanings and responsibilities associated with command control and

Number	Recommendation	Discussion
		coordination proposed in this report reinforces this recommendation.
12.	SACFS appoint the Regional Controller and/or Coordinator as the Incident Controller for any Level 3 incident occurring within their Region to provide better continuity and improved coordination. The position of the Regional Controller and/or Coordinator could then be backfilled by a suitably qualified individual as required.	This recommendation may have been overtaken. The consensus developed at the Validation Workshop is that the Level 3 Incident Controller would be in the chain of command subordinate to the Regional Commander. If the Regional Commander in this case is a Controller (as opposed to a Coordinator) then the ability and responsibility for the Regional Commander to apply local knowledge to the management of the incident will meet the intent of this recommendation. The clarification of command, control, coordination proposed in this report should inform the response to this recommendation.

Number	Recommendation	Discussion
13.	Review the current practice of issuing an 'emergency alert' telephone message or an emergency warning and/or watch and act alert to ensure that it is consistent, relevant and necessary. Prior to issuing an Emergency Alert Message, consider state level involvement so that other agencies are made aware of message and intent.	Complete.
14.	SACFS and BOM review current weather, fuel loads and curing rates to determine the most appropriate and accurate forecast is prepared, issued and validated against current conditions.	This work is ongoing. The Fire Danger Working Group and standardisation of BOM services will mostly address this recommendation. The Bushfire and Natural Hazards Cooperative Research Centre (CRC) project to develop next generation fire modelling capability and capacity is proceeding. SACFS and DEWNR are represented at this CRC. In this fire, the forecasts and fire behaviour analysis were satisfactorily accurate.
15.	That SACFS consider the Traffic Management Procedures and guiding principles adopted in Tasmania as a model that could be implemented within South Australia.	Complete.
16.	That SACFS, in consultation with SASAMFS, consider adopting common terminology and	Complete.

Number	Recommendation	Discussion
	capability requirements for strike teams being 'four to five appliances and a Group Officer' in line with other jurisdictions.	
17.	That SACFS considers a review to develop an effective interagency messaging system and agency resource management system.	Incomplete.
18.	Review relevant legislation associated Acts and Plans to establish a consistent approach to fire and emergency management to minimise duplication and risk of contradiction. That the Hazard and Functional Area Plans be amalgamated to establish a South Australian Bushfire Plan, under the State Emergency Management Plan, which clearly define the role of SACFS.	Complete.

Table 2. Status of AFAC Independent Operational Audit Recommendations

Victorian Bushfires Royal Commission Recommendations

Noetic was provided with a document produced by the State Bushfire Coordination Committee, which reported the South Australian position with respect to the recommendations made by the VBRC. The report was accurate as at 21 February 2014. Of the 202 recommendations made by the VBRC, 58 required direct action or input from SACFS. Of these 58 recommendations, only three reflect issues that re-emerged in this review of the Pinery fire. They are:

+ VBRC Recommendation 9: This recommendation identified the need for an exercise program for Level 3 IMTs. The SACFS response indicated that Level 3 exercises are conducted annually in the lead-up to the fire season. The same lessons emerged from this review. Exercises should range from simple desktop seminars for staff sections through map-based exercises to improve aspects of decision-making, 'telephone battles' in which IMT staff are exercised in the internal coordination of actions in the IMT to full scale free play exercises in which IMT staff are presented with the full complexity of incident management. Ultimately, to be fully competent in incident management, IMT staff should pass through this entire progression on a regular basis.

+ VBRC Recommendation 43: This recommendation recognised the need to prepare identified ICCs with appropriate communications and IT connectivity. The same lesson emerged from this review.

+ VBRC recommendation 202: This recommendation noted the need for investment in a new State Bushfire Control Centre. The same lesson emerged from this review.

Wangary Coronial Inquest Recommendations

The Wangary fires resulted in the deaths of nine people. The findings of the coronial inquest were handed down in December 2007 and made 34 recommendations. The South Australian Government fully accepted 30 of these recommendations and partially accepted the remaining four. In 2010, the South Australian Fire and Emergency Services Commission (SAFECOM) conducted an audit of progress against the recommendations and concluded that 26 had been effectively completed and that one required no action. The remaining seven recommendations were either in progress or required some further work.

Those recommendations with outstanding actions have been reviewed and only one appears to be still awaiting action. Recommendation 18 related to risk assessment by IMT staff during incidents. In response, SACFS instituted the situational analysis and checking tool which is included in the list of operational forms contained in OMG 16. The audit of progress found that there was insufficient guidance provided on who should use the tool and how it should be used. Three audit recommendations were made relating to clarification of these matters. At present, there appears to be no further reference to the tool anywhere in the Tri-manual.

Project Phoenix and Dr Bob Smith's Independent Review of Wangary Fires

Following the 2005 Wangary fires, SACFS engaged Noetic to complete a lessons learnt study that subsequently led to Project Phoenix and the commission of an Independent Review of Circumstances Surrounding Eyre Peninsula (Wangary) Bushfire of 10 and 11 January 2005 (the Dr Bob Smith Review). For Project Pinery, Noetic was provided a SACFS document: *Consolidated Actions – Project Phoenix & Dr Bob Smith* (updated 10 January 2007 with comments), which forms the basis for the following discussion.

The Consolidated Actions document lists 81 recommendations made by Project Phoenix or Dr Smith and classifies them as either *Complete – no further work required* or *Not Yet Complete – However is on Track*. There are 33 recommendations in the latter category, many of which have subsequently been completed. In light of the experience of the Pinery fire, there are only three of the consolidated recommendations that require further specific action:

+ Recommendation 29: which says that the SACFS intends to review current technology and report on possible systems for resource and asset tracking. As noted in this report, asset tracking and AVL remain issues of concern.

+ Recommendation 62: which proposes that the SACFS implement a program for potential members of IMTs from areas where opportunities to obtain experience in fully functional IMTs is limited to gain experience in observing fully functioning IMTs. For illustration purposes, volunteers willing to undertake IMT duties in LEP could be offered opportunities to observe and participate in IMTs for major bushfire incidents in the Adelaide Hills. Individual certification in the Incident Control System (ICS) needs to be supplemented by practice and application of the skills learnt. This relates to the lesson in this report highlighting the need for an exercise continuum for IMT staff.

+ Recommendation 67: The SACFS adjusts the duty statements of regional staff to reflect the actual roles and responsibilities of staff in chain of command, control and coordination functions in the discharge of routine functions (prevention, mitigation, preparedness and response) and when working under ICS. Although it is understood that the duty statements have been revised, Lesson 3 of this report is closely

related and reinforces the need to more clearly define the responsibilities of individuals at the SCC, RCC and IMTs for command, control and coordination.

CONCLUSION

This Report explains the observations and understandings that underpin the lessons that were discussed at the Validation Workshop on 9 March 2016.Workshop participants across South Australia's emergency services and support agencies verified these lessons to ensure they were true reflections of events, to identify any important matters that have been overlooked and to determine the actions that will lead to the final list of lessons being learnt. These are outlined in detail in Annex C.

The most compelling lessons relate to the challenges of establishing effective control as early as possible in the development of rapidly escalating fires. Noetic's understanding is that the nature of this fire meant that it was not possible to gain control until the weather conditions changed and that there was little that the SACFS could have done to change the course of events on the first day .

However, SACFS' leadership has the opportunity to consider its preparations in light of the challenges presented by such incidents as the Pinery fire to put in place arrangements that improve agility and ensure that the organisation is managing the incident it has and not the one it was expecting. An appropriate response requires leaders to intervene as the incident escalates, in order to adapt procedures to seize the initiative from the fire and to shape SACFS's response to make it a better fit to the actual context.   This ultimately rests on greater clarity of the roles of individuals across the chain of command but would be greatly facilitated by appropriate enhancement of command and control facilities and capabilities.

List of Annexes:

A.   Terms of Reference
B.   Project Methodology
C.   Lessons
D.   Interview Summary (issued separately)

ANNEX A: TERMS OF REFERENCE

On 25 November 2015, a fire occurred at Pinery in the mid north of South Australia which burnt 82,500 hectares. It is intended that a specific process be implemented to identify, and then implement, any Lessons Learned from the Pinery fire. The process will adopt the principles of:

+ "No blame"

+ Lessons will always be learned from any event

+ SACFS is committed to continuous improvement

+ SACFS will consult and engage key people and stakeholders in what we do

+ SACFS will keep the process simple

+ At the end of this process, SACFS will have:

+ identified opportunities for improvement from the Pinery fire;

+ accepted or acknowledged any issues and consulted with those who may be interested in any such issues;

+ worked with those who are interested in the solution to any issue to identify what SACFS needs to do to address the issue, and;

+ either implemented processes to facilitate any opportunity for improvement, or have developed a program (and allocated resources where available) that will result in the issue being addressed.

Steering Group:

The Steering Group for Project Pinery will include (but not be restricted to):

+ Executive Director Frontline Services

+ Executive Director Frontline Services Support

+ Director Operational Capability and Planning

+ Director Regional Operations

+ Regional Commander – Region 1

+ Executive Director SACFSVA

+ Director State Operations.

The Steering Group will report to the Chief Officer.

The review will capture and identify the following:

1.   Adequacy and timeliness of:

1.1   Initial response including aviation response

1.2   Call Receipt & Despatch Centre response and support to requests

1.3   Information from fire ground to inform warnings/messages

1.4   Community warnings and messages

1.5   Deployment and actions of the Incident Management Team(s) including the integration of key stakeholders to support the IMT

1.6   SAMFS Strike Team assistance and integration/liaison at the IMT

1.7   Overall resourcing until incident was controlled and associated transition

1.8   Interstate Assistance

1.9   Request and deployment of the Large Air Tanker (LAT) and Very Large Air Tanker (VLAT), integration of these into air operations plan and effectiveness of the drops

1.10   Demobilisation of resources and restoration of Control facilities, staging and base camp

1.11   Rapid Damage Assessment deployment, coordination and data collection.

2.   Adequacy of:

2.1   Information Technology and Communications Infrastructure including SAGRN at Incident Control Centres, Regional Coordination Centre, and State Coordination Centre

2.2   Incident Control Centres, Regional Coordination Centre and State Coordination Centre

2.3   Decision making processes and required intelligence to support this

2.4   The resources and capabilities available to SACFS to coordinate, monitor, recommend &/or manage key supporting functions or services on which SACFS depends when responding to these types of incidents

3.   Adherence to:

3.1   Operational protocols and systems of work (Doctrine)

4.   Review of

4.1   Implementation of recommendations from previous; AFAC Independent Operational Audit SA Fires January 2015; Wangary Coronial enquiry; Dr Bob Smith Independent Review (Wangary); SACFS Project Phoenix; 2009 Victorian bushfires Royal Commission '

ANNEX B - PROJECT METHODOLOGY

Learning Lessons

Noetic has conducted a large number of reviews of emergency responses in jurisdictions across Australia. It has used this experience to develop a practised and proven approach to learning lessons. The key tenet of Noetic's approach to lessons learnt is that a lesson is not truly learnt until behaviour is changed. To this end Noetic applies its proven lessons learnt process to ensure that:

+ an organisation's valuable observations are captured and validated

+ the key lessons are identified and analysed

+ achievable actions and accountabilities assigned so that there is a clear path to the desired changes in behaviour.

The Noetic approach is based on the following principles:

+ **No Blame.** The lessons learnt process is not an inquiry or investigation but an attempt to collectively learn from localised experience. Self-assessment and self-reporting is important and encouraged. There is no place within the lessons learnt process for the apportionment of blame to individuals.

+ **Weak Signals can be Important.** In an emergency not all decisions or actions have immediate consequences. However, identify those that are less than optimal can help detect weak signals and provide opportunities to learn from 'what might have happened'.

+ **Gather Observations from all Sources.** In any situation different people will have different perspectives of events. All of these perspectives contain information that could be important and so engaging with the widest possible group provides assurance that lessons are both well founded and comprehensive.

+ **Focus on the Future**. The aim is not just to redress errors, but to avoid errors that have not yet occurred and seize opportunities for improvement generally.

+ **Take a Systems View**. Accidents don't just happen, they happen because the circumstances were created which allowed them to happen. A system view seeks to prevent those circumstances from arising.

+ **Lessons are not Learnt until Behaviour Changes.** Lessons must include an implementation plan and be approved, prioritised and resourced by managers.

Observations and Lessons. While there is a clear connection between observations and lessons the two terms should not be conflated. The difference between observations and lessons is important:

+ **Observations** are descriptions of events that seem to offer an opportunity for improvement either locally or generally. It is important to note that observations should be constructive. They may capture either positive or negative aspects of the organisation. Capturing positive observations is an important

mechanism to continually improve the things that are working well. Observations on negatives provide the opportunity to mitigate issues before they gather momentum.

+ A **lesson** is an observation which has been analysed to identify its root causes and which proposes adjustments to system settings that promise to deliver the desired improvements. Lessons are only learnt when the behaviour of individuals is changed as a result of adjustments to the systems that drive or constrain their behaviour.

Project Pinery Phases

Noetic used a six phased approach to undertake the work for Project Pinery, as outlined in Figure 1:

Figure 1: Project Phases

Phase 1: Project Start-Up

Noetic consulted with the Project Sponsor and other key SACFS staff to confirm the project scope and mutual expectations to ensure that Noetic and the SACFS had a shared vision of the project's outcomes. Based on Noetic's proposal and initial consultation, Noetic developed a Project Management Plan which included a breakdown of methodology, risk and mitigation strategies and agreed milestones of the project.

Phase 2: Information Gathering

Noetic undertook a desktop review and five days of stakeholder consultation in South Australia during this phase. A semi-structured interview process was utilised to draw together findings across thematic areas. Noetic also visited the Pinery fire grounds to gain greater appreciation and assess the impact of the bushfire. Noetic provided the SACFS with the findings from consultations.

Phase 3: Identifying Quick Actions

Noetic proposed quick actions that could be implemented within the current fire season, and these were considered by the steering committee and identified to be longer term projects. As such no quick actions were taken forward from this. Initial identification occurred during a short teleconference between Noetic and the Project Pinery Steering committee, which identified the issues for immediate action, and those that can be actioned in the short to medium term.

Noetic then facilitated a half day workshop with a small group of SACFS stakeholders to identify the immediate solution to the issues raised, assigned responsibility, and identified the resource implications and timeframes to address these issues.

Phase 4: Develop Lessons and Validate

Noetic undertook an initial categorisation of observations, which collated similar observations, discarded any obvious outliers and grouped the remaining observations into thematic groups based on the information gained throughout Phases 2 and 3 and a draft Action Plan was produced for SACFS.

Phase 5: Develop Action Plan

Following the Validation Workshop, Noetic worked with the Steering Group to draft an Action Plan for SACFS.

Phase 6: Closure

Noetic's involvement in Project Pinery will conclude when the action plan is presented to SACFS executive leadership team.

Consultation

The project proceeded through a series of meetings with the Steering Group, face-to-face interviews and a Validation Workshop consisting of staff and volunteers.

ANNEX C - LESSONS

Lesson One: Incident Management

Effective incident management during complex or rapidly changing environments often challenges the understanding of command at various levels. At times tasks may be duplicated or decision making responsibilities clouded. Where roles are clearly understood and processes exist to enhance command, control and coordination together with support structures, incident management and emergency management at higher levels operate in a more cohesive manner.

The early development and sharing of incident action plans, including communications plans and situation reports enhances effective management of an incident. These products all contribute to a common operating picture across all levels. These products and other forms of intelligence also assist in informing other support agencies and the public.

Incident Management is responsibility shared across the SACFS chain of command. The Chief Officer is responsible and accountable for the suppression of certain fires and, on occasion, delegates some of those responsibilities and accountabilities to incident controllers. However, in exercising this command function, the Chief Officer is supported by remainder of the SACFS generally but by the state office, SCC and RCCs specifically. It is important that the obligations of this support are recognised and that organisations are adapted to meet them fully.

Incident Management Teams have a critical role in the effective management of emergencies. During the initial phase of emergencies the incident controller is normally located at the fire. The transfer of incident control from the fire to an incident control centre during the rapid escalation phase of the fire is often complex.   Transfer of tacit information, setting up an IMT and establishing effective liaison with higher levels of command and other agencies all consume time and attention. If this transfers is not done smoothly there may be periods in which control is not optimal.

Large scale incidents stress parts of the SACFS system that normal emergencies don't. For example, the experience of Group Officers does not necessarily prepare them for their roles in very large scale emergencies. Preparing for relatively infrequent but impactful large scale events will compete with preparations more frequent and routine occurrences.   The management of risks across this spectrum is a key function of management.

Lesson Two: Public Information and Warnings

The provision of information to the public is critical and supports communities in implementing their own plans. During rapidly escalating fires such as Pinery, the pace of intelligence gathering and analysis, issuing of warning and actions of communities is often challenging. The use of predictive services together with understanding of current situation and provision of information to the public across a diverse range of media and social platforms will aid in decision making and response by communities.

It is recognised that CFS actively engages with communities post fire events to learn from experience and engages with researchers to identify opportunities and analyses accessing trends post events. It is recognised community warnings being reviewed and studied at a national level and SACFS is an end user as part of the research program.

Lesson Three: Intelligence Gathering and Sharing

The collection of information, analysis and dissemination of intelligence is critical for decision makers at all levels. While the improved articulation of intelligence as part of AIIMS 4 is new, the understanding and development of this capability will enhance sharing of a common understanding of operations across all levels.

Lesson Four: Emergency Management Facilities

SACFS doctrine describes various responsibilities for establishing control facilities at the Incident, Region and State level. Their primary function apart from providing work areas for incident management teams is to permit liaison with other stakeholders and permit communications through various technologies and systems of work. These facilities need to be robust enough to enable incident management teams to operate over long durations while enabling them to undertake the functions required in managing the incident at various levels. It was found that facilities at all levels challenged effective operations.

Staging Areas and Base Camps are essentially temporary emergency management facilities. Their functions are clear but the detail of their establishment and functioning is also correlated with the size and duration of an incident. They therefore fall into the category of CFS actions that are only fully stressed during large scale emergencies. They presently function adequately but, if more refined functioning is needed, this will require a focused approach combining training and exercising.

Lesson Five: Relocation and Relief of Persons

The relocation of persons and the provision of relief services during emergencies is often challenging for all agencies. SACFS promotes the decision to relocate early and does not direct evacuations. There is some evidence that the application of these policies is not fully understood by all SACFS members or by the public.

Lesson Six: Aviation

The coordination of aviation resources is well documented and managed within SACFS and is demonstrated by the capability to effectively manage a large number of aircraft in crowded airspace under extreme conditions. The application of the VLATs without its usual accompanying aircraft presented some challenges for coordination.

Lesson Seven: Personnel Safety

Fire appliances were impacted by fire and heat on many occasions. Although injuries occurred, where the latest safety systems were fitted to fire appliances, crews survived severe burnovers and the impacts of fire and heat and were generally subsequently capable of continuing operations.

Automatic Vehicle Location (AVL) systems provide controllers with enhanced situational awareness and the ability to correlate appliance locations with a rapidly moving fire front. They therefore reduce the likelihood of burnovers and markedly enhance firefighter safety.

Lesson Eight: Interagency Operations

During emergencies the priorities and action plans of the control agency need to be clearly understood by all agencies with a direct or indirect role in emergency management. Some of these agencies will have a presence at the ICC, some at the RCC, others at the SCC and some will have no presence in SACFS centres at all and will be accessed through the SEC if it is activated or directly if it is not.

Lesson Nine: Fatigue Management

The processes described in doctrine to manage fatigue are sound but there is some scope to enhance management in some areas. At the validation workshop participants raised a number of instances where fatigue was not well managed, examples were:

+ Crews with long drives starting their journey after a shift because the base camp had closed.

+ The requirement for entire strike teams to return to the staging area at the end of a shift when they were already near their homes increased their time on the road