TRANSCRIPT OF PROCEEDINGS

CORONER'S COURT OF THE
AUSTRALIAN CAPITAL TERRITORY

MS M. DOOGAN, CORONER

CF No 154 of 2003

INQUEST AND INQUIRY

INTO

THE DEATHS OF DOROTHY MCGRATH,
ALLISON MARY TENNER,
PETER BROOKE, AND DOUGLAS JOHN FRASER,
AND THE FIRES OF JANUARY 2003

CANBERRA

DAY 1

10.05 AM, TUESDAY, 7 OCTOBER 2003

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[10:00am]

THE CORONER: This is the inquest into the deaths of Dorothy McGrath, Allison Mary Tenner, Peter Brooke and Douglas Fraser, and the inquiry into the fires of January 2003.

MR LASRY: I am ready to proceed, your Worship, yes. Your Worship, soon after 3 o'clock on Saturday, 18 January of this year, a fire which had begun about 10 days earlier in the Brindabella National Park in New South Wales in the vicinity of a place called McIntyre's Hut burned into the western edge of Canberra. Having come over Mount Stromlo and destroying the installations there, it struck the urban area of Canberra in the vicinity of the intersection of Warragamba Avenue and Eucumbene Drive in Duffy. Over the next hour, two other fires which had begun as three fires in the vicinity of Bendora Hut and Stockyard Spur in the Namadgi National Park also affected Canberra as part of what became a huge firestorm.

The fires which struck the urban edge of Canberra were in three separate sections - the main McIntyre's fire to the north, the Bendora fire south of that, and a breakaway from the McIntyre's fire between those two which, I suspect, by convective force - and expert evidence will be given about this - appears to have been pulled between the two fires.

That meant that the immediately exposed urban area that was exposed to the fire threat in Canberra stretched from Duffy in the north to Gordon in the south, a straight line distance of about 15 kilometres. One of the spectacular effects of this fire, and I say "spectacular" not in any other than perhaps a tragic sense, was that the fires were of sufficient intensity and force to generate what was genuinely a tornado. It began somewhere near the Pierce's Creek plantation, proceeded into the Arrawang

Nature Reserve and then into the suburb of Chapman around the vicinity of Lincoln Close and that, of itself, as your Worship will hear, did some devastating damage.

Apart from the weather event, the evidence of the weather bureau witnesses, who will be the first witnesses called in this section of the inquest, will indicate that the fire on 18 January was of sufficient intensity to actually create its own weather cell, in effect creating its own thunderstorm, and the cloud plume from the fire reaching as high as some 42,000 feet. Over a period of some three weeks, 70% of the entire Australian Capital Territory was burned by these fires. This was a devastating fire and it was a disaster that may have been preventable or at least its intensity lessened.

The evidence is likely to indicate that the ACT and its residents were very poorly prepared for this event, despite previous fires over the years and various warnings that such a disaster was possible and in the view of some inevitable. The extent of that lack of preparation will be debated in the coming weeks and months during this inquiry. That debate will no doubt refer to concerns about complacency at certain levels, the suitability of the structure of the fire authorities in the ACT and issues of fuel reduction and the extent to which that had or had not been satisfactorily achieved.

Additionally, and importantly, in the days leading to 18 January 2003, the evidence may well suggest that the ACT public were not given anywhere near the information they needed to cope with this catastrophe. If on the evidence that turns out to be so, then of course the question will be why not. The question is highlighted by the fact that on Saturday, 18 January, four people were killed. Many more were injured and a phenomenal loss of property occurred. Some of the injuries were very

serious, and their effects will be carried by those who were affected for life. For those who survived this trauma even without physical injury, the sheer trauma of the Saturday afternoon will probably have left emotional and possibly psychological scars which may never heal.

Under the ACT Coroner's Act, you are about to embark on a detailed inquest of inquiry into these fires. On 16 June of this year, you outlined the basis upon which that inquiry would be conducted, which included the need to ascertain the cause and origin of the fires. You referred in the course of your remarks at that stage to the public interest in such an inquiry being held and predicted that you would make recommendations and may make comments on relevant matters that come within your jurisdiction.

Naturally, much of the public's attention has already been concentrated on the events of Saturday, 18 January, since that was the day when the devastating losses occurred. As I've already said, there was a common theme about that day which was that there was a lack of public information about the tragedy which was to occur and how people might prepare for it.

The nature and timings of public warnings will be something that we'll examine with some considerable care later in these hearings. Much of that evidence we expect will be given in the second phase of the inquest, which will be held in the first half of next year. As is well known to the people of Canberra because they lived through the smoke haze for the 10-day period, these fires began well before 18 January.

This inquiry will, like others before it, examine the manner in which the fires beginning on 18 January in the Namadgi and Brindabella National Parks were responded to and the manner

in which operational decisions about that response were made. And, going back a little further, some history may be at least briefly examined both as to the organisations responsible for bushfire fighting in the ACT and on issues of fuel management and fuel reduction.

As I've already said, we are concerned effectively in this inquiry with four fires which became three fires. The primary source, as I understand the evidence, of the Canberra firestorm on 18 January was a combination of the fire which started near McIntyre's Hut in New South Wales, another one which commenced in the vicinity of Bendora Hill, and two other fires, Stockyard Spur and Gingera, which started separately but combined on the morning of 15 January and became known as the Stockyard fire. These fires were in a sense separated by a state border and, therefore, being dealt with by separate agencies, albeit cooperatively. The evidence may or may not indicate that that resulted in differences in available resources to be applied for fighting the fires, as well as variations in the approaches or tactics that were taken in relation to them.

Whether there were such differences and whether those differences, if they existed, caused difficulty, will be a matter that will need to be examined. The fire obviously knew no state boundaries and, in this inquest, it may be that the question of whether or not the border between the ACT and New South Wales is in some respects an obstacle to effective bushfire fighting might become an issue, and no doubt those issues will be dealt with in phase 2.

Another issue which has been raised in public discussion and in other inquiries is the issue of fuel loads, particularly in the national parks and the manner in which those fuel loads were managed or reduced or whether there was a lack of sufficient fuel reduction which, in

turn, dramatically increased the intensity of these fires. We will of course examine those issues.

Amongst the material which forms part of the phase 1 brief are documents which trace the development of fuel management plans in the 1990s, and the nature of those plans and implementation, or lack of it, will be examined during the hearings. And it is hoped that, by the end of the evidence, useful recommendations will be able to be made which will stand to the substantial benefit of the ACT on issues such as that.

It is appropriate to note at the outset that, as a result of these fires, four people died, and a number were injured. Those who died all died in the Duffy vicinity, the most severely damaged area in these fires. Those people were Ms Dorothy McGrath, aged 76, of Cottage 5, Stromlo Forestry Settlement, 113 Cotter Road, Duffy. Ms McGrath died some time in the late afternoon of 18 January 2003 when the fire came into the Stromlo forest settlement and she died as a direct result of the fires.

Mrs Allison Tenner, aged 38, of 9 Burrendong Street, Duffy, also died in these fires. Her house is two rows of houses back from the Warrangamba Avenue firefront, in effect, and one of a group of six houses that were destroyed. Mrs Tenner died in her home on the afternoon of 18 January, some time after 3.30 in the afternoon.

Peter Brooke was aged 74 years and lived at 40 Tullaroop Street in Duffy. Mr Brooke died some time in the late afternoon of the 18th of January, and it appears that occurred while he was on the roof of his house trying to defend it from the fire. The likely cause of death were burns received in the course of that activity.

Finally, Douglas Fraser was aged 60 years. He lived at 23 Burrendong Street, only about six houses away from Mrs Tenner, and Mr Fraser died at some time after 4pm on Saturday, 18 January in the backyard of his premises, and it's likely that he also died attempting to protect his home from the fire. The likely cause of death in his case was smoke inhalation.

It is appropriate at this stage of course to make the observation that one of the fundamental purposes of this inquest is to examine the manner and cause of death of those four persons and to do so in a manner which causes them appropriate dignity. It is also appropriate to note that a number of people were injured, both civilian and emergency service personnel. In excess of 350 presented as injured at the Canberra and Calvary hospitals. Of that number, 46 were admitted and several of those suffered serious injuries with lifelong consequences. Some 83 emergency services personnel, including all services, sustained various injuries which brought the total number of injuries, whether slight or serious, to in excess of 430 people.

Despite the tragedy of the four deaths which did occur, it is in many ways miraculous more people were not killed, given the ferocity of what occurred on that day. On top of all that, there is of course the question of cost. Inevitably these are estimates, but we estimate that the total cost of the fires is appropriately in the order of half a billion dollars - that is $510,296,000. Without being able to quantify the damage done to the catchment areas and the consequential cost to the water supply for Canberra, together with the financial value of the forestry destruction in the pine forests, it may be that the total figure, if it could ever be calculated, may be closer to $1 billion, and that is a phenomenal sum of money.

The known amounts are made up of the following components - loss to the ACT Government by damage of destruction of property, $59,896,000; civilian loss based on the value of total insurance claims as best we can estimate, $350,400,000; loss to the Federal Government, including Australian Federal Police installation and the Australian National University, $43 million, but if in fact the Mount Stromlo Observatory, which was destroyed, requires to be rebuilt on a heritage protected basis, then that cost will be closer to $100 million.

As your Worship knows well, there have been several other inquiries following the last fire season and several other inquiries which affect the fires that we will inquire into. In the ACT, an inquiry was conducted by Mr Ron McLeod AM, which was concerned principally with what was described in his report as the operational response to these fires. Mr McLeod completed his work in the middle of the year, reached a number of findings, and has made a number of recommendations which the ACT Government has said it will implement.

In New South Wales, the Deputy State Coroner has recently released his findings in relation to the fires at McIntyre's Hut, Broken Cart in New South Wales and Mount Morgan. Some of the material from those inquiries will probably find its way into the hearing in this inquest, but of course in our submission, whether you come to the same conclusions as those inquiries did on the issues that they considered, will depend entirely on the evidence you hear and what you make of it.

It's not our intention to urge you to conclude that other inquiries have reached the correct or incorrect conclusions. Many of the conclusions reached by those inquiries are not contentious. But we will present the available evidence and you can reach your own conclusion

on the matters which come within your ambit as the ACT Coroner. If they are different from other conclusions which have already been reached and expressed publicly, then no doubt that will be a matter of public interest and discussion, probably by reference to the variations in the nature and the quantity of evidence before each inquiry.

This inquiry and inquest is important because of the nature of the subject matter of the inquiry and because throughout the inquiry the evidence gathered from witnesses will be on oath and subject to cross-examination by the various represented parties. Whilst a large amount of the material is in documentary form, a large number of witnesses will be called over the duration of the inquiry so that the conclusions which ultimately will be contended for by us assisting you and by representative parties can be tested by cross-examination.

And as has been previously said, the hearing of this inquiry will be held in two phases - in this phase much of the material is documentary, and I'll take you shortly summarily to the documents and make some comments about them. But this part of the hearing will include also oral evidence and, by the end of this part of the hearing, we expect to have a clear picture of these fires, how they started, how they spread and the circumstances under which they impacted the western edge of Canberra.

As has been previously foreshadowed in direction hearings before you, at the end of this evidence we would hope that we would be in a position to announce what we would submit would be an appropriate list of issues that would govern the remainder of the inquest. We would expect those issues to include topics such as information and warnings, community safety and education, logistics and resources, incident management, incident planning and strategies and fuel management, and there may

be a large number of other issues which, against the background of the evidence to be called in this phase of the inquiry, will be appropriate to be looked at.

Primarily we are concerned with what occurred between 8 and 18 January. Of course the fires didn't go out on 18 January - and indeed they burned for some 12 further days after that - but it seems to us with a view to dealing with the matter as expeditiously as we can and concentrating on the issues that are important, that those issues primarily arise in that 10-day period between 8 and 18th January.

Your Worship, it might be useful, although everybody has the material, at least the representative parties have and you have, but if I endeavour briefly to summarise the evidence that I expect will be given about the fires themselves and their progression. Were there a jury in this room, they would be instructed that what I'm about to say is not evidence and it's the evidence that's to be preferred, which is always devastating for the ego of the barrister who's making the summary, but nonetheless, in so far as I make any errors in this summary, of course it's the evidence that's the critical thing. Hopefully the summary will assist in some understanding of the evidence that's to follow.

The evidence, broadly, will indicate that, in 2002 and 2003, the El Nino weather event produced below average rainfall and abnormally high temperatures in eastern Australia, obviously including the Australian Capital Territory. Although rainfall was below average for most months from April to October 2002, the critical period was between October and December 2002. And in that period, the rainfall was the third lowest total on record for that period. On the other hand, the average maximum temperature in November 2002 was 5 degrees above normal.

In this part of the world, fire authorities use an index to measure a number of things including dryness in the soil. It's calculated in millimetres and is the theoretical amount of rain required to bring the upper levels of soil to saturation. In late December 2002, that index, which is called the Keetch-Byram Drought Index, and which will probably be better known from here on as the KBDI, to avoid the lengthy name, had reached 100 millimetres, which is described by experts as being an extreme level, and means, among other things, that fires, forest fires, which are alight during the day will remain burning overnight even in mountainous country.

In addition to the KBDI, there's also another scale which is in effect a forest fire danger scale called the McArthur fire scale, which I think incorporates the KBDI as part of its analysis. This has been used for many years and combines an index of soil moisture, relative humidity, wind speed and recent rainfall, and it produces an index of the difficulty of suppression of fires occurring in the standardised fuel type, broadly categorised by a dry eucalypt forest carrying a fuel load of 12.5 tonnes per hectare of fuel. I think the evidence will indicate that fuel loads in the forests were significantly higher than 12.5 tonnes at the point when these fires commenced.

Your Worship will hear about those indexes and the way in which they were used to analyse fire risk during this period.

On the afternoon of 20 January 2003, as a result of what were called dry thunderstorms and consequential lightning strikes, a number of fires started in the region, being the Brindabella and Namadgi National Parks. As I've already said, the fire was started in New South Wales. About which most of the evidence will be heard will be the one that started at

McIntyre's Hut and the ignition point was something of the order of 12 kilometres west of the Australian Capital Territory border, and it's clear that that fire played a substantial role in the damage done to Canberra 10 days later on 18 January. As I've already outlined, it was effectively the northern section of the firestorm and it was that tonne or finger of fire which struck Duffy on the afternoon of 18 January.

On the afternoon of 8 January, witnesses also observed that there were three other fires in the ACT in the vicinity of Bendora Hill, some distance away from the Bendora Dam, Stockyard Spur and Mount Gingera. On 8 January, the weather included a temperature of 31.5 degrees with relative humidity of 20%, and the relative humidity, your Worship, will be obviously important in the descriptions of the fire conditions over the following 10 days. The winds at that stage were either from the north or south-west and the KBDI, that I've earlier referred to, was showing 108.2, and subsequent forecasts rose to 117.

In the days following 8 January, the temperature dropped - 24.2 on the 9th, 24.9 on the 10th, and a bit cooler on the 11th, and the winds, as they often are in this region, had swung to the east-south-easterly, and that was expected to continue until Wednesday the 15th.

One of the issues that's already arisen in other inquiries is the question of whether there was a lack of aggression demonstrated in the response to these fires at the earlier stages - that is, during the 8th, 9th and 10th of January.

In relation to the fire near McIntyre's Hut, that came initially within the jurisdiction of the New South Wales Parks and Wildlife Service. On the afternoon of the 9th of January, that fire was brought under section 44 of the New

South Wales Rural Fires Act, which provides that the Commissioner of the New South Wales Rural Fire Service in such circumstances must take charge of bushfire fighting operations where it's clear that it's going to be a large fire. It's obviously not what the section says but it's clearly what it means, and of course the Commissioner may also delegate his functions for the purpose of acting under section 44.

The initial strategy adopted by all concerned in the fires at that stage is described as remote indirect suppression, the tactic of having, at least in the case of McIntyre's Hut, broad containment lines in which back-burning became the essential tool of combatting the fire. So far as the three fires in the ACT were concerned, there was no direct attack on those fires either. Whilst the fire crew had attended the Bendora and Stockyard fires in one form or another, it was determined that no crews were to remain to conduct firefighting or control operations overnight on either 8 or 9 January.

In his report, Mr McLeod was very critical of this decision and suggested that the manner in which the decision was made not to remain at the fires overnight must be taken to have been seriously flawed. We'll be anxious to test the evidence about those matters during the course of these hearings. You may or may not later conclude that the failure to use the advantages that arise in the evening to control these fires was a significant opportunity that was lost, and that situation appears to prevail for at least two nights.

In relation to the McIntyre's Hut fire, the incident control team determined to control the fire on 8 January within identified control lines. Broadly they were the Goodradigbee River to the west, the power line fire trail to the south, the eastern fire breaker at the

Brindabella National Park to the east and Doctor's Flat Road and Webbs Ridge trail to the north. The evidence also suggests there was an interagency meeting between New South Wales Parks, New South Wales Rural Fire Services and the ACT Emergency Services Bureau at 8.30 that night at which strategies and resources for several fires were settled, which included broad containment strategies.

On 9 January, no direct suppression action was taken anywhere on the edge of the McIntyre's fire and no suppression action was attempted on the night of 9 January.

As to the Bendora fire, some early suppression was undertaken on the north-east flank, I think, on 18 January and preparations were made to run out a hose line to cut off the head of the fire. There were some water drops from the helicopter 'Firebird 7'. However, at around 7.30pm the crews were withdrawn and no work was done on the fire overnight.

More work was done the following day, on 9 January, but it was abandoned at about 6pm on that evening. As I've earlier said, until 14 January, the Stockyard Spur fire and the Mount Gingera fires were separate. On the night of 8 January, apart from some water bombing, no suppression action was taken on the Stockyard Spur fire. By the time the crews actually arrived in the vicinity and pondered the prospect of having to walk at about 7pm, it was decided to abandon any attempt and return to Canberra and no action was taken on the Gingera fire on this date at all.

On 9 January, a remote area fire team, which is often known by the acronym RAFT, arrived at Stockyard and began constructing a hand line near the north-west section of the Stockyard fire. But by 3 o'clock the fire burnt up to the containment line and crews withdrew and then withdrew for the day at 5.30.

At Gingera a four-man crew arrived but found they did not have enough personnel for hand-line construction, nonetheless remained overnight to stop the fire from crossing the Mount Franklin Road.

Over the following days, all the fires continued to spread. Because of the nature of the country, they were becoming increasingly difficult to control. There is no question, your Worship, that fighting fires in regions like this is difficult work. This is not flat country. This is, as you've seen, mountainous terrain. By trails and by fire breaks, access by water-carrying tankers is not always possibile. It also seems that water bombing from the air is a precise art and requires significant planning and skill.

No rain had fallen from the thunderstorms on 8 January, so there was no rain to assist with fire suppression, and all of the fires continued to spread over the following days, although on the following days, 10, 11 and 12 January, the conditions were relatively cool and calm and the winds moved to the east south-east. And when we move into the benefits of the technology in this court, you'll see satellite photographs that actually track the way in which that wind changed.

Severe fire weather was, however, inevitable. And, by 14 January, the weather bureau was telling fire authorities that the extended outlook was not good. Indeed, at about that stage, the weather bureau participated in an in-person briefing at the Emergency Services Bureau. What they were saying from 14 January onwards was that temperatures for Saturday, 18 January would be at least 35 degrees, and as the day got closer, the predicted temperatures were increasing.

On Wednesday, 15 January, the bureau were

telling all interested parties that the conditions will deteriorate and that Saturday, 18 January would be a day of concern, with temperatures in the 30s, and of course, importantly, winds from the north-west. By Thursday, 16 January, the temperatures were back to about 33 degrees. At the same time, relative humidity was dropping to below 20%. Some time on 16 January, the Emergency Services Bureau determined that a total fire ban would apply for five days, given the weather conditions and the state of the fires. And on this day, senior personnel from the Emergency Services Bureau briefed the ACT Cabinet on the fire situation. We trust we'll get access to the detail of that briefing.

In the early hours of Friday, 17 January, a north to north-west wind developed, temperature peaked that day at 36 degrees, humidity dropped to 15%. The scene was then set for a significant fire problem. By then the McIntyre's Hut fire was now close to the ACT border, which in a straight line is about 15 kilometres from the urban area of Canberra. Spot fires were commencing well beyond the eastern containment line. On 17 January, the Bendora fire was burning in both New South Wales and the ACT and was expanding. By 6 o'clock on that Friday night, the fire was spotting between Mount Franklin and the Cotter River, and by 9 o'clock that night a spot fire had burned into the Pierce's Creek pine plantation just to the west of the Murrumbidgee River and, once that river and the Bullen Ranges are crossed, it's a short trip to Canberra, in the order of 5 kilometres or so.

The Stockyard fire was spotting across the northern end of the Corin Dam, and those spot fires are likely to have produced a fire that burned through to Mount Tennent about 9 kilometres due south of the Canberra urban area.

This meant that by Friday night, with an extreme weather day to follow, the entire western side of Canberra was under threat. The Emergency Services Bureau held a planning meeting at 9.30 on 18 January, and during that meeting they were given the projected outlook from the weather bureau. That meeting discussed the potential for the McIntyre's fire to have an impact on the western urban edge of Canberra, as well as affecting areas such as Tuggeranong and Williamsdale - those areas being affected by the other fires.

The evidence about the behaviour of the fires themselves is relatively complex and will be given in detail by Mr Cheney in his evidence. But, in summary, as I understand it, it basically follows this pattern - by midday on Saturday, 18 January, the McIntyre fire was burning in timber country, behind Uriarra Station. That meant that it was still some 10 kilometres away from the Weston Creek area. By 2 o'clock, the fire was in the pine plantations at Mount McDonald, across the Murrumbidgee at 2.30 and, 15 minutes later, was on the western slopes of Mount Stromlo. It hit the suburb of Duffy at the intersection of Warragamba Avenue and Eucumbene Drive just about 3 o'clock and, half an hour later, hit between Dixon Drive and Hindmarsh Drive also. As I understand it, the rate of spread of this fire was quite significant and unusual.

Also on this Saturday, a section of the western edge of the McIntyre's fire broke away and crossed the Goodradigbee River. Your Worship will recall that the Goodradigbee River was to be the western containment line. It crossed the Goodradigbee River and then burnt east and, by 2.45 in the afternoon, had merged with the other section of the McIntyre's fire to the north and the Bendora fire to the south, and that merged fire entered suburbs from Duffy down to Gordon. And it's in this context that the tornado occurred which entered the suburb

of Chapman. The weather bureau called such an event, I think, an intense local vortex, and you'll hear evidence about the various possibilities that explain the happening of this event.

There's an issue to some extent as to whether and how the Bendora fire and McIntyre's fire merged. On one view of the evidence, they did merge at about 3.45 in the afternoon. It seems likely that some days before the fire struck the Canberra urban area, subject to weather conditions, they were recognised by the authorities as being unstoppable. When that was and what they did by way of informing the Canberra public about that will be a matter of subsequent evidence. And, as I've already referred to, a detailed description of this fire activity, with all the associated technical assistance, will be given later in this hearing by Mr Phillip Cheney, who I think is regarded as one of the foremost experts in Australia on bushfire behaviour.

I come then to the brief as it presently stands and say a little about the material that's in it. As I've already said, the evidence will come from witnesses and from the documentary material which has been supplied to the parties. Most of it has been available, although some further material which is relevant has come to light over the last week and will be referred to during the course of the evidence.

For the purpose of these hearings we've prepared a brief which had several basic components and we've tended to include more material rather than less, although the inclusion of documents does not mean that they're all necessarily directly relevant. I hope it will become clear that certain issues will be still in the course of these hearings and, as inevitably will occur, particular documents will become more important and

fundamental than others.

In hard copy form, the documents occupy about 12 volumes at present. The first 10 volumes of that set is a collection of a significant amount of historical data that might be relevant. Some of that material may not be the subject of any further evidence at this stage, and indeed further analysis is yet to be done in relation to it. I'll refer now to some of those categories.

The first category is historical documents and historical overview. The documents in the brief in relation to that make it clear that major fires in Canberra are not unusual, although certainly not to the scale of this one. The very first document in the first folder is a newspaper clipping from the 'Canberra Times' of 16 January 1939 - 64 years ago. According to that report, the fires had "raged" along the Murrumbidgee on a Saturday afternoon and crossed the river at certain points. Complaints were made amongst the citizenry that the fire had been neglected for three days because the fire was thought to be too far away to cause any damage. Ironically, I think the Federal Minister for the Interior announced that he was going to set up an inquiry to examine how there might be more effective organisation in fighting bushfires. And there were also complaints then, 64 years ago, about the inadequate organisation of bushfire fighting.

On 27 January 1952, there were fires this time in the vicinity of the suburbs of Red Hill and Narrabundah on the eastern edge of the Canberra area, and on the day of those fires an inquiry was announced to start immediately. A week or so later, on 6 February 1952, fires commenced in the Mount Stromlo area, and again damaging the Mount Stromlo Observatory. This fire was also said to have been caused by a lightning strike. It does not appear that the 1939

fires, nor the 1952 fires, though, represented a major threat to the Canberra and urban area in the way that of course these fires did.

On 14 February 1979, fires burned between Canberra, Gundagai and Mittagong. In March of 1985, fires occurred again in the Red Hill area and in the vicinity of Queanbeyan, and there were emergencies described as being in two shires - Yass and Yarrowlumla. A spectacular fire in 1985 was in Mount Majura, not far to the east of the suburbs of Hackett and Ainslie. The emergency in 1985 lasted for a number of days and, on 5 March 1985, as you will see in the material, the opposition spokesman on the environment, Mr Connolly, now Justice Connolly of the Supreme Court, was quoted in the 'Canberra Times' as being critical of the handling of the fire disaster and, in particular, the cooperation between the ACT and New South Wales fire authorities.

There were also fires at Black Mountain and Pierce's Creek pine plantation in 1991 and in Curtin in 1994. And, on Christmas Eve 2001, another series of bushfires commenced. These fires apparently commenced on the Uriarra Road near Huntly, north-west of the Stromlo pine forest, and another fire commenced on the Coppins Crossing Road, which became known as the Stromlo fire. In July of last year, Mr Peter Lucas-Smith from ESB prepared a report for the Coroner, which is in this brief as well as in the brief for the Coroner, dealing with that matter. His report indicates those fires burned for more than two days and covered a total area of about 1,700 hectares. That inquest into that fire has not yet been heard, so perhaps at this stage it's not appropriate to say anything more about those fires at this stage.

The next category of material is in fact visual. We have prepared a compilation of video taken during the course of these fires.

Our intention is to play the video in its entirety at the conclusion of Mr Cheney's evidence and ask him to comment as we go through, but it's a video that may take two or three hours to play.

The footage comes from a variety of sources - CSIRO, the local media, various other individuals who took film - but it is important data and it goes back as far as the 8th. The film, as I understand, contains extracts from 8 January, the 12th, 13th, 14th, 15th, 17th and of course the 18th when there was a significant amount of film, including dramatic film of the situation in Duffy on the afternoon of Saturday, the 18th, which I think was taken by a Channel 9 cameraman.

The next section of the brief will deal with fuel management and, as I've already said in the course of this opening, we expect that will be an important issue. In his report, Mr McLeod recommended to the ACT Government earlier this year that:

> The ACT bushfire fuel management plan should be reviewed in the light of changed circumstances since the January 2000 fires. Increased emphasis should be given to controlling burning as a fuel reduction strategy.

We propose to produce at this stage all the fuel management planned for the ACT and the nearby region of New South Wales from 1995 onwards. It will be appropriate to examine the history to some extent of earlier reports and recommendations in relation to this because of the fundamental importance of fuel loads to the intensity of fires such as the fire that occurred here in January of this year.

It seems likely that the events of January 2003 had been predicted on several occasions and it

seems likely the government had been warned on those occasions that such a fire would occur. The important question, which will no doubt be an issue for you to consider, will be whether appropriate measures were in fact taken by the relevant authorities to either alleviate or diminish the risk and, if the answer to that is no, then why not.

In a sense, this topic starts with a Mr Howard McBeth, and he'll give evidence in this phase of the inquest. Mr McBeth was the deputy chief of the South Australian Country Fire Service and, in 1994, was commissioned to report on the effectiveness of the fire hazard reduction practices of ACT Parks and Conservation Services. In his report, he formed the view that the scope and terms of reference were inadequate by being restricted to the ACT Parks and Conservation Service and, in his opinion, the ACT Government needed to adopt a whole of government approach to file land management and associated issues.

A dispute broke out between Mr McBeth and the government of the day. Mr McBeth's report was neither implemented nor paid for. The fact of that became an issue in the 1995 ACT election and Mr Humphreys, who, following that election became the Minister for Police and Emergency Services, released the report and made an order that Mr McBeth be paid for his work. In that report, Mr McBeth also noted that, under extreme weather conditions, and given the total fuel loads in some areas are well in excess of 30 tonnes per hectare, extreme fires were inevitable.

He noted that such extreme fires are beyond the capacity of any fire service to suppress or contain. He urged that the quantity of fuel be reduced and that the reduction be maintained. He recognised that there was a balance to be reached between fuel reduction and conservation, though he noted that fire was a

natural component of the Australian landscape. He expressed the opinion that ACT Parks and Conservation Service programs did not provide an adequate safeguard against the impacts of single or multiple wildfire events in the ACT. He adopted views that had been expressed by Mr Phil Cheney in September 1991 in his comments on a report which concerned the reorganisation of emergency services.

In 1991, Mr Cheney had made a number of points which included that minimising damage from wildfires required effective action at home-owner and local levels, fuel must be reduced, the main risks are from areas just adjacent to the urban area, land management organisations must take responsibility for fire suppression, and, since they don't in his view, fire protection in the ACT was flawed. There needed to be in his view a cooperative fire management plan involving parks management and urban home owners adjacent to parks, and the ACT Parks and Conservation Service should organise findings and undertake rural firefighting.

A consequence of the 1995 election was that a task force was established called the Task Force on Bushfire Management. It was established under the chairmanship of Mr Graham Glenn AO. It had been established and reported to the ACT Government in August of 1995. In essence, it recommended among other things that ACT Government land managers, in consultation with residents, give priority to fuel reduction and to bushfire safety awareness for residents in identified fire hazard areas. It also recommended that fuel management plans be prepared and be reviewed every two years and be approved by a bushfire fuel management committee.

The task force noted the importance of integrating fire suppression and fuel management. It is also important to note, we

think, that the report referred to the urban interface of having particular concern in terms of fuel management and referred to a number of areas, and at the top of the list was what is described as the Narrabundah Hill, which is the area adjacent to the Eucumbene Drive-Warrangamba Avenue, Duffy, intersection, and also he referred to the Stromlo pine forest adjacent to the Tuggeranong Parkway. Apart from its recommendations as to fuel management plans and practices, the task force also strongly recommended that particular building regulations appropriate to bushfire-prone areas be rigorously applied where new houses were being built or old houses were being replaced or extended. It recommended the revision of what were then called urban edge guidelines.

Your Worship, the whole issue of fuel reduction, I suspect, will be discussed against that background of reports, predictions and expressions of concern.

The next category of documents is essentially to do with the history of the ACT Emergency Services Bureau and the organisational structure. The documents which are in the brief in relation to that at the moment are essentially for historical understanding of the way in which the ESB developed. The material will of course refer to issues which will become much more significant in the second phase of this hearing.

The other material is concerned with zoning for bushfire hazards and within the Canberra suburban area, suburbs which are gazetted as being potential fire risks or to be affected by fires, and also the next section of the material concerns resources in areas of responsibility, and again I won't go into detail in relation to that at this stage of this proceedings.

Also, the next category of material is material

from the weather bureau, and there will be evidence to be given by the weather bureau. What's in the material is the submission of the bureau which was provided on 25 August of this year, in the form of a submission. The document describes in detail the manner in which the bureau operates during a fire season and the nature of the information it obtains and disseminates. The submission covers a description of the procedures followed by the Canberra Meteorological Office, which is, I think, known to those within as the CMO, in providing routine weather fire services and the way in which those are distributed.

The submission of the bureau will be supplemented by the evidence of three witnesses, each of whom are meteorologists. The first witness, Mr Rob Webb, in fact comes from the rural forecasting centre, I think it's called, in New South Wales, and Mr Davis and Mr Mason are both meteorologists here in Canberra.

The written submission refers of course to the antecedent weather conditions in 2002 and 2003 and describes a period which I've already referred to of very low rainfall and above average temperatures. The submission also describes in detail the operational aspects of forecasting. Much of that material we suspect will not be in contention.

One thing that's clear from the material - it's a matter for you, of course, in reviewing it for this purpose - is that by 14 or 15 January, as I've already said, it was apparent that Friday, 17 January and Saturday, 18 January, weather-wise, were going to be particularly difficult days and days when at least a combination of very low relative humidity, very high temperature and north-westerly winds were going to prevail - those endeavouring to deal with the fires that were burning in the region having almost overwhelming problems.

The next section deals with lightning strikes and, as I've already said, part of your role as the Coroner is to determine the cause and origin of the fires which are being examined. It's unlikely that this is contentious. There's nothing in the material suggesting that any of these fires were commenced by human intervention, at least that I'm aware of at this stage. Indeed, if that were to change, your Worship, I will announce it almost automatically and immediately.

The material in relation to lightning strikes comes from two sources - from the group known as Katton, which is able to observe and record lightning data. The material from Mr Prendergast can be found in folder 11 of the brief. He's provided a written report which sets out data consistent with the conclusion that I've already referred to as to what occurred on 8 January, 2003. And indeed amongst the material that you'll see on this rather magnificent screen is a map of the lightning strikes not only in this area but throughout the south-eastern Australian region, New South Wales and extending into Victoria.

Also in that material is the statement of a Mr Brett Finn, who was the duty lookout at Mount Coree in the Brindabella National Park to the west of Canberra. His statement, which may or may not be able to be supplemented by evidence, because I think we've had difficulty locating him, indicates that he saw at least two columns of smoke about 10 or 15 minutes after he'd seen lightning flashes, and his log radio transmissions seem to indicate that what he saw was smoke in the vicinity of McIntyre's Hut - one of the places.

Central to this phase of the inquest and inquiry will be the evidence of Mr Phillip Cheney. He is the senior principal research scientist with the CSIRO and project leader in the section of the CSIRO dealing with bushfire

behaviour and management. He holds a Diploma in Forestry and Bachelor of Science in Forestry from the University of Melbourne. He is, we suggest, the pre-eminent expert in Australia on fire behaviour. His work concerns research into bushfire behaviour to understand how fires spread in their natural environment and the development of models to predict the behaviour of important fuel types. He's researched and is researching fire meteorology and researching management systems using knowledge of fire behaviour to develop improved and safer bushfire management. Since these fires occurred in January, Mr Cheney has been committing a substantial amount of his time to developing an analysis which you'll see of the way in which these fires started and the way in which they spread. It will include a number of technological aids which will, in effect, map the fires and will, we hope, fundamentally fulfil one of the purposes of this opening phase of the inquest.

He will also provide expert comment on the manner in which the fires were responded to at the time and the way in which they were dealt with at various stages of their development. His evidence will be detailed and, as you would realise, much of the summary that I've outlined to you, your Worship, has been based on that evidence.

Another important area to examine is the fire effects in the urban interface, and again the CSIRO has provided us with expert evidence about this in the form of Mr Peter Ellis. He prepared an assessment of the ACT suburban house losses from these fires and will give evidence during the course of this phase of the hearings. For his purposes, he examined something of the order of 779 suburban houses in Canberra, including damaged and destroyed houses and some of the adjacent houses. Some houses were significantly damaged by wind, for example, in Kambah.

His survey of the houses that he looked at indicated that of the 779 houses, 381 were categorised as destroyed, 63 were damaged, 317 were undamaged, although they had some damage to garden, fence or external structures. Of course the area that he concentrated on was the suburb of Duffy.

What he was interested to examine was the cause of these house losses. As I understand the evidence, not one house was lost by the direct radiant heat of the fire. In every case, houses were lost either by embers igniting the houses or gardens or adjoining structures, or from a fire spreading from another house. It may indicate that, in circumstances such as this, those houses that were close to the fire front were often destroyed. Those that were able to be defended, subject to water pressure or other assistance of that kind, were able to be defended. That will remain to be seen, but the primary causes for house destruction or damage appeared to be apart from embers spreading from house to house, ignition from fire-prone gardens and other structures, damage to gas mains and also from houses with cypress pines, which are apparently particularly flammable.

Complaints of course were made by residents, which is perhaps almost inevitable in circumstances such as this, about a lack of water pressure, and that may also be something that needs to be examined in the course of these hearings and become the subject of comment and/or recommendation.

The remaining two categories, your Worship, are in relation to the financial impact, and I've already outlined those details. They're the product of the research of a member of the AFP investigation team, which was established under the leadership of Sergeant Therese Barncout after these fires to connect these inquiries.

Constable Judy Goldsmith has researched the costs and her statement sets out the details of the figures I've already outlined to you. It appears in folder 11 and has a number of attachments which summarise the fire damage, and again the quantity of damage is obviously a matter of significant interest and may in several respects not be imprecise and also not particularly contentious.

Finally, there is also a report in relation to the injuries which were inflicted on various people as a result of these fires, and I've already referred to those.

Your Worship, that broadly concludes the summary and opening that I wish to offer the court. We will proceed shortly with the evidence of the Bureau of Meteorology and, at the end of this phase of hearings, perhaps I should say we propose to present to you all the evidence in relation to the inquest into the four deaths which occurred and we expect to invite your Worship to make findings in relation to those deaths in a sense on a preliminary basis so that at least for the families of those people the matter will be brought to a conclusion for their benefit. If your Worship pleases.

THE CORONER: Yes, thank you.

MR LASRY: The first witness --

THE CORONER: I thank you, Mr Lasry, for that introduction. I found it very useful, very informative. I hope counsel also found it so and members of the public.

MR LASRY: If your Worship pleases. Your Worship, the first witness is a Mr Webb from the weather bureau, and I know he needs a few minutes to come to grips with the technology and I wonder whether your Worship might --

THE CORONER: We might take a morning adjournment.

MR BEGBIE: I wonder if I might say a few things. The first is, with respect, to seek your Worship's leave for myself to come and go a little bit during the proceedings because a number of these witnesses and a number of the areas of evidence won't directly concern my client. The second is that your Worship asked at an early stage in a directions hearing whether I represented the Chief Police Officer, Mr Murray, and I said - I cleared that up for your Worship, so I now indicate that with your Worship's leave, I will so appear for Mr Murray.

THE CORONER: Thank you, Mr Begbie. You certainly do have my permission to come and go, and that goes for all counsel. If you do feel that there is a part of the inquest that is not particularly relevant to your client's interests, then please feel free to attend those sessions and those witnesses that you wish to, and you're certainly excused from not being here for those witnesses who you feel are perhaps not relevant to your interests. But you certainly have that permission, Mr Begbie.

MR BEGBIE: Thank you.

THE CORONER: So you also represent Mr Murray, thank you.

MR STITT: Might I also announce my appearance with my learned junior, Mr Andrew Coleman, your Worship.

THE CORONER: Thank you, Mr Stitt.

MR JOHNSON: Thank you, your Worship. If I could formally indicate that in this matter I'll be appearing for the Territory as senior counsel. My name is Peter Johnson. I think on prior occasions there have been several counsel

solicitors appearing. If I could indicate for the record that from here on I'll be the senior counsel for the Territory.

THE CORONER: Thank you, Mr Johnson. All right. Thank you. We'll adjourn and resume about 11.25 or so. Thank you.

ADJOURNED [11.06am]

RESUMED [11.33am]

MR LASRY: If your Worship pleases, we call Mr Webb, please.

<MR ROBERT MATTHEW WEBB, SWORN

<EXAMINATION-IN-CHIEF BY MR LASRY

Q. Would you tell the court your full name and professional address, please?
A. Robert Matthew Webb, 300 Elizabeth Street, Sydney, Bureau of Meteorology.

Q. Are you a senior severe weather meteorologist with the Bureau of Meteorology?
A. I am.

Q. And are you ordinarily stationed in New South Wales, in Sydney?
A. Yes.

Q. And were you on duty in that capacity at least between the dates of 8 and 18 January this year at various times?
A. At various times, yes.

Q. Can you just describe briefly the role that you have in the Sydney bureau office and the way it interacts with the Canberra office, and perhaps before you describe the role, in Canberra there's a local meteorological office and there's obviously interaction between the two because effectively the ACT is part of New

South Wales for weather purposes anyway. Just describe how that works.
A. My role as senior severe weather meteorologist is I head up a specialist section within the New South Wales region known as the Sydney weather section. Our responsibility is severe thunderstorm warning services and bushfire warning services in New South Wales. As far as our relationship with the Australian Capital Territory goes, I liaise with the officer in charge of the Canberra Meteorological Office on the formats of the way we deliver the service as well as interacting with individual forecasters on a day-by-day basis to ascertain general weather conditions.

Q. During a period such as occurred between 8 and 18 January, there's obviously a regular liaison between your office and the Canberra office and also between both of those offices and the fire services; is that correct?
A. That's correct.

Q. And as a matter of course, where advice is given to the fire services over the telephone, either by your office or the Canberra office, are ordinarily those conversations tape-recorded?
A. The key phones within the office which involve the senior forecasting within the office and the severe weather operational phone, those phone calls are recorded, as are the phones within the Canberra Meteorological Office, I believe.

Q. Your Worship, just in relation to that, we have been provided I think at the end of last week with a CD which I think contains all the relevant conversations during this period. Not all of them are particularly significant. A lot of them are procedural type phone calls and there are some conversations where there are briefings to, for example, the New South Wales Rural Fire Service on weather conditions and so on - all conversations about substantial issues

between this witness, for example, and weather bureau staff in Canberra.

What we will do is make available to the parties all of these conversations and endeavour to pick out the significant ones and play them once we've gone through that sifting process. But they're not available to the parties yet, but they will be in the next day or so. I might say apart from the fact that the conversations make it clear that, among others, Saturday, the 18th was going to be a particularly bad day, I'm not sure that there's not much else in them that's contentious.

Mr Webb, you heard what I said to her Worship about that. From time to time between the 8th and 18th January you were involved in discussing the weather with a view to the fires that were prevailing?
A. That's right.

Q. With various people?
A. That's right.

Q. And in particular from Sydney, you provided briefings by way of conference phone calls to the senior personnel within New South Wales Parks and New South Wales Rural Fire Service; is that correct?
A. Generally the briefings are to, in the first place, the New South Wales Rural Fire Service, which is the coordinating body, and at different times briefings - other interested fire agencies would take place in those briefings.

Q. And we can listen to the conversations subsequently, but broadly they are a briefing about the expected weather over a particular outlook period?
A. That's right. Normally out to three and four days depending on the situation. We may be able to go a little bit further, depending on the weather situations.

Q. Now, I outlined during the course of the opening reference to a couple of indexes that are used which are used within the weather bureau as well, are they not - the KBDI, the Keetch-Byram index, and also the McArthur fire index. Are you familiar with both of those?
A. I'm familiar with those.

Q. Would you just describe each of them more accurately than I was able to.
A. The Keetch-Byram drought index - both of these indices are used with services held in conjunction closely with the New South Wales and ACT fire authorities. The Keetch-Byram drought index has been - they requested that we use that to ascertain the level of dryness or soil dryness over a particular area. We use that particular index, soil dryness, to be input into fire danger ratings. The bureau's responsibility is to provide the public with conditions - warn the public of conditions that may give rise to bushfires and we do that via - in close consultation with the fire agencies and using such a thing called a fire danger index, which incorporates fuel state, humidity, wind speed and temperature.

Q. Am I right in saying that the Keetch-Byram index is an index which is designed to basically give information about the dryness of the soil and thus to get some information about the dryness of fuel that might be caught up in a bushfire?
A. The Keetch-Byram is the theoretical - the Keetch-Byram drought index is the theoretical amount of rain required to bring the upper levels of the soil to saturation.

Q. Is it also correct that anything over 100, that is theoretically 100 millimetres of rain, which would be required to bring the soil to saturation, is regarded as extreme?
A. That's the levels - the terminology that I believe is used, yes.

Q. And as to the fire danger index, just give us an idea of the way in which that's -
A. The fire danger index within the presentation that I will give - I will explain that in a little more detail, but there are five different levels of rating that we give, starting low, moderate, high, very high and extreme, depending on numbers. 50 is the level of extreme. That's the level in conjunction with fire that the bureau must issue a fire weather warning. That is expected, but there is discretion below that.

Q. And just on that, that's within the weather bureau's activities - the decisions on total fire bans, for example, that's within the jurisdiction of the emergency services?
A. That's right.

Q. They make a decision about that based, among other things, on the information they get from you?
A. That's right.

Q. I think - and we'll come back to this, as I already said - there were a couple of occasions on which you provided briefings to the New South Wales Rural Fire Service and I think the one which contained a discussion about the outlook for 18 January was one which occurred in the early afternoon of 15 January; does that accord with your recollection?
A. Yes.

Q. For the purpose of this inquiry and inquest, the bureau has put together a very detailed submission, which is in the material. Did you play any part in the assembly of the material, in putting this document together?
A. I did. I provided the preliminary meteorological advice within that assessment of the conditions between the day of ignition on the 8th and the 18th and subsequent days.

Q. And we can read the material for ourselves. In a sense, you've attached to it some of the contemporary documents, particular forecasts and various other documents which were provided by way of information as the fires progressed during that 10-day period. But have you also prepared something that's perhaps a bit easier to follow by way of Powerpoint presentation?
A. I have.

Q. And what's the relationship between the Powerpoint presentation and this document?
A. The Powerpoint presentation aims to provide a summary of the document from a meteorological perspective, the weather conditions only, looking at the antecedent conditions in the years leading up to this event, as well as any detail of the individual characteristics of the meteorological setting.

One thing in addition is that we make some more comment within the Powerpoint presentation about the smoke, and our meteorological radar at Captains Flat to the east of the ACT, it gives an indication of the development of the smokescreen above Canberra on the 18th. I have some information on that as well.

Q. All right. Thank you. Perhaps I'll ask you to start that presentation. Your Worship, the way we thought we would do this is, if your Worship is happy with this, for Mr Webb to stand. We have a magic pointer which he can use to adjust the presentation as it goes. I might ask some questions along the way, but if that's suitable, your Worship, that would be explanatory of the written material, and as you can see, it's already loaded on to the material. The parties won't have this presentation in electronic format. What they have at the moment is the original submission of August. But we'll also make copies of this available as well.

THE CORONER: That submission is in volume 10 of the materials?

MR LASRY: That's right, your Worship, yes.

Q. Mr Webb, with her Worship's permission, if you want to leave the witness box so that you can use the pointer, and perhaps we'll leave it to you to take us through the slides. Can your Worship see that screen?

THE CORONER: Yes, I can, thank you, Mr Lasry.

MR LASRY: I might sit down unless I have a question to ask.
A. I apologise at the outset for using a pointer. It's a bit new and fancy for me to use.

MR LASRY: Before you start, can I just give you one bit of advice as a witness. If you could raise your voice a little so that everybody can hear and just slow down just a fraction, that would be helpful, particularly for the lady who has to write it all down for us.
A. This summary of the meteorological aspects of the January 2003 bushfires was prepared over the last couple of months, since the bushfires. We analyse documents and information both that were available before the bushfires and that became available after the bushfires as well. So not all the information was actually available at the time that the bushfires were breaking out. I have to make that point at the outset. But as with any meteorological study, we tend to analyse things very closely and far more closely after the event than we ever can during the event.

The outline of what I will talk about today is the antecedent conditions, meaning the conditions leading up to January 2003. I will focus on the weather conditions on 8 January and as well 9 to 16 January, and in some detail look at the weather conditions on 17 and 18th,

including local factors that may influence the weather. These include the local topography as well as the actual fire itself, the rapid development of a large plume or typical fire, and I will go into the development of that plume. Also looking at intense local winds, the vortex or tornado, or whatever it would be called, that occurred, and in a very close analysis of our radar data afterwards we may have found some information of interest.

So the antecedent conditions - sorry, I might get you to go back one. The two-year rainfall for the years 2001 and 2002 is demonstrated by this map here. This map is what we call a decile map. Deciles are one way that the Bureau of Meteorology can display how particular rainfall amounts compare to average.

The way to explain deciles is they are essentially tenths. We take all the data that we have for a two-year period over all our stations around New South Wales and we line them up. We then group them into ten groups. If we had 100 data elements, the lowest ten would fit into the first decile or the lowest 10% of records. The highest ten would fit into that top decile. On this map here you will see a number of colours. Along the scale we have the dark red, being the lowest ever record on record. I might get you to go up again. As we go through into the pink, we have very much below average, and going through up into the blue, the highest on record.

In this two-year period 2001/2002, we see a large area of what we call decile 1 or rainfall in the lowest 10% of all records. That 10% or decile 1 value is approaching into the western edge of Canberra, indicating that that rainfall in that area was in the lowest 10% of all records, with a number of portions over the north-west of New South Wales actually receiving their lowest rainfall on record for that period.

As we go into the actual year 2002, the January to December period, we see the area of 10% or very dry conditions, very much below average conditions, still extending over much of New South Wales. The ACT itself is actually in the lowest 20% to 30% of record, but still defined as what we define as below average rainfall. I might add that these charts are produced by our National Climate Centre in Melbourne. They're not actually produced by myself.

Coming to shorter time frames, the six-month rainfall between July and December 2002, again much of New South Wales in the lowest 10% on record. And the lowest on record we're seeing over the South Coast of New South Wales, and looking up towards the Illawarra area in the Southern Highlands, also receiving the lowest rainfall recordings on record for that six-month period. Canberra itself again, or the ACT itself, again within that 10% record - lowest 10% on record.

Moving into the three-month rainfall, October to December, very much the shorter term, we see lowest-on-record totals in a strip over central western New South Wales, extending from near Hungerford and Bourke towards the Wagga Wagga/Albury area. And again most of the state actually still, or at least half the state, still receive rainfall in its lowest 10% on record. So an extended period of dry conditions leading up to this event.

One other way to look at the rainfall is via what we call accumulated rainfall. There are two lines on this screen - one is a dotted line called the median or middle value. We would expect this value to be exceeded on 50% of the time, and the rainfall would be less than this value on 50% of the time.

Just explaining what the median is, the red line is the value between March of 2002 and

January of 2003. What we mean by accumulated rainfall is that if we concentrate on the dotted line, the blue line, the median, in March we would typically expect about 40 millimetres of rain during that month. We add to that what we would normally expect in April, May, June. So gradually, as we accumulate rainfall throughout the year, on any normal year, we should have accumulated - by the time we get from March or January, we should be around something about 450 millimetres of rain.

Now, looking at what actually happened during this period, we had a red line here being the actual totals, which followed the median or relatively normal conditions for that early part in the year between March and June. The period between June and August, where those two lines started to go apart, indicated below average rainfall, less than average rainfall during that period.

We jumped back up during September with some rainfall that fell during the month of September that picked up the accumulated rainfall, but from September onwards, we see those two lines actually diverge again and in fact by January we're sitting about 270 millimetres accumulated rainfall and the actual average was somewhere around 470. So very much below average in that respect.

There was a lot of talk as to how this particular drought that Australia had been experiencing or long-term area time of rainfall deficiency, how this compared to previous droughts. The National Climate Centre in Melbourne looked at all 10-month periods within Australia - all 10-month periods over a period - excuse me, I'll just get some water. They looked at all the 10-month periods and found out the per cent of Australia in this column that was actually below the 10th percentile, how much of the aerial extent of Australia that

records. Ranked number one there is the so-called federation drought, the period between November 1901 and August 1902 when 61.2% of the country actually had rainfall in the lowest 10% on record.

March 2002 to December 2002 actually ranked second for this 10-month period. We could take any period of say, 11 months, 7 months, depending, but I've just used this to highlight the period leading up to these fires.

You'll see that most of the reports from this top 10 are actually for that federation drought - number 1, number 4, number 5, number 6, number 8 and number 10, all for that 1901 to 1902 period. Two of them are for the period of this recent rainfall deficient time, during 2002 and into early 2003, and there is one here for the 1982/1983 drought, another famous drought in Australia's history.

Another way that we assess or another important factor to look at leading up to a fire season is the maximum temperature anomalies. All we're doing here is comparing the average maximum temperature in a particular month or during a particular period with what we would normally expect the maximum temperatures to be. So for the period October to December 2002, the area over the south-east of New South Wales, around the ACT, had an average maximum temperature some 2 to 3 degrees above average. This is what I would term a large number, considering that for that three-month period, more than 80 or 90 days, on average we've had two to three degrees above what they would normally expect in that part of the world. I can split it up now into individual months. We can go into October, where over the ACT area, some 2 degrees above average for that month, their maximum temperature.

Moving through to November, a massive increase in that maximum temperature anomaly. Canberra

itself, Canberra Airport, was some five degrees above on average each day, five degrees above the maximum temperature.

Moving into December, when you compare it to November, it looks like things have backed off, and it's true that they are less anomalously warm. But in December, over the ACT, there was still some two degrees above average maximum temperature. Moving into January, continuing warm conditions with two to three degrees, so that's above the normal maximum temperature, so an extended period of warm conditions, coupled with extended periods of unusually dry conditions.

I already have mentioned the Keetch-Byram drought index and explained it. But essentially to recap, it's the method by which fire agencies have asked that the fuel state be assessed and incorporated into our fire danger meters. I'm holding up here a fire danger meter, which I'll show in one of my slides. That has been supplied by the fire agencies, and from what I understand the way it is used, from that they can ascertain between a drought - the fuel state and certain weather elements, a fire danger.

I'll go into this again, at least the weather inputs into this, but the Keetch-Byram drought index is the way by which using this wheel that we assess the fuel state. It incorporates maximum temperature on every day as well as the rainfall to 9am on that day, so it compares the maximum temperature and the rainfall to produce a figure which indicates the theoretical amount of rain required to bring the soil to saturation.

This graph here shows along this axis at the bottom, April 2002 through to January 2003, and the KBDI, or the Keetch-Byram Drought Index, along the left-hand axis. The blue dots are the monthly median Keetch-Byram Drought Index,

based on the years of record that we have for Canberra Airport, showing generally a rising Keetch-Byram Drought Index during our warmer months, through into December and January, and a minimum in the Keetch-Byram Drought Index during the middle of the year.

What I have plotted along the top of that in red is the actual daily Keetch-Byram Drought Index for 2002/2003, and you can see with the rainfall here, during September, this index goes up and down with rainfall and temperature. On each day it will rise with temperature, but as we get rainfall, that index can drop.

With rainfall in September, it actually dropped down to a low value of zero, but those warm and dry conditions through October, November, December and January, we see this index rise very rapidly, and seemingly far more rapidly than the normal value you would normally expect.

The forest fire danger index I had discussed a little earlier. It's the way by which the fire agencies have asked the bureau to assess the degree of flammability or the difficulty of suppression or wild fires and, from our input into this, simply the weather conditions. We're forecasting the weather conditions that go into forest fire danger index. It incorporates the fuel state, it incorporates the temperature, the relative humidity and wind speed. It doesn't directly incorporate the Keetch-Byram Drought Index, but it uses another factor known as the drought factor, which is calculated using the Keetch-Byram Drought Index.

This is just a scanned-in version of the meter I was holding up. So depending on the different wheels that are used by a fire agency, from that they can assess down here using the drought conditions or the fuel safe conditions and on to that relative humidity, temperature, wind speed, and lining up those

meters can produce a fire danger rating.

From the Bureau of Meteorology's point of view, we're forecasting such things as relative humidity, air temperature and wind speed, and using automatic computer programs, producing fire danger ratings for the fire agencies on a daily basis.

It's a good moment to point out that the wind speed we use here is in kilometres per hour and is actually the 10-minute average. There is some variability around a mean speed. We input a 10-minute average wind speed into that and local gusts and lulls can be much greater and less than the average wind speed. So it's over a 10-minute period that we are trying to forecast the wind as well as sample the wind using our automatic weather stations.

The reason I went into the forest fire danger rating - I went back and compared for each season the number of days at Canberra Airport, which is one of the official bureau recording sights within the ACT, the number of days that the forest fire danger rating reached the extreme level. On an index of 0 to 100, 50 is the extreme level, so we can see each season here in '94/'95, there were two days where extreme fire danger was measured. And as we go through the years, a number of years, '95/'96 and the years leading up to 2002/2003, there were none from our Canberra Airport meteorological station - no observations that reached extreme.

But some years, such as 1997/1998, we see 10 days there where the fire danger reached extreme and this recent season in 2002/2003, nine days where we reached extreme. This is at Canberra Airport.

I'd like now to go on to the meteorological conditions between 8 and 18 January. Most of the analysis that we did was based on a

Canberra Airport meteorological - automatic weather station. Now, in trying to ascertain the weather conditions near where the fires were burning, it is very difficult for us to know exactly what was happening, and we can't know for certain what was happening but we have to make do with the closest observations that we do have, and that being Canberra Airport. Another observation site that we do have is at Tuggeranong, and another observation to the south-west at Cabrumurra.

Just giving you an idea on this map of the automatic weather stations that are available around the ACT, we can see Canberra Airport in the north there, Tuggeranong a little bit further south from there, Wagga Wagga is the first station to the west of the ACT, due west of the ACT, and then we have Cabrumurra down here to the south-west of the ACT, which at times I have used in my assessment to try to understand what was happening at higher elevations to the west. It's important to remember when we are analysing meteorological conditions that the wind speed and direction can vary with height as we step up in the atmosphere from Canberra Airport, which is somewhere at around 580 metres above sea level, up to the mountain ranges to the west, which might be up towards 1,200 to 1,400 metres. We can see marked changes in wind speed, wind direction and as well as temperature. The temperature conditions generally tend to drop off somewhere between 0.8 to 1 degree for every 100 metres you go up in elevation, as a general rule, during the day.

The way I have structured this presentation is to show a weather map on each day. On most days it would be the 11am - 10am to 11am weather map on each of these days and just a general summary, a broad summary, of the weather conditions that were experienced either at Canberra Airport, with some inferences for what might have been happening further west, as well

as temperature maximum on each day, a relative humidity, which is the measure of moisture in the atmosphere, 100% being a fully saturated atmosphere, and it drops down as the relative humidity drops, hence how dry the atmosphere is, as well as the fire danger maximum. The fire danger maximum doesn't necessarily tell you the conditions that were experienced for the whole afternoon. It just tells you the highest 10-minute period that we reported at Canberra Airport, the highest fire danger, so there is great variation in the fire danger as the afternoon does progress.

So on 8 January we had a frontal system on these maps. For those of you who haven't used weather maps before, we have high pressure systems and low pressure systems, and associated with them these lines with arrows on them are designated cold fronts, dotted lines are troughs or areas of relatively low pressure. So over the south-east of Australia we see a frontal system and a trough system in that area. Now, that system there developed thunderstorms during the morning in fact, and they continued over the south-east and the ACT area with associated lightning. Generally the winds on 8 January were averaging 30 to 40 kilometres per hour.

Now, the wind gusts on top of that could have been much higher. Generally over smooth surfaces we think that gust factor would be somewhere in the order of 40% higher at times, whereas over land we may see wind gusts even greater than that, sometimes 50, 60, 70% higher than those average wind speeds, but remembering that the input into the fire danger meters are the 10-minute average wind speed. There was an easterly wind change over the Canberra area at about 7pm that moved through the ACT. This will become a fairly common occurrence over the ensuing 10 days that the easterly or south-easterly or north-easterly wind surge moves through the average. Maximum temperature

34 degrees on this day, relative humidity minimum of 13 and the fire danger maximum reached 52 extreme.

This map here is the satellite picture. The satellite sits many, many thousands of kilometres above the earth. It looks down and takes a photo at a certain time - in this case somewhere near 2pm on 8 January. Explaining what the individual - what we see in green, the different place names, the magenta outline is state borders and territory borders, and these white fluffy clouds, I call them white fluffy clouds, are large convective type thunderstorm clouds that we associate on satellite images with shower and thunderstorm activity.

I want to step through two hours and just watching this area of cloud mass down towards the south-west of the ACT, stepping through, that activity has moved towards the east of the ACT, and although it's not telling us the rainfall out the bottom of these, not telling us any idea of how much lightning there was, it's giving us a feel for what the conditions were like from above.

The forest fire danger index taken at Canberra Airport on 8 January, on this particular slide I split it up just to give you an idea of where each of the gradations within the fire danger index lies, so we have low, moderate, high, very high and extreme. And for much of the afternoon on 8 January, from approximately on this edge of the scale here just prior to midday, we're in the very high fire danger range, and for a very short period it reached 52 extreme, and that coincided with an actual shower, moving across Canberra Airport, associated with showers. Sometimes we had an increase in wind speed and that tipped the fire danger index into the extreme level but for much of the afternoon we were in the high end of the very high fire danger rating.

On 9 January, the winds tended to drop off, the frontal system that was over the south-east of the continent moved further east into the Tasman Sea and the large high pressure system which we generally associate with relatively light winds started to become the dominating factor over the Canberra - over the south-east of New South Wales. I might add, at the end of this I will show you a combination of the weather conditions for the entire period, so it can be compared - so the individual weather conditions can be compared. But generally we had winds that were generally light north-west to south-westerly winds but there was an easterly wind surge in the late afternoon that moved over the area. The temperature maximum was much cooler than the previous day, at 26 degrees. The relative humidity minimum still very dry at 14%, given that the winds were still generally light north-west to south west, blowing off a dry air mass or dry - not much moisture source to the west. The fire danger maximum reached into the very high range.

Coming into 10 January, on the synoptic chart we see the high pressure system moving down towards Bass Strait, between Tasmania and Victoria. Generally light variable winds were reported at Canberra Airport. But likely using the Cabrumurra observation, we suspect there was likely to be a light westerly wind over the higher ground in western parts of the ACT. We can't be certain of that, but based on the conditions and Cabrumurra being at a high elevation of 1,400 metres, we feel that it's likely that there was westerly over the higher ground, and another easterly wind surge moved through the Canberra area mid-afternoon.

Maximum temperature of only 25 degrees, but the relative humidity minimum of 26%. So the relative humidity, the actual minimum isn't as low as it had been on the previous two days, and the fire danger maximum reached 17 high.

Moving through to 11 January, if we look at this high pressure system here, centred over Tasmania, generally as a general rule for the low-level conditions or mean sea level conditions, we expect the winds to be following these ice bars as a general rule anti-clockwise around the high pressure systems and clockwise around the low pressure systems. When the lines are close together it generally infers that the wind speed will be stronger than when the lines are further apart, as in the centre of the high. So the general meteorological regime over the ACT was an easterly - an east to south-easterly winds but quite fresh, 30 to 40 kilometres per hour winds in the afternoon. This was in fact the maximum temperature, 23 degrees Celsius was the lowest maximum in the period. The relative humidity minimum was at 38% and the fire danger maximum was still high, but a value of 15 high.

THE CORONER: Mr Webb, you had a note there on the bottom that said coolest day in period. Is that for that period, the 8th to the 18th?
A. That's right, your Worship. On 12 January, east to south-easterly winds weren't quite as strong as they were on the 11th and generally 20 to 30 kilometres per hour for much of the day. Temperature maximum slightly warmer than the previous day's 23 degrees, it reached 24 Celsius, and the relative humidity minimum started to drop off again to 33%, fire danger maximum at 17 high.

On to the 13th, we see the high pressure system is looking further towards the east and another frontal system moving in to the western part of New South Wales. Generally ahead of these frontal systems at least at elevation we see the wind start to turn around to the north-west, but over the lower elevations around Canberra, south-east to north-easterly winds predominated at a relatively light 15 to 20 kilometres an hour with a north-easterly wind surge at 20 to 25 10-minute average winds

extending through in the early evening.

The wind in the western parts of the ACT may have turned light west-north-west. Certainly at Cabrumurra it suggests the winds did turn to the west-north-west but they were only very light. The temperature maximum on a warming trend of 27 degrees, the relative humidity minimum at 28% and the fire danger maximum at 20 high.

Stepping through to 14 January now, the wind over the ACT became south-west to north-westerly again, so we lost the easterly influence and we were back to albeit light south-west to north-westerly winds of 10 to 15 kilometres per hour in the afternoon, but there was another easterly surge coming in from coastal areas. Sometimes it was in the case of a frontal system moving in from the east. Other times it was in the form of the sea breeze, which sometimes - or at least a front - generated by the sea breeze and made it into the ACT area. The temperature maximum was 29 degrees. The relative humidity minimum 23%, and the fire danger maximum at 21 high.

Over the 15th January, east to north-easterly winds predominated. We had a dominant high sitting over in the Tasman Sea and a broad trough of low pressure to the west of the ACT. East to north-easterly winds 15 to 20 kilometres an hour. They increased, another surge in the afternoon, to 30 kilometres per hour, but the wind in the western part of the ACT is likely to have been a west to north-westerly, up probably to about 20 kilometres per hour but we just don't know for certain exactly what was happening out there, particularly given the vastness of this particular data network. Temperature maximum of 29 degrees again. Relative humidity minimum wasn't quite as low, 29%, given the winds dominating over the area on 15 January.

From now on, 16th, 17th and 18th, we see a gradual deterioration in the meteorological conditions from a fire weather point of view. On 16 January, a north-easterly wind at first but it was replaced by upper level north-westerly winds in the afternoon. The normal course or cycle of winds in an area is generally to be relatively light winds in the morning and as we get heating during the day we get what's called convective mixing. We get bubbles of hot air heated by the land being thrown up into the atmosphere and turbulent mixing, bringing down upper level winds which predominantly in this part of the world are from the north-west. So as the temperature is increasing and the temperature maximum on this day was 33 degrees, the north-westerly wind developed during the day. It reached 20 to 25 kilometres per hour at times in Canberra. And there was another north-easterly wind shift a bit later this time, after 8pm. so the north-easterly wind shifts are generally cooling the temperature down and increasing the humidity levels as they move into the area. Fire danger maximum reached a very high range of 35.

On 17 January, the north-westerly winds increased even further, up to 30 to 35 kilometres per hour during that day. They possibly reached as high as 35 to 45 average winds, at higher areas in the west. I can't be certain, but using the Cabrumurra station, it seems to have picked up to those time speeds and it's quite possible that the higher elevation areas in the western parts of the ACT were affected by those kind of strengths. At Canberra Airport, the temperature maximum of 36 degrees, the relative humidity minimum down to 15%, and the fire danger maximum at 54 extreme.

In a bit more detail, this graph here has two coloured lines on it, one being a blue line indicating the wind direction at Canberra Airport based on 10-minute averages, the red

line being the wind speed. The scale at the bottom runs from midnight in the very early hours of the morning of the 17th through during the day to midnight on the 17th, and the wind speed being in kilometres per hour along the left-hand axis. Generally in the early hours of the morning we had very - I'll start with the red line - fairly light, at 10 kilometres per hour winds, that actually dropped down to calm at different times overnight. But as we see shortly after sunrise, between 6 and 7, some time in that period, I'm not exactly sure when the sunrise was, but as the temperature rises during the day, we get that thermal or convective mixing and we start seeing winds from above the surface brought down to the surface, and it's quite a dramatic increase here between 9am and 11am. We go from the speed of 10 kilometres per hour, quite rapidly reaching 30 to 35 kilometres per hour. But again you can see that there is large variation in the wind speed during the afternoon. At times it reached as high as 40 kilometres per hour for a period, but it was cycling up and down.

There wasn't on this evening here a very distinct north-easterly wind surge that moved across the area. It wasn't a particularly distinct one. It may have made it into the very eastern edges of the ACT but it didn't actually penetrate inland very far.

Another factor that - the reason I've highlighted the wind direction - one of the things that we see at Canberra Airport is some funneling or modification of the wind direction because of the local topography. It is a very common occurrence that Canberra settles down to somewhere between 280 and 300 or 320 degrees from the north-west - that kind of an angle on our compass. I might add, I didn't clarify the wind direction. When we forecast or observed wind direction, it is the direction from which the wind is blowing, so a north-westerly wind

blows from the north-west.

There's not a lot of variation in the wind direction until the wind speed drops off late in the evening and there is much more variation in the wind direction once the wind speeds drop off.

The forest fire danger index - that's that five-tiered scale or forest fire danger rating. The red line here is marking the 50 extreme level. This was very low, down in the overnight period, cooler temperatures, and not as much wind speed and humidity levels up. But as we see here, during the day, this forest fire danger index rises, and for a number of short periods during the afternoon, it reached into the extreme level - not for the entire afternoon but at Canberra Airport at least for a number of short periods during the afternoon it reached into the extreme level. It was still in the higher range at midnight at the end of the day on the 17th.

On the 18th of January, another frontal system approached and a trough system was situated over western parts of New South Wales. The north-westerly winds increased early by about 9 o'clock, I believe, to 30 kilometres per hour. It increased further after midday to be 30 to 35 kilometres per hour average at Canberra Airport, and they became very erratic in speed during the afternoon. Temperature maximum reached 37 degrees. The relative humidity minimum reached to a level of 4% late in the afternoon. The fire danger maximum here calculated from our automatic system of 104 extreme, but remembering the actual metre is supposed to be a scale from 0 to 100.

That wind speed up on 18 January at Canberra Airport, relatively light, sitting around the low 10 kilometres per hour in the early hours of the morning with a couple of spikes, one spike at least, that jumped above 10 kilometres

per hour before 4am. The wind speed dropped off to calm very briefly, for only a short period, and then rose quite quickly. You can see, as I mentioned earlier, at about 9 o'clock we were sitting around 30 kilometres per hour. From about here at midday, we see another increase in the wind speed up to a point of just after 2pm. It's after this time that you can see that the wind speed at Canberra Airport becomes quite erratic, it becomes very erratic in nature, including its peak. It reached a maximum of somewhere near 50 kilometres an hour for a short time, but a short time later the lull was around about 30 kilometres per hour. So there is a great variation in the wind speed. I might say these are based on 10-minute average wind speeds too. So there is even variability in that 10-minute average.

Another point to note is the drop-off in wind speed after 6pm to a relatively low, somewhere near 13 to 14 kilometres per hour, before it briefly rose again. That rise is the development of an easterly wind change that moved over the ACT that evening, developed in the area, and you can see the winds - as the temperature cools, we start to lose the effect of that upper level mixing of the wind, but another feature came through that increased the wind speed again, which was the easterly change.

We can look at the forest fire danger index, as I have on other days between 11am and 9pm on the 18th January, and it's reached into the extreme level just after 12 o'clock in the afternoon and continued in that extreme level until somewhere between 6 and 7pm. So for much of the afternoon, the forest fire danger index was in the extreme level, but you can see that there is still some quite large variability in that forest fire danger index. It's not a matter of saying it was a certain value for the entire afternoon. You can see this brief period here at around 1530 of the forest fire

danger index jumping up to 104, based on 10-minute average winds.

Again, there's four lines on this chart. The dotted lines are just place holders that give you an idea of where the 40 degree temperature line might be and the 10% relative humidity line might be. Starting off with the temperature, which is the red line, on 18 January we have a scale again at the bottom which is time, and the temperature and degrees Celsius up the left-hand scale. The red line, you can see for much of the early hours of the morning, the temperature in Canberra was sitting in the low 20s, low to mid-20s in fact. For a brief period where that spike in wind speed I pointed out a number of slides ago happened, the temperature actually shot back up to 28 degrees Celsius, and then it dropped down to a minimum somewhere in the low 20s. Once the sun comes up, we see a gradual rise up until the maximum of somewhere near 37 degrees Celsius just after lunchtime.

Typically our maximum temperature would be later in the afternoon, but we believe that this particular maximum occurred at 12 o'clock due to the fact that the sheer amount of smoke blocking out a lot of the solar or the sun's rays, not allowing the temperature to rise any further, and in fact it dropped off gradually through into the late afternoon and we can see a more rapid drop once that easterly change comes through.

That was the temperature. Looking at the relative humidity, it was a relatively low value overnight. By midnight we were still down at 28% and when we look at this night, compared to some of the previous nights when we compare it over the entire week, or 10 days, you'll see the difference between this night and how that compares to what might normally happen. But the maximum reached just before sunrise, or near sunrise, was somewhere near

45%, but then a rapid drop-off during the morning, and actually by early afternoon, we'd dropped in relative humidity below 10%. This blue line here, an extremely low value, and it maintained those very low values for a long period, right through until the change came through between somewhere near the 7 o'clock mark.

You'll see that there is a further drop after 4 o'clock, a further drop in the relative humidity. It's unclear exactly what caused that. There seems to be a movement of a very dry air mass from western New South Wales that progressively moved east during the day and moved over the ACT area during the afternoon, and this is quite possibly what caused this particularly low relative humidity. That movement of that air mass in the form of what's likely to be some form of a wind change or trough moving over the area, may have had some impacts a little bit later as far as the development of the plumes that I'll show you on our radar.

The other thing we had done was plotted up the forest fire danger index.

THE CORONER: Excuse me, Mr Webb, we might have to have a short break. I think the recording system has developed a bit of a difficulty. We'll just take a short break.

ADJOURNED [12.30pm]

RESUMED

MR LASRY: Before Mr Webb continues, can I just raise one matter. We issued a subpoena to those in charge of the documentation for the McLeod inquiry and, in particular, what we sought were all the submissions that were made to Mr McLeod's inquiry. I gather that the subpoenas were returned today and there should be a copy of the subpoena on the court's

record. I gather the documents have now been produced and I gather they're somewhere downstairs. I wonder if your Worship would order that, in so far as the documents have been produced pursuant to the subpoena, that they be released to us and then we'll make the appropriate arrangements to distribute them to the parties.

THE CORONER: Yes, certainly. If the documents have been produced - and I'm sure they have been - you can certainly have access to them and make them available.

MR LASRY: Thank you, your Worship.

THE CORONER: I apologise, Mr Webb, for that. I hope we didn't miss too much of what you were saying, but perhaps if you might just repeat just prior to the adjournment, if you would be kind enough to repeat that information.
A. I might ask you to go back one slide. I had been talking about the change in the temperature and relative humidity over the Canberra Airport area on the 18th and the next slide, as we move into the following slide, this particular slide shows us the change in forest fire danger index between 8 January and out to 24 January.

We can see that high or the extreme fire danger reached for a brief time on the 8th and then there's what I'll call the diurnal cycle, or the cycle of the change in the fire danger index between day and night. We had our peaks during the day when the temperature is normally warmer and the relative humidity lower and generally our wind speeds are higher at that time. So we see the peak day on 8 January, dropping down overnight on the 9th, rising again during the day on the 9th to a point near or just below 30, and then a period between 10 January moving through until about the 15th of what would be - what you could class as relatively benign at Canberra Airport, relative

compared to the peaks at either end.

From 16 January onwards, we see this rise in forest fire danger index, reaching that maximum here on 18 January. An interesting point to note in this is the forest fire danger index. The night before the main impact on 8 January, we can see a much higher minimum, the actual amount the forest fire danger index dropped off overnight was less. It dropped off to a low value. Even in the middle of that night we see a brief peak in the early hours of the morning that coincided with that brief spike in wind, and that suggests to me that the actual cool layer of air associated with this diurnal trend was actually very shallow and, in fact, it may not have been representative of the conditions experienced out at the higher elevations to the west of the ACT, but we can't know that for certain.

This is the extended period or the entire period maximum - the temperature, the actual temperature read on 10-minute intervals starting off with a high maximum here on 8 January and then a much lower maximum on the 9th, 10th, 11th and 12th and then this general warming trend out until the 17th and 18th, which were relatively warm days, but again that minimum temperature overnight, this period here, indicating the midnight between the 17th and 18th. Those temperatures did not drop down as much in the night preceding the main fire outbreak on the 18th.

Relative humidity will show the opposite - generally the opposite diurnal trend where the maximum temperature occurs generally during the day. The maximum relative humidity will generally occur overnight, so we have here a very dry condition or low relative humidity, low moisture, on 8 January, rising up overnight briefly reaching almost 70, but for much of the night sat somewhere near 60%, and then this zig-zag or this change between day and night.

I'll move through until the 17th and 18th again. A gradual drop in the minimum relative humidity, but overnight between the 17th and the 18th that relative humidity did not rise as much as you would expect would have occurred on other nights.

Just recapping on the meteorological conditions on 18 January, it's impossible for us to ascertain the exact conditions over the fire grounds. I've said that a number of times because we are using the usual data from Canberra Airport to look at the conditions, and we're using them as being representative but we can't be certain. There were some fire tower observations that we subsequently received in the month following the fires that suggest wind gusts very stronger than those measured at Canberra Airport. The nature of the exposure of those observations is unknown to us. The quality of the instrumentation or the calibration of the instrumentation is unknown to us and we don't know how good they are, but it's important to note that it is quite possible that the winds were in fact stronger than those measured at Canberra Airport.

The local weather conditions - this last point here, the local weather conditions around topography or around western ACT could have been affected by such things as the topography. Local valleys and local hills can greatly alter the local weather conditions experienced at any one particular point. But, importantly, the fire itself can produce changes in the local weather conditions. Certainly from my point of view, it's not something that we know exactly the effect the fire would have, but we can infer some things from some of the observations that we saw.

This was just a summary slide of the first point at least of how the terrain can influence the fire. It can affect - it really can funnel

the wind direction and cause increased wind speed. But fire-induced effects are very difficult to get a handle on. Large fires can cause a large heat source, can cause huge amounts of vertical motion, air going up, ascending air above the fire and, hence, where we get lots of air going up, we can get air coming down in the vicinity of that and very turbulent motion and very, very erratic wind conditions near the fire, and in fact down the wind of the fire.

Large plumes of cloud can form above the fire, known as pyrocumulonimbus. Every now and again you can get plumes on top of fires that can get to the stage where we are getting thunder and lightning and pyrocumulonimbus clouds. There is enough charged separation developed from the ice crystals on the top of the cloud, given that it is well above the freezing level by the time the top of the plume - in some cases by the time you get to the top of the plume.

I make a comment here that we can enhance winds downstream of a large fire mass, we can cause very erratic conditions in the winds downstream. It enhances the amount of turbulent mixing in the lead of that particular fire.

When I talk about convective plume, this is the kind of thing I'm talking about, the photo that was made available to us via the National Parks and Wildlife Service at Tumut, I believe, believed to be approximately 2pm. A large area of smoke, here you can see in the lower levels, but the lighter white cloud at the top indicates that there is moisture or condensation taking place and we actually have cloud formation above that particular plume.

Another example is a photo taken over the ACT. I don't know exactly where this was taken, but this was 18 January - 1546 is the time stamp on the photograph - but this large area of smoke

in the lower elevation areas and lighter white cloud aloft, and for me, I mentioned earlier on specialising in fire weather and severe thunderstorm meteorology, this is the kind of thing where we're looking at photos of severe thunderstorms and photos of thunderstorms, this is the kind of feature that we would be seeing in many of those thunderstorm shots. There have been some anecdotal reports of lightning or thunder at least heard from this particular plume.

What I might ask you to do is flick to the radar loop. To explain the radar, on about or just after 20 December, 22 December 2002, a new weather watch radar was installed to the east of the ACT, near Captains Flat. Now, the radar works by sending out a beam of energy and listening to reflected energy coming back. It has a dish which reads reflected energy coming back. And one thing that we found during the recent fire event was that it does pick up smoke plumes and degrees within smoke plumes and may provide a useful idea of the conditions that were experienced in the shape of the smoke plume.

This particular image is a three-dimensional radar image constructed from our radar data. The radar doesn't just look at one level. Those of you who may be familiar with the Bureau of Meteorology's website it has base scan radar data. That produces a volumetric scan. It gives us an idea of the low-level scans and scans at the top of the atmosphere as well.

I'll just play that through to start with and then step. The loop starts - early on in the loop is about 11am. Towards the east is the radar, that little cavernous hole there is - because the radar can't look up, it doesn't look straight up, it has a finite maximum angle which is about 32 degrees. The green colour is indicative of relatively low elevations or low

altitude returns and, as we get higher and higher, it goes through shades of yellow into shades of brown.

The map down the bottom here is the southern tip of the ACT and the northern parts of the ACT extending further, obscured by the actual plume. But we can see this variation in the actual height of the plume. It's not a matter of a convective plume developing on top of a fire for the whole afternoon. It seems based on this that the plumes certainly weren't there at a huge height for long periods. What I might do is stop that and start again. Just step through one or two.

This 250 UTC - universal time coordinate or Greenwich Mean Time - is the time stamp on most of our information. That is equivalent to 1.50pm or thereabouts. It takes about approximately six to seven minutes, or thereabouts, for the radar to go from its base standard to the top, after it's rotating around and stepping up scans. And it was at 1.50pm we see an increase in a plume over the western parts of the ACT. I might get you to do the clicking through there, you might be faster for everybody.

So that's a 2pm image and we see a large plume here, picked up by the radar. I might just ask you to flip back to the last Powerpoint slide, and go back up one slide. This photo is actually at 2pm - we're not certain of the time of this photo, but it may well be a similar plume that we are looking at at this point.

I'll just ask you to flip back to the radar again and just step you through. We can see that that plume went up and it actually affected - there were upper level westerly winds and it was pushed towards the east, but towards the west now we'll see over the next, if you click through about three scans, further development over that spot. We're now at about

3.10pm, and there's a plume that has begun to develop over the northern - further north in the ACT, and just step through again and again and again, and that plume starts to develop. I'll show another depiction of what the radar was seeing in a moment, and just step through again, and this conglomeration.

We're now at about 4pm in the afternoon and the plume starts spreading out mainly over the northern parts of the ACT. I'll just get you to play that again. We'll just play that through a couple of times so you can appreciate it. That's just another depiction that in 10-minute intervals we can get a view of the overall picture of what the radar was seeing. It's just picking up the amount of reflected energy back, it looks out and returns what it sees.

We might go back through to the presentation again. This is a view from NASA showing at about 2.30pm the activity - just another view of what convective plumes may look like from a satellite. This is a particularly high resolution picture, and Burrinjuck Dam here, Jervis Bay over towards the eastern parts and the ACT area underneath this area of large fluffy plume-type phenomena.

In this case, the images I show you over the next few slides are actually where I've taken a slide somewhere at the 10 to 11 kilometre area in the atmosphere, so we're looking at about 10 or 11 kilometres high and taking a horizontal slice through the atmosphere.

We can see the ACT there on the map and certain locations marked - Canberra Airport to the north, Tuggeranong, Tidbinbilla and Corin Dam. And, at about 2.53pm, this is about the time when the radar was getting to that scan. When it took this scan, we see two areas of high reflectivity, reflectivity going from the dark blue colours and black colours where it's not

getting any reflection through the lighter blues and into yellows when we're getting heavier or more reflectivity.

There are a number of large scales on top of this one. When we're talking about large severe thunderstorms, we go right through into reds and pinks, indicating very heavy rainfall, and that's typically what we are using radars for. We use radars to track showers and thunderstorms and provide the severe thunderstorm warning service. It's not something as a rule that we use to track fires, but they do give us some insight into the conditions and at least the behaviour of the plumes on the day.

2.53pm - let's step through each slide. By 3.03pm there's a little plume has developed just to the west of Canberra Airport. This is at 10 or 11 kilometres high. There was a lot of smoke activity and activity below this level leading up to this, but I was trying to capture the very - the peak in the plume activity. We still have two large plumes, one over the southern areas, the central areas, and one starting to develop, at least briefly, at just after 3pm to the west of Canberra Airport. That actual plume has dropped off a little bit. It's not something that - once the plume is there it doesn't necessarily stay there for the entire afternoon, as I mentioned. They are quite transient. We can see this particular central one being the dominant one in this case, but out further north, we're starting to see activity develop at the 10 and 11 kilometre high level, high mark.

10 minutes later, that area has increased, so we're now at 3.23pm. 3.33pm, this area of reflectivity, whether it be smoke or precipitation, has increased in area quite dramatically over that period. Stepping through there, 3.43, 3.53, 4.03, and another one, dissipating the actual upper level plume

dissipated and being invected to the east by later on. Can I ask you to go back to the start of that sequence again please.

I'll just go through that one more time - the quite incredible explosion, what I can only call an explosion of activity, at elevation. Very rapid development over an area of these ranges here are approximately 25 kilometres apart so it's a massive area aloft - above this northern part of the ACT. What caused that - there's too many variables that are non-meteorological for me to even come up with an answer.

From a meteorological point of view, some things that may have had an effect on this would have been a drop in the relative humidity or very dry conditions moving through the ACT, that subsequent drop that occurred in Canberra - but we certainly don't know that for certain, and there may have been quite a subtle wind change move through that could have affected things.

When we're forecasting thunderstorms, for instance, we're looking for areas where the thunderstorm is more likely to occur, areas of vertical motion favoured in the atmosphere, and it may have been in this case the passage of a trough, a trough that we saw early on in the piece and on the mean sea level chart, may have moved through the area at about this time with associated vertical motion that could have assisted the plume to develop. Again, we're not sure for certain that the actual wind change wasn't picked up on any of our network and it may well have been subtle. It might have been something moving from a north-westerly wind around to a westerly wind or the actual change in direction being quite subtle. But again, given our automatic weather station network, it's tough to know that for certain. What we can see with the radar is that something has increased that activity.

MR LASRY: Your Worship, I perhaps interrupt Mr Webb at this stage. Would that be a convenient time.

THE CORONER: Yes, if that's a natural place to have a break, we'll take the luncheon adjournment. We'll resume at 2 o'clock.

ADJOURNED [1.30pm]

RESUMED [2:00pm]

MR LASRY: We recall Mr Webb, your Worship.

THE CORONER: You're still under the oath that you took this morning, Mr Webb.

THE WITNESS: Good afternoon. Prior to the lunch break, I had been showing you the radar returns at about the 10- or 11-kilometre high mark over the ACT during the afternoon of 18 January. I might just ask that you step through that. By 4.13pm - just before 3, we saw this explosion in the activity and then it gradually dissipates after 4 o'clock and moves on towards the east.

This chart here is another graph I've plotted up where I took the highest point in the smoke plume of the fires west of Canberra. I haven't looked further south, at the rapid change in the height of the fires to the south. It would have made the graph a bit too complicated. I wanted to concentrate on the area just to the west of Canberra, if I could.

At 11am in the morning - these are at each 10 minutes. At 11am in the morning, the general height of the smoke plumes to the west of Canberra was about 4,000 metres, 4 kilometres high. There are a number of gaps here where the radar clouds - we did a volumetric scan, so we didn't have that information.

You can see here after about midday, 12 o'clock, a gradual increase in the height of that smoke plume, up to about six kilometres high, right through until approximately between 2 and 2.20pm. Then we see another rapid increase in the rise of the smoke plume, where in fact by 3pm, here we're reaching 10 kilometres high, and by between 3 and 4, the maximum smoke plume height was just below 14,000 metres high. This is the area of the development of the convective plume just to the west of Canberra over that area in the ACT.

To finish with, I'd like to discuss the intense wind behaviour that was observed in different parts of the ACT as a result of these large fires. There were some areas, from what I've told, that were damaged not by the fire but by purely wind damage, particularly in the suburb of Chapman - around Chapman and Kambah. One of our meteorologists went out in the days following this event and did a damage survey. Most of the time, our damage surveys are actually done to tell the difference within a severe thunderstorm event, whether it was caused by what we term as downbursts or straight line winds, or rotation associated with a tornado, and the different techniques we use to ascertain that depends on the way the debris is scattered.

So these kind of intense local winds in this case may have been caused by downbursts or the intense local vortices, which commonly we refer to as tornadoes.

In the case of downbursts, and in fact thunderstorms for that matter, once we get precipitation within a convective plume, that precipitation or rain or ice crystals, whatever it may be, when it evaporates, as it falls it can cool a layer of air around where that evaporation has taken place. That cool layer of air becomes relatively dense. We think of the basic premise that warm air is rising and

cool air is sinking. Cool air sinks, it can hit the ground and spread out radially in all directions.

When we're trying to decide whether it's one of these downbursts that causes damage, generally because it's spreading out radially, most of the debris and most of the damage is laid out in the one direction. Most of the damage in the case of trees are laid out in the one direction - not always, but that's a general rule that we use.

The intense local vortices, or tornadoes, there are a number of ways in which these can form and be intensified. Local rotation, or just rotation of an air mass, can be adduced by erratic motion near the fire. We think of the very strong updrafts and vertical motion around the fire, lots of hot air, air rising, and there's a lot of turbulent motion, so you can get at times this very erratic motion and local rotation that can form local fire balls.

There's local terrain effects. The lead effect of slopes as air flows over a slope or around a mountain - you can get different kinds of lead effects that do occur around terrain. There's another thing that can adduce rotation: the deeper characteristics of the wind profile. When I say the deeper characteristics of the wind profile, I mean the changing wind with height. We may have strong winds above the atmosphere relatively or weaker winds below the atmosphere so we end up with a discontinuity, or what we call wind sheer, changes in wind with height. That kind of wind sheer can be tipped from a vertical wind sheer to the horizontal and can cause rotation.

Now, when we look at the damage, this was actually reproduced by one of the forecasters at the time in the Canberra Meteorological Office around Lincoln Close. If you can see, there's a number of different symbols on it.

There's arrows, there's red squares and there are black dots. The arrows are indicating fallen trees and the direction in which they fell. We will generally walk around with a map and, as we come across a bit of fallen debris, we'll mark it on the map in the direction in which it fell. So that way, when we get back and plot them on a reasonable map, we can get a feel for if the debris is actually laid over in the one direction. From here you can see quite erratic behaviour in the way that that debris - the trees were laid down. It isn't particularly uniform - most of them pointing towards the north in that area and pointing towards the south in that area, so there is a little bit of variation in that damaged part.

Coupled with that, there are apparently, from what we gather, a few eyewitness reports of this rotation or this rotating column of smoke in the area, and what we've already done is gone back and looked at the low level radar data to see whether we could actually see anything, and over the next - sorry, just go back up one. This was some of the damage, and these photos were taken by James Caust at the Bureau of Meteorology, but trees were either snapped off and, in some cases, uprooted by the force of the wind.

The next thing I did was have a look at the low level radar scan to see whether I could see any hint of it. It's a bit of a long shot to be able to see this kind of information, given how much smoke was actually occurring and particularly in the low levels around Canberra because of the topography. We tend to have a few gaps in our radar data. But, as I step through these, we have Tidbinbilla here, Tuggeranong here and Canberra Airport here at 3.40pm. We'll just step through this one.

The area to keep your eye on is just this part of the world here. As we get to 3.50pm and 4pm, we actually see quite subtly a little area

of what is termed high reflectivity, or high radar returns. As I step through one more, that area of intense reflectivity gives us a position of something that's giving high reflectivity returns. Most of this is actually smoke. It's smoke particles, at least ash and the like, but there's something here moving relatively uniformly that tracks down towards the east. Could I just ask you to go back up two slides.

So, as I step through again, I have this area here spawned from high reflectivity and, hence, what we can infer from that is that the radar is getting better returns from this area. As I step through, we see that extend down towards the south-east.

Now, based on the timing that our discussions with people and the time that this vortex is supposed to have impacted on suburbs, it's quite possible that this actual feature here is what we're seeing, the debris picked up by the vortex, additional debris, larger debris, giving bigger radar returns. But it just allows us to place some times on it and speed of motion of this thing.

That is the end of the slide show that I had prepared. I hope it's given you a reasonable overview of what we were just talking about.

MR LASRY: I just want to ask you a couple of questions arising out of some earlier things that you said, and in particular as you were explaining the records suggesting the very low rainfall and very high temperature. That information, of course, drought information, is being accumulated day by day, as records evolve. But is there a means or a formal means by which the fact that, for example, we're heading for the lowest rainfall or for a series of above average temperatures is conveyed to those authorities who are affected by it? I mean, is what we are seeing the summary of

information that was disseminated as it was occurring?
A. The information regarding actually how the rainfall compares to average, looking back in time, the last six months, the last year, is available on the Bureau of Meteorology's registered user website. We maintain five or six registered user websites for each fire agency in New South Wales. It's available there.

There are also means from during October of last year. We issued a seasonal climate outlook for the fire agencies based on the broader seasonal climate outlook produced by the National Climate Centre. They're the climatological experts. We took their information and gave it a slightly more New South Wales and fire-oriented slant and issued that to each of the fire agencies in New South Wales and the ACT during October.

Q. Right. And is that issue in documentary form, or do you actually give them a briefing --
A. That was issued in the October case - I'll just confirm that that was October. (Pause) Yes, during October 2002 that was issued. There are also mechanisms by which during pre-season meetings we do a seasonal outlook as well as to the possibility of above or below average rainfall.

Q. I take it there's a formal or standing process of liaison between the Bureau of Meteorology and the fire authorities?
A. There are. We have pre-season and post-season meetings with the fire agencies to discuss either possible improvements to the service or any changes that we may make during the season.

Q. All right. Is there any record of the detail of the information that was issued to the fire authorities before the last fire

season?
A. I have a copy that I sent via e-mail here of an outlook that was issued in October of 2002 discussing the coming fire season and the rainfall leading up to the fire season.

Q. Is that amongst the material?
A. No, it's not.

Q. Would you mind just putting that out, thanks. If I could have a look at that.
A. Sure. Attached to the back of it is a covering e-mail that was sent out, I believe.

Q. The e-mail is addressed to a large number of people, and I take it they include people concerned with the New South Wales Rural Fire Service and the ACT Emergency Services Bureau?
A. That's right.

Q. Is that right?
A. Yes.

Q. I'd like to ask you to take this back in a moment and I just want to refer to the summary. The document, which I'll tender in a moment, refers to rainfall and climate outlook temperature and the El Nino, which you suggest looks likely to continue through until at least the end of the year. And, in the summary, the document says:

> This outlook presents a serious situation within New South Wales, particularly given the current severe rainfall deficiencies in many parts. The continued severity of the coming fire season will depend on the individual systems that pass over New South Wales and continued vigilance will be required.

That was the view of the bureau as at October of 2002; is that right?
A. That's right.

Q. And is it right to say that the serious situation - depending on the individual systems that pass over, the serious situation was not ameliorated by the systems that passed over, but in fact was made worse?
A. That's right. When we say the systems moving over, we mean a bout of westerly continued or enhanced westerly winds, which in some seasons with the same dry conditions may not happen, but with the westerly winds it's possible.

MR LASRY: Your Worship, this is the first time I've seen this document, so I'll just tender it in the more usual manner, your Worship. Your Worship may wish to have a look at it. We'll arrange for copies to be made.

MR JOHNSON: Yes, if it's possible to have it copied. I certainly have some questions of the witness and I haven't seen that particular document before. I don't think it's annexed to the submission.

MR LASRY: No, it's not.

THE CORONER: It's not very lengthy. We can arrange for some copies to be made available to the parties prior to the cross-examination. I'll mark that document as an exhibit in any event. So how would you describe that? A briefing that the bureau provided in October 2002 to the fire authorities of New South Wales and the ACT?
A. That's right, yes, your Worship. I would say that it's based upon monthly briefings that are issued by the National Climate Centre that come out every month, and they're also available on the bureau's website quarterly.

THE CORONER: So that document will be exhibit 1.

<EXHIBIT #1 DOCUMENT ADMITTED WITHOUT OBJECTION

MR LASRY: Your Worship, just in relation to exhibit numbers, as these documents are tendered we'd anticipate that we put them on to the casebook system so they would probably then be given subsequently a different number so they can be found on the system. If your Worship wouldn't mind treating exhibit 1 as a provisional number, subject to the document going on to the system.

THE CORONER: Certainly.

MR LASRY: Mr Webb, the next thing I want to ask you is this: the forest fire danger rating to which you referred, again do I understand you to be saying that's something which is monitored or calculated from time to time by the bureau as the fire season progresses?
A. That's right. Calculated as well as forecasts of that index prepared for the fire agencies at their request.

Q. And I take it that the forest fire danger rating becomes a part of the routine fire weather forecasts that are issued by the bureau; is that right?
A. Yes, that's right.

Q. And I think probably your slides made that clear enough. Next, your view as at 15 January was pretty clear, that the weather would deteriorate, that is get hotter and drier, and more windy from the north-west or from the west-north-west, on the 16th, 17th and 18th. Am I right about that?
A. The briefing I gave to the New South Wales Rural Fire Service, I had requested a phone hook-up. I rang them on the morning of the 15th and requested a phone hook-up to discuss the deteriorating conditions. We felt that Saturday conditions would deteriorate. There was a gradual warming trend, but we felt on Saturday the winds would pick up and quite possibly there would be some deteriorating

conditions as well, or at least bad conditions into the following week.

Q. And of course by then you knew that you were providing forecasts and outlooks for people who were already confronted with quite substantial fires to the west of Canberra?
A. Yes, we started the forecast service for the fires at least in New South Wales - the fires to the north-west of Canberra during the - the first one we gave was on the 8th of January at the request, in fact, of the ACT Emergency Services Bureau.

Q. And, finally, the other matter I wanted to ask you is you refer to the temperature on the 18th, and I think your evidence in the course of your presentation was that the temperature on that day reached something of the order of 37 point something, which is over 100 degrees in the old measure, and I think you thought that the smoke haze had provided a moderating influence on the temperature. Am I right about that?
A. That's right. There was the general comment from the Canberra forecasters at the time that they were taking off a certain amount of temperature but, because of smoke haze, as far as forecasting maximum temperature, it seems that the smoke over the ACT inhibited the solar radiation.

Q. But, in the absence of the smoke haze, it dissipated for some reason on the Saturday. Am I right in understanding from your evidence that you would have expected the temperature on that day to be significantly higher than 37 degrees?
A. I don't know whether significantly higher. I'm not sure how much higher, but I think it would have been higher. I'm not sure of the actual figure.

MR LASRY: Thank you, Mr Webb. I don't have any further questions.

THE CORONER: Yes, Mr Johnson.

<CROSS-EXAMINATION BY MR JOHNSON

MR JOHNSON: You've given some evidence to the court today, Mr Webb, of the very detailed demonstration of events that occurred over a period of 10 days from 8 to 18 January this year. That's so, isn't it?
A. Yes.

Q. And I think you said that the compilations which had been given on the screen had been done over recent months by the Bureau of Meteorology?
A. The detailed analysis was done in recent months.

Q. And that's a compilation of information which has been obtained from a variety of sources, as you've indicated in the course of your evidence?
A. Yes, it's a variety of sources, particularly in respect to the detailed information.

Q. It's providing a history of the past events by reference to what we now know to have been the actual conditions that existed from day to day. That's so, isn't it?
A. That's right.

Q. And that history of past events has been further supported by photographs showing smoke and indeed the satellite photographs showing other features?
A. That's right.

Q. Now, you don't suggest in any way that the type of detailed information obtained now retrospectively as a matter of history was available in this form to those confronting these fires at the time, do you?
A. No.

Q. Now, you are familiar with the submission made on behalf of the Bureau of Meteorology dated 25 August 2003?
A. I am.

Q. Were you one of the authors of it?
A. Yes, I discussed the meteorological conditions, the --

Q. And so far as one looks to find what the information was that was given contemporaneously in particular to the ACT Emergency Services Bureau in the period up to 18 January, one finds that information reported in this submission; is that so?
A. Much of the information is discussed.

Q. And have you got a copy of this submission with you?
A. I have a copy, yes.

Q. There is attached to the submission a set of appendices, is there not?
A. Yes, there is.

Q. And, starting at page 38, there's an index to the appendices. And just without going into great detail, just to say that the classes of the information which was available at that time, behind appendix A, commencing at page 39, were what's described as operationally issued routine fire weather forecasts; is that right?
A. Yes, actual routine fire weather forecasts, 8 to the 18th.

Q. There is an index at page 3 of the submission which lists the appendices and provides descriptions, and if you could just keep that handy.
A. Okay, sure.

Q. So the first class of material available are the operationally issued routine fire forecasts. The second class at appendix B,

which commences at page 61, the operationally issued fire weather warnings. There are a number of those?
A. Yes.

Q. And then the third class behind appendix C, the operationally issued special fire weather forecasts which commence at page 77?
A. Yes.

Q. And then there is at page 123 what's described as supplementary information from the CMO to the ACT Emergency Services Bureau, sent manually by fax on Saturday, 18th January 2003. Is that so?
A. That's right.

Q. And that was sent at 2.03pm, approximately?
A. According to this document it was sent at 2.03pm.

Q. And then at appendix F, at page 129 and following, there are what are described as CMO briefing notes used in ACT ESB face-to-face briefings from 15 January onwards.
A. Yes, that's on page 129.

Q. Those were notes made by Mr Mason; is that so?
A. I'm not certain exactly who made those notes.

Q. It certainly wasn't you?
A. No.

Q. And you weren't present at those briefings?
A. No.

Q. So in so far as one is looking at the material available to the ACT firefighting agencies at that time, at that time being in the period prior to 18 January, one finds it within those categories of information which

are part of the Bureau of Meteorology's submissions; is that so?
A. Sorry, you might need to repeat that. I'm not sure what you were saying.

Q. Well, in so far as one is looking for the information which was provided by the bureau to the ACT Emergency Services Bureau, in the days leading up to 18 January, it's contained in these schedules I've just taken you to; is that right?
A. Apart from the verbal briefings that were given to the ACT Emergency Services Bureau, which are discussed in the text of the briefing, this outlines - you mentioned that it outlines the notes used in the ACT ESB face-to-face briefings. I don't know exact details of all the briefings that were done from the Canberra Meteorological Office. The forecasters there would be in a better place to comment on that. But the contents of the report also discuss those briefings, but I'm not aware of the individual contents of those briefings.

Q. And they were briefings at which you were not present?
A. No, that's right.

Q. As far as you know, does the submission contain all the weather forecasts in documentary form at least as provided to the ACT Emergency Services Bureau in the period between 8 and 18 January?
A. As far as I know, it contains the specialised fire weather forecasts available to the ACT Emergency Services Bureau from 8th January. There are other forecasts issued by the Canberra Meteorological Office, but I'm not aware of the dispatch list or the total list that the ACT Emergency Services Bureau get and there may be other forecasts that are not specifically related to fire weather that aren't included in this document.

MR JOHNSON: Could I just have a moment, your Worship, to look at this document which has been marked provisionally as exhibit 1. We haven't seen it before.

THE CORONER: Yes, certainly. (Pause)

MR JOHNSON: That's all, thank you, your Worship.

THE WITNESS: Can I say something, your Worship? I may have misled in a little respect. Some of the forecasts within this document were produced from the New South Wales office, some of the special file weather forecasts were produced from New South Wales for the fire to the north-west of Canberra, but the briefing material was related to the ACT Emergency Services Bureau.

MR JOHNSON: At some stage, your Worship, I'd take it that the document which is the submission will be tendered as an exhibit because it isn't actually in evidence at this stage. I'm perhaps asking a question of counsel assisting through your Worship in that respect.

THE CORONER: It might be better to do that sooner.

MR LASRY: Because the document is part of the brief and the brief has been provided electronically, I suspect my learned friend will find in the bottom right-hand corner of his document a number and, rather than confuse the issue with adding more exhibit numbers, as a matter of general practice the number on the front page of the document will be for these purposes also the exhibit number. As it happens, I have in front of me one without the number.

MR JOHNSON: I certainly have a number and I can put it on the record.

MR LASRY: I think I've been told it's the wrong one.

MR JOHNSON: I think there's some question as to what the --

THE CORONER: Which number are you referring to, Mr Johnson?

MR JOHNSON: It's [BOM.AFP.0092.0001] And the document running through to 0144. So it's a document with 144 pages, both submission and annexures. I'm certainly happy if it bears that number as the exhibit because I'm conscious that the numbering of exhibits may become very complicated if there's not a consistent process. So I've got nothing more to say about that. It was only the question of just ensuring it was before your Worship as an exhibit.

THE CORONER: It is before me, thank you. But I think you were also asking, Mr Johnson, whether or not the brief, which means all of these folders, the 10 folders and the electronic version of those 10 folders - were you not asking whether or not that has been officially tendered?

MR JOHNSON: I was just asking as to whether it was going to be treated as tendered. I'd rather assumed that was likely to be the case from my friend's opening this morning because he referred to it from time to time specifically and globally but, if it's understood that it will all be before the court as an exhibit, then those who have leave can at least approach the question of evidence from that point of view, and in this area of course there is substantial factual issues in the documents which need to be looked at in conjunction with the oral evidence of the current witness.

THE CORONER: I think that's certainly the intention, to have that whole brief before the court as an exhibit.

MR JOHNSON: Yes.

THE CORONER: That's so, Mr Lasry, is it?

MR LASRY: Yes, your Worship. If I could formally ask your Worship to adopt the procedure that all the documents in the brief are in evidence and that, for the purpose of recording exhibit numbers, the exhibit number for each separate document will be the exhibit number - will be the number that that document has on the system. That means that, for example, where documents have been referred to in the transcript, I think it's going to be possible to cross reference from the transcript straight to the document. If we have the complication of another intervening exhibit number, it will make it that much more document.

THE CORONER: So, for example, this current exhibit, this exhibit 1, that has been tendered just a few moments ago, that will be renumbered within the system.

MR LASRY: Yes, your Worship, that's so. As it happens, I think it will be necessary for me, from time to time, to announce that exhibit number 1 is now whatever it is, so that we keep the record up-to-date.

THE CORONER: That's fine, thank you. Yes, thank you. Mr Stitt, do you have any questions?

MR STITT: Just a couple.

<CROSS-EXAMINATION BY MR STITT

Mr Webb, the intense local vortices that you gave evidence about, I take it is the condition

that some people have described as the tornado effect; is that right.
A. Yes, that's right.

Q. There is such a thing as the Haines Index, is there not, which provides a scale representing the least to the most unstable wind conditions?
A. That's right.

Q. Are you familiar with the Haines Index?
A. I am familiar with the Haines Index, yes.

Q. You know that that index goes between 2 and 6, with 6 being the most unstable?
A. Yes.

Q. And you know that on the 18th the Haines Index was calculated to be 6?
A. Yes.

Q. So that's the maximum instability of air that can be recorded?
A. Using the Haines Index, that's the top end of the Haines Index.

Q. You also showed us some photographs of damage to property and trees from wind. The anecdotal evidence suggests that that wind may have been as strong as 200 kilometres an hour. Would you disagree with that?
A. The initial assessments we made were upwards - greater than 150 kilometres per hour. But I will add that I did not walk the damage path - the entire damage path. And I have only viewed those photos of those trees.

Q. But it's not unreal to suggest that that local vortice may have been at times between 150 and 200 kilometres per hour?
A. It is possible, but that is only based on the anecdotal evidence that you suggest and people who have done other damage surveys. I have not done it personally so I would not be able to answer it.

Q. So you don't disagree one way or the other?
A. My comment is that I have not walked the path and it certainly is possible that it did occur, but it's not my own professional opinion because I did not see all the damage.

Q. I see. And you know that on the 18th, the forecast winds were expressed to be 15 to 25, with gusts to 40, and possibly isolated gusts to 60 kilometres per hour on the 18th?
A. Which forecast are you referring to there?

Q. Page 36, said to be forecasts for Saturday, 18 January, issued, et cetera.
A. Page 36?

Q. If you look at the schedule, 6.23am, Saturday, 18 January, winds 15 to 25 kilometres per hour during the morning, reaching 30 to 40 gusts, to 60 kilometres per hour. That's the highest that it was forecast to reach. Is that accurate?
A. They are the average winds - that was the highest forecast of the average winds over that area were forecast to reach.

MR STITT: Nothing further.

THE CORONER: Mr Lowe, do you wish to ask any questions?

MR LOWE: No, thank you, your Worship.

THE CORONER: Do you have any re-examination, Mr Lasry?

<RE-EXAMINATION BY MR LASRY

MR LASRY: On that last matter, the forecast on the 18th to which my learned friend referred, I think he referred to the one at 6.23am. That's a forecast of conventional winds given the prevailing weather pattern, I take it.

A. That's right. That's a forecast for the general wind conditions over that particular fire, which at 6.23 was issued from the Sydney regional forecasting centre for the McIntyre's - actually for the McIntyre's Hut fire in that case.

Q. And I take it that the kinds of winds that occurred in the unusual weather event, which was the tornado, which was essentially created by convective forces; am I right about that?
A. Yes.

Q. That was something that as at 6.23am on the Saturday would have been pretty much unforecastable.
A. I would agree with that, that that the forces - we're not sure of the origin of the actual vortex itself, but it's certainly something that - it's something that would be beyond the capability to forecast ahead of time.

Q. My learned friend Mr Johnson sought to draw a distinction between the manner in which the information was presented by you during the course of your presentation of your evidence, and what was actually available at the time. However, what was available at the time, apart from the daily weather forecasts, did include information about rainfall and temperature?
A. Yes, that's right. As far as - I'll just clarify what you mean there, rainfall and temperature --

Q. I mean the history, the preceding history.
A. Yes, that's right.

Q. And indeed that's set out in what is presently exhibit 1, the outlook as from October 2002.
A. That's right. At the end of each month, that is when we get the data for the entire month, so at the time of the fire outbreak, we would not have been able to include January's

rainfall data. The data available would have been the data to the end of December.

Q. Yes, and any other information that was relevant to weather conditions in a fire season which doesn't find its way - if there is any, it doesn't find its way into the routine forecasts is, I think as you've said, available on the bureau's website?
A. Yes, much of the information, as far as the current conditions, temperature, wind speed, at our forecast locations, is available on the bureau's website.

MR LASRY: Thank you, Mr Webb. Your Worship, I'd ask that Mr Webb not yet be excused. We anticipate being in a position tomorrow morning to play to this witness and other witnesses the oral briefings that have been recorded, but we're just not in a position to do that now. So if perhaps Mr Webb could be stood down, I can go on with other evidence and complete him first thing in the morning.

THE CORONER: Thank you, Mr Webb. You can step down. You're not excused though. You may step down for the time being, thank you.

<THE WITNESS WITHDREW

MR LASRY: I call Ian Mason, please.

<MR IAN BRUCE MASON, SWORN

<EXAMINATION-IN-CHIEF BY MR LASRY

MR LASRY: Mr Mason, would you tell your Worship your full name and professional address, please.
A. Ian Bruce Mason, 32 Hensman Street, Latham, ACT.

Q. And are you a meteorologist?
A. Yes, I am.

Q. And in that capacity, you had been I think until 1996 engaged by the Bureau of Meteorology here in Canberra?
A. It's a little more complex than that. I left the Bureau of Meteorology in Canberra in 1989, and between '89 and '96 I worked in the Department of Administrative Services in Canberra.

Q. Right. But in any event, in January of 2003, you were asked to come back to the Bureau of Meteorology I think on a temporary basis; is that correct?
A. Yes, that's correct. I started duty with the Bureau of Meteorology in fact in August 2002.

Q. August of 2002, quite right. And you were acting as the officer in charge --
A. Yes.

Q. -- of the Canberra bureau; is that correct?
A. Yes.

Q. And I think that's called the Canberra Meteorological Office, or CMO; is that correct?
A. Yes.

Q. And in your capacity as the officer in charge, you had both administrative duties, which involved staff and infrastructure and things of that kind, and some operational duties as well; is that correct?
A. Yes, that's correct.

Q. And did you occupy that position during the period that we're interested in, between 8 and 18 January?
A. Yes, I did.

Q. Now, in your operational capacity during that time, was it the case that you, like others, had been called upon to give information to particularly here in Canberra

the Emergency Services Bureau about weather, given that fires were burning and had been burning since 8 January?
A. Yes.

Q. And is it also the case that I think on Tuesday, the 14th or - I think it might have been Tuesday, the 14th to start with, you were requested by Mr Rick McRae from Emergency Services to attend the following morning, Wednesday, the 15th, and provide to the bureau personnel an in-person briefing on the weather conditions and the way it was expected the weather would develop?
A. Yes, that's correct. They were particularly interested in the extended outlooks out to seven days or so in advance.

Q. Now. I wonder whether I might get a copy of the submission of the bureau just so the witness can have the document to look at. I just want to get you a document, Mr Mason. I'll pass this to you. Just testing our new system, your Worship, the document number is [BOM.AFP.0092.0001] and it's the bureau's submission to your Worship, dated 25 August of 2003. We'll take the witness to page 129 of the document, which is also page 0129. It's part of the number. I'll just hand you that. So I'm looking at page 129 of the submission. Now, does your Worship have a copy of that? It is on the screen.

THE CORONER: Yes, thank you.

MR LASRY: First of all, the documents at page 129, 130 and 131 are all in your handwriting; am I right about that?
A. Yes, that's correct.

Q. And going back to page 129, these are briefing notes used by you for the briefing which occurred on 15th January, on the morning of 15 January?
A. Yes.

Q. And as I understand it, they're notes made by you after, as it says at is very bottom, notes from memory made after the briefing?
A. Yes, that's correct.

Q. But they're notes which enable you to recall what you told the Emergency Services Bureau about the outlook for the following at least five days. It gets a bit difficult, doesn't it, beyond that to provide reliable outlooks?
A. It's certainly difficult to provide reliable outlooks but we're usually able to give some kind of general indication about the weather after seven days.

Q. Now, this is a briefing, as you've said, which occurred I think initially to a handful of people at 9 o'clock on the morning of the 15th and then to the full meeting, which was a much larger group of people at 9.30 on the 15th; is that correct?
A. Yes, that's correct.

Q. And what you told them was the outlook for that day. And would you just tell us, because they're your hieroglyphics, what those mean, the outlook for Wednesday, 15 January?
A. For Wednesday, 15 January, I told them that we expected the winds to be south-east to north-east, 10 to 20 kilometres an hour, tending to north to north-westerly in the afternoon. We were expecting a easterly surge around 15 to 25 kilometres an hour in and around 1900 local time, that's 7pm, and at the fire ground around 2000, that is 8pm. The numbers at the bottom of that particular box, 15 to 30, represent the forecast minimum and maximum for that day.

Q. All right. Now, that's a forecast for the Wednesday, given that day, so that's likely to be pretty reliable?
A. Yes, and that was in fact based on other

forecasts for the fire area which we received.

Q. Then you went on to talk about the Thursday, and what did you tell them about Thursday, reading those notes?
A. Thursday, at that stage, we were expecting easterly winds 15 to 25 kilometres an hour, freshening to 25 to 30 kilometres an hour by the evening, with gusts to 40 kilometres an hour, possible swing to the north-west in the afternoon. In the course of the briefing itself, I probably would have elaborated to the effect that the north-westerlies were more likely at the fire ground than at Canberra Airport.

Q. And why is that?
A. It's a higher altitude, the Canberra Airport, and in general in Canberra at that time of the year winds at higher elevations are more likely to be affected by upper winds in the atmosphere.

Q. Now, obviously the swing to the north-west is significant, I assume you thought?
A. Yes.

Q. Bearing in mind the position of the fires?
A. Well, yes, it's obviously significant when you're looking at fires from the point of view of the emergency services people who have to decide where to deploy their people for the best effect in fire attack.

Q. And also the risk at whatever level that could be measured at that stage, that the fires might affect the western edge of Canberra?
A. Yes, that would have been in everybody's mind.

Q. Yes. Are you able to recall whether or not that topic was discussed on Wednesday, 15th?
A. I can't recall the details of the discussion in the planning meetings at

Emergency Services Bureau, but they were very detailed and thorough as far as I could make an assessment of it as a meteorologist, and they certainly would have been well aware in my opinion of the likelihood of the fire moving towards I think suburban areas of the ACT.

Q. All right. But whether or not that specific topic was discussed in this meeting or the Wednesday, you're not able to say?
A. Not with certainty.

Q. Well, do you have any memory at all of it being discussed on the Wednesday morning?
A. Not clearly, no.

Q. Well, that wasn't quite the question I asked. Putting aside whether the memory is clear, do you have any recollection of the topic being raised on the Wednesday morning?
A. The process in these planning meetings at Emergency Services Bureau was that the meteorological information came first, then there was a fairly detailed presentation of the exact location of the fire front at that stage and the way they were deploying staff to cope with it.

Q. You stayed for that discussion?
A. I stayed for that discussion, yes. My recollection in the intervening months is that there was some discussion of the likelihood that the fire front could affect the suburban area.

Q. But as to the detail of that you are not clear, I take it from your evidence?
A. No.

Q. All right. Going back to this document, for the Friday, that's the 17th, just interpret if you would what you've put there in your handwritten note?
A. We were expecting a cold front to be close to ML, which is shorthand for Melbourne, late

Friday afternoon. Winds freshening in Canberra in the afternoon to 35 to 40 kilometres an hour with gusts to 50. The humidity dropping. The following hieroglyphics - TD represents dew point of 2 degrees.

Q. Just explain what dew point is?
A. That's the temperature to which the air has to be cooled to get condensation. A two degree dew point is quite low

Q. And what's underneath that?
A. FWW likely. It says fire weather warning likely. In other words, on the morning we were telling them that, so a fire weather warning was likely to be in force for the Friday. 15 to 33 represents the forecast minimum and the maximum temperature.

Q. Yes. And then for the Saturday, it obviously starts with your information that there was a front approaching the ACT, north-west to westerly winds; is that right?
A. Yes, north to north-west winds, 30 to 40 kilometres an hour, trajectory from New South Wales and southern Queensland, forecast minimum 15, maximum temperature 35 degrees plus.

Q. So of the pattern so far, obviously Saturday was the worst of those days from a fire weather situation?
A. Yes.

Q. Was there any discussion about the consequences of that at that meeting that you can recall?
A. No, I think at that stage everyone accepts that forecasts four days in advance contain a fairly high level of uncertainty and, while there was definitely some interest - well, a great deal of interest in the fact that we were forecasting the weather to deteriorate from a fire weather point of view, it was accepted that that was the best forecast that could be provided at the time.

Q. And then you go on to Sunday, which is getting now further out, we're now five days in advance, but you nonetheless are offering some estimation of winds tending to the north-east. What is that next word? "Remaining hot", is it?
A. Remaining hot, yes.

Q. What is the rest of it?
A. Possible north-westerly in the afternoon.

Q. And 15 to 34 on the Sunday?
A. Yes.

Q. And then for Monday, which is the 20th, another front approaching from the west, hot dry north-westerly winds above --
A. Ahead of the front.

Q. Ahead of the front. What does the rest of that say?
A. Could give high 30s. I was referring to the maximum temperature there. Then possible thunderstorm, lightning, minimum 15, maximum 35 plus.

Q. Now, there's a blank for Tuesday and then a notation underneath that, "Note: possible thunderstorms near fronts"; is that right?
A. Yes, that's correct.

Q. What does the rest say?
A. Risk of lightning but probably high base so little precipitation.

Q. So in other words they weren't going to get any assistance from rainfall to put the fires out?
A. Yes, that's correct.

Q. Now, beyond what you've referred to there, is there anything else about that meeting that you can recall, or is that the extent of your recollection?
A. I think that's a reasonable summary of my

recollection of the meeting.

Q. Okay. Just go over the page, if you would, to page 130 - that was also an in-person briefing, given on the 16th, the Thursday. As with the previous notes you say that these notes were compiled as an office record after the briefing and compiled somewhere between the 16th and the 18th of January; is that right?
A. Yes, that's correct. I might say that I took a considerable amount of meteorological documentation to these meetings in the forms of charts, forecasts, but I didn't take written notes.

Q. Yes. Now, again, Thursday, which is the day you were there, had pretty much turned out as you predicted the previous day, so that was a pretty reliable forecast, according to the notes that appear here in the first box, Thursday the 16th.
A. Yes.

Q. North to north-westerly winds in the afternoon; is that right?
A. Yes, that's correct.

Q. Read the rest of it.
A. 10 to 20 kilometres an hour, after 1800, 6pm, easterly, 15 to 25, gusts to 35 kilometres an hour, chance of thundery showers with a question mark after it. We were at that stage thinking that there was a possibility of some convective activity in the afternoon that could have produced large showers but, at the meeting itself, I emphasised the uncertainty in that and said it was simply a possibility.

Q. Is the change to the east from 6 o'clock at night onwards a common occurrence in the summer in Canberra?
A. That's quite a frequent occurrence in Canberra in the summer time. There's several mechanisms that can produce it. Sometimes it's the incoming cold air following a cold front

which comes in from the east to south-east. Other times it's the type of sea breeze effect.

Q. Yes. And once the wind has changed to the east, after 6pm at night, does it tend to remain consistent and remain from the east overnight?
A. It tends to remain from the east overnight. Just how long it persists into the following day depends very much on the depth of easterly that comes in. It can vary depending on the weather situation.

Q. All right. Now, for Friday, which was the day after you were giving this briefing, predicting north to north-easterly winds and then to the north-west in the afternoon; is that right?
A. Yes, that's correct.

Q. 20 kilometres an hour?
A. Yes.

Q. And what's that next?
A. Possibly a little more, with gusts 35 to 40 kilometres an hour, then again we were predicting a weak easterly late in the afternoon, in general hot hazy conditions because at that stage the smoke from the fires was affecting the Canberra city and suburban area quite extensively. Minimum 16, maximum 35.

Q. For the Saturday, the 18th, on Thursday it was again in a sense reinforcing the prediction you've made the previous day. It was clearly going to be a hot day with north-westerly winds, wasn't it?
A. That's correct.

Q. And by this stage was your forecast as far as you were concerned pretty reliable, two days out?
A. Two days out at that stage we felt it was quite reliable. One of the challenges of

weather forecasting is that you continually are getting new information and on practically an hourly basis. We felt at the time that that was probably a reasonable reliable forecast.

Q. And then on Sunday, slightly cooler with the winds initially east to south-east and then changing to the north-east and then north-west in the afternoon and 34 degrees?
A. Yes, that's correct. That would be a fairly common sequence of events following a weak easterly change.

Q. And Monday, you were predicting 35 plus, north-westerly winds 20 to 30 kilometres, gusts to 50 or 60. This is with another front approaching and the possibility of a change on the Tuesday; is that correct?
A. Yes, there was another front likely to be affecting the ACT, probably we thought at the time late on Monday or possibly on Tuesday. But the timing that far in the future is quite uncertain.

Q. Certainly the worst day out of that group, as you forecast it, was Saturday, the 18th. Would that be correct?
A. Yes, I think that's correct.

Q. Now, am I right also that on that Thursday afternoon, the 16th, you spoke with Mr Lucas-Smith from Emergency Services, and I think that was on the telephone?
A. Yes, that's correct.

Q. I don't think that's one of the conversations that's been recorded. But did he explain to you some concern about the weather outlook?
A. Yes, he was - this would have been about 3.30 to 4pm on the Thursday afternoon. The conversation is available, and I understand it's being extracted by the people in Melbourne who supply this.

Q. We'll get that for ourselves. But was one of the consequences of that conversation that he decided, as is his province to do so, that he would impose, or that ESB would impose, a total fire ban for the following five days?
A. Yes, that's correct.

Q. And did you tell him that you thought things were going to get worse, that the situation was certainly deteriorating?
A. Yes, at that stage we decided to issue a fire weather warning for the Thursday and, on the basis of the outlooks that we provided to Emergency Services and on further updates of their operational fire weather forecasts and the routine fire weather forecasts that would have been available to Mr Lucas-Smith by late afternoon, he telephoned me to discuss the outlook for the following four to five days and, on the basis of that discussion, he decided to issue a total fire ban with a five-day period, starting midnight on the Thursday.

Q. If you just go over to page 131, these are your speaking notes for the briefing that you gave that day. Does that mean that these are notes you compiled in advance to which you then referred during the course of the briefing?
A. Yes, that's correct. These are the ones I took with me.

Q. And, again, this is a meeting on the Friday morning, the 17th, at the same time, 9.30?
A. Approximately 9.30.

Q. And you've predicted or given a prediction for the Friday which is in accordance with the detailed forecasts which had already been published by the bureau; is that right?
A. Yes, that's correct.

Q. What does the rest of that entry say?

A. Winds variable until 10am, then 1000 to 1300 - those are times - north to north-westerly, 20 to 25 kilometres an hour, 1300 to 1900, that's 1pm to 7pm, north-westerlies, 30 gusts to 45. Gusts 50 plus on the ranges. Possible 30 to 40 kilometres an hour mean wind on the change ranges. Minimum temperature 15, maximum 36. At this time I'm including forecast due point of 3 to 4 degrees.

Q. And what do you say about that dew point of 3 to 4 degrees?
A. That's a low dew point.

Q. And then for the Saturday, for the following day, does it say west to north-westerly, 25 to 35, gusting - what does that say?
A. Gusting 45 to 60. Then an easterly change late in the day or overnight, probably after 10pm, that's our best estimate of the time of arrival at that stage. The forecast minimum 17, maximum 37 and the dew point 0 to 2, which is a very low dew point.

Q. That's in ordinary language a very nasty fire weather day, isn't it?
A. That would be a very nasty fire weather day, yes.

Q. Did you use words of that kind in the course of your briefing, do you believe?
A. I may well have done so, but there probably wouldn't have been any need to emphasise the fact in that particular company that that was going to be a bad fire day.

Q. Again, if I can go back to the topic I raised with you earlier, can you recall whether or not questions of the consequences for the urban edge of Canberra were being discussed at this stage on the Friday morning?
A. I have no doubt they would have been, but I can't honestly say I have any clear

recollection of them being discussed, no. There was undoubtedly a very clear understanding that this was going to be a bad fire day and I think the action of Emergency Services in imposing a total fire ban for the five-day period indicates that they were well aware of the situation.

Q. Yes. And of course in those circumstances the critical winds I take it are the north-westerly - westerly, north-westerly winds?
A. That's correct, yes.

Q. Then your outlook for Sunday was a bit cooler, 32 degrees, with east to north-easterly winds, shifting to the north-west, and then back to easterly late in the afternoon?
A. Yes. That again is a fairly common sequence of events in Canberra, with the easterly washing out to a westerly in the afternoon and then coming back out in the evening.

Q. And the remaining outlook for Monday, Tuesday and Wednesday shows not much respite until possibly Thursday, and nothing in the way of rainfall?
A. Well, no. At that stage we were expecting Monday and Tuesday to be again fairly severe fire weather days. We were expecting the change that I referred to on the previous day to come through some time probably late on the Tuesday and producing a cooler day on the Wednesday.

MR LASRY: Yes, thank you, Mr Mason. I have no further questions.

THE CORONER: Yes, Mr Johnson.

<CROSS-EXAMINATION BY MR JOHNSON

MR JOHNSON: Thank you, your Worship.

Q. You indicated that there were some tapes, Mr Mason. Are they only of telephone calls or were your face-to-face briefings recorded as well?
A. The face-to-face briefings weren't recorded by me. You'd have to check with Emergency Services to see whether they had any recording.

Q. So, as you understand it, the discussions you had in relation to weather which were recorded were telephone discussions?
A. Yes.

Q. Now, could you turn to page 129, that is the note for the 15th January. I think you indicated to the court that you attended the briefing with a considerable amount of documentation.
A. Yes.

Q. By that do you mean that you essentially extracted particular bits of information and passed that on at that briefing?
A. I took the documents to the briefing in order to be able to refer to them at the briefing. Essentially, I should say, that these briefings tended to occur in two parts - the initial one was a fairly technical briefing to staff and Emergency Services who had the meteorological background to cope with a fair amount of scientific and technical information.

Q. That's the 9am one; is that right?
A. That's the 9am one. Then at 9.30, there was a briefing provided to the general planning meeting of the Emergency Services Bureau, which was a group of 15 or 20 people with various responsibilities. That did appear to be at a lower degree of technical detail and was essentially what I set out in the documents that you have.

Q. So I think, as you've indicated, these notes then, with respect to the 15, constituted

your best recollection at the time you made the notes of what you'd said to the more general one at 9.30am, that briefing?
A. Yes, that's correct.

Q. Are you able to recall now whether the notes concerning 15 January were made on the 16th or the 17th?
A. They were made on the 17th.

Q. Right. And the notes for the 16th of January, what day were they made?
A. They were also made on the 17th. It became apparent by that stage that we were heading for a significant fire event and I thought it was desirable to keep some record of what was said.

Q. And then by the 17th you prepared some notes which you actually took along to the briefing?
A. Yes, that's correct.

Q. And what you've got for the 17th and the 18th are notes that you actually spoke to at the meeting?
A. Yes, they were prepared in advance.

Q. All right. In so far as these forecasts are concerned, were they forecasts which, as you understood it, were intended to cover the whole fire ground, stretching from McIntyre's Hut in the north to Mount Morgan in the south, or were they more local than that?
A. Okay, these particular forecasts are intended to be verified off Canberra Airport data. This was understood by the Emergency Services staff at the meeting, and they were able to make any modifications that were required or they could question me if they felt that they needed further detail about what the conditions were going to be like at the fire ground.

Q. So these indicated what the forecast

conditions would be at Canberra Airport and it would be necessary to make some variation to that if it was appropriate to fit in with the particular local area where the fire may be, whether it's McIntyre's Hut in the north or any of the other fire grounds?
A. Yes, that's right. As Mr Webb mentioned there are consistent variations to temperature with height which need to be applied when you're looking at variations over the ACT.

MR JOHNSON: That's all at this stage, thank you, your Worship, but these tapes apparently will be available. It could be there are some more questions which could arise from that. But that's all for the moment.

THE CORONER: Thank you, you will have another opportunity if that arises.

MR JOHNSON: Thank you.

THE CORONER: Do you have any questions, Mr Stitt?

MR STITT: I have no questions except I was wondering whether Mr Mason had a weather forecast for the Rugby World Cup?
A. Unfortunately, no. I never come prepared!

<CROSS-EXAMINATION BY MR LOWE

MR LOWE: Could I ask one question. In relation to the dew point, you made a point of making a couple of comments in your notes relating to unusual activity. What is the dew point, how does it relate to - why do you actually make this point? What is it normally?
A. Okay. The dew point is a measure of the amount of moisture in the air. It's important in fire weather forecasting because it affects the amount of moisture in the fuel on the forest ground and it will affect the range and spread of the fire through fuel.

Q. What would you expect it normally to be?
A. The dew point is extremely - it's quite variable. In the summer time an average sort of a dew point in mid-afternoon might be around about 5 degrees, but when the easterly comes in in the evening it would typically rise up to maybe around about 10 degrees. Once again this is quite variable, depending on the situation. Mid-afternoon on a very hot summer's day it can drop below zero, and in fact in the end on the 18th the dew point did fall below zero for a period of time.

Q. This is known as a characteristic of that?
A. Yes, yes.

MR STITT: Thank you.

THE CORONER: Yes, Mr Lasry, any re-examination at this stage?

MR LASRY: Not at this stage, your Worship. I'd ask you to follow the same procedure with Mr Mason and perhaps we'll not complete his evidence until the morning.

THE CORONER: Yes, thank you, Mr Mason. You can step down for the time being. Thank you.

<THE WITNESS WITHDREW

MR LASRY: I call Mr Clem Davis, please.

<MR CLEMENCE JOHN DAVIS, SWORN

<EXAMINATION-IN-CHIEF BY MR LASRY

MR LASRY: Mr Davis, would you tell her Worship your full name address and occupation.
A. Clemence John Davis. I'm officer in charge of the Canberra Meteorological Office and the bureau address is 12 Moore Street, Canberra.

Q. Thank you. And how long have you been a

meteorologist, Mr Davis?
A. 31 years.

Q. And all of that time here in Canberra?
A. No, I originally served in Perth for a couple of years, went up to Darwin for 7.5 years, served in Perth for another 11 years and since January 1994 I've been working in Canberra.

Q. All right. Now, you were involved - you were working at the Canberra Meteorological Office during the period under consideration, but in particular you were on duty on the 18th January; is that correct?
A. That is correct. During the time of the fires I was working as an operational forecaster. We had Ian Mason in as acting officer in charge and I was working over the period of the fires and I actually did the 3am to 10am shift on the Saturday morning.

Q. Anyone who starts work at 3 o'clock in the morning deserves instant recognition, in my opinion. Indeed, as you've said, you did start work at 3am on 18 January and, as we'll hear tomorrow morning, you had a number of discussions with people by telephone in relation to the outlook for that day; is that correct?
A. That is correct.

Q. At about 8.45 on the morning of the 18th you attended the ESB briefing and you fulfilled the role that had been fulfilled by Mr Mason on the previous three days; is that correct?
A. That is correct.

Q. And I wonder if you could turn the documents you have there to page 132. I think you'll find a document in your handwriting.
A. That is correct.

Q. Now, this is you telling the Emergency Services Bureau what the outlook was going to

be for, in effect, the next - it looks like the next six days, although the more reliable days are the days closer to the briefing date; is that correct?
A. That is correct.

Q. And would you just tell us - you can read the note if you like, but if you can remember other things that were said - can you tell us what you said on the morning of the 18th about how that day would develop?
A. Yes, the briefing notes says north-westerly winds developing in the morning, then gusting in the p.m. We were looking at 35 kilometres an hour gusting to 55 kilometres an hour, temperature 38 at the airport, and I've got 31 at the fire ground. As Ian and Rob have said, the temperature tends to drop off a bit with height, so you have to take into account the difference in elevation. Dew point of 3. We were expecting a south-easterly change in the evening but it may not reach the fire ground until after 9pm. I did actually say at the briefing that there probably would be gusts of 60 kilometres an hour along the ridges.

Q. And do you also agree that that means that that Saturday was going to be a very difficult day for the fires?
A. Yes, it was. We did have a fire weather warning out that I reissued in the morning and the fire danger ratings were calculated in excess of 60 at the maximum temperature.

Q. Now, again, unfortunately, I might need you to come back and continue your evidence in the morning, Mr Davis, but, after you attended that briefing, did you speak with Mr Webb, the first witness this morning, and also Mr Mason, about what had been discussed at that briefing and what the effects of it were?
A. Yes, I did.

Q. And in talking to Mr Webb, did you tell him that at the briefing there had been

discussion about the significant risk to the western edge of Canberra?
A. Yes, I did.

Q. And again we'll hear that tomorrow morning, no doubt. But a request had been made to you, hadn't it, for an extra special fire weather forecast for 800 metres?
A. That is correct.

Q. What does that actually mean?
A. Rick McRae at the ESB was asking us for a special fire weather forecast for close to Canberra. We had been issuing one for up in the hills around 1,400, 1,200 metres. He was requesting one for the height of 800 metres closer in to cover the area in closer to Canberra.

Q. Yes. And again as we'll hear tomorrow in the conversation with Mr Mason, you referred in that discussion to what you had been told at the briefing, that is that there was a significant risk of the fires affecting the urban interface and, as I understand it, the arrangement was that you would remain at the Emergency Services Bureau until the wind changed; am I right about that?
A. Not quite correct.

Q. Sorry.
A. What it was was that Rick also asked us to stay on duty until the easterly had come in, so Ian was coming on in the afternoon. I was ringing up to brief him and we made arrangements that I was going to come back at 6.30 in the evening to cover the hours up to when the easterly would come in.

Q. What can you recall about what was said in the briefing about the likely effect on the Canberra urban interface at the meeting on the morning of the 18th?
A. At the meeting there was - we usually gave our weather report first, then there was a

report on the fires, and there was considerable discussion about the impact of the fires on western Canberra as a possibility during the day.

Q. And did anyone venture an opinion as to when that might happen?
A. I can't recall exactly, but my impression was that it was - they were looking at it for later in the afternoon.

Q. Later in the afternoon. Well, your Worship, I wonder if I might pause Mr Davis's evidence there until we deal with this tape-recorder telephone conversation issue and, if it wouldn't inconvenience your Worship or my learned friends, if your Worship might consider adjourning for the day now and we'll perhaps complete that aspect first thing tomorrow morning.

THE CORONER: I'll just ask one question. What time was it on the 18th, Mr Davis, that Mr McRae asked you for this briefing, for this 1,800 metres briefing, impact of the fires closer to Canberra, do you recall?
A. I think it was after the planning meeting, before I came back to the office.

Q. And what time did you go back to the office?
A. I would have left the ESB about 10.15. I was back in the office at 10.30.

Q. So some time between 8.45 and, say --
A. It would have been later in the period that that request was made, probably more like around 10 o'clock.

THE CORONER: All right, thank you. You can step down for the time being, please, Mr Davis.

MR LASRY: I'm sorry about the delay but I'll endeavour to have the conversations ready for the morning.

THE CORONER: That's fine.

<THE WITNESS WITHDREW

THE CORONER: We'll adjourn until tomorrow morning at 10 o'clock.

MATTER ADJOURNED AT 3.23PM UNTIL WEDNESDAY, 8 OCTOBER 2003

TRANSCRIPT OF PROCEEDINGS

CORONER'S COURT OF THE AUSTRALIAN CAPITAL TERRITORY

MS M. DOOGAN, CORONER

CF No 154 of 2003

INQUEST AND INQUIRY

INTO

THE DEATHS OF DOROTHY MCGRATH,
ALLISON MARY TENNER,
PETER BROOKE, AND DOUGLAS JOHN FRASER,
AND THE FIRES OF JANUARY 2003

CANBERRA

DAY 2

10.06 AM, WEDNESDAY, 8 OCTOBER 2003

[10.06am]

THE CORONER: Yes, Mr Lasry.

MR LASRY: Your Worship, I'll recall Mr Davis into the witness box.

<MR CLEMENCE JOHN DAVIS, RESWORN

<EXAMINATION-IN-CHIEF BY MR LASRY CONTINUING

MR LASRY: Your Worship, it seemed to me perhaps the most efficient way to do this is, while Mr Davis is in the witness box, to play through all the tapes that we propose to play, and there are a number of them,although the conversations aren't very long, and, in the event that any clarification is needed as to identity of speakers or anything like that, then I can ask him those questions. And the other two witnesses, Mr Webb and Mr Mason, are in court. If the other parties want to ask them questions arising out of these conversations, then of course they can be recalled for that purpose. But I thought I'd go right through from start to finish and play the tapes. And perhaps as we go, I'll introduce them at least to some extent.

I should perhaps indicate that this is not all the conversations obviously. A number of conversations took place in person and it's also not all of the taped conversations, but, in so far as there are further conversations to be produced, then they can be produced later in the course of the evidence. But we only really became aware of these at reasonably short notice, so this is the best that we've been able to assemble so far.

They start, your Worship, on 8 January. The first conversation is Mr Webb on 8 January offering a briefing, I think, to senior personnel in the New South Wales Rural Fire Service at about 5.21 that afternoon.

(A telephone conversation was then played)

MR LASRY: Your Worship, the next tape is at about, I think, 7.29pm on 8 January. It's Mr McRae from the ACT ESB ringing Mr Webb, requesting a special fire weather forecast.

(A telephone conversation was then played)

MR LASRY: The last one for 8 January, your Worship, also involves Mr Webb and New South Wales State Forests at about 10 o'clock on 8 January.

(A telephone conversation was then played)

MR LASRY: Your Worship, we move forward to 14 January and the next number of conversations - really the 14th and 15th, to start with, involve various people from the Canberra Meteorological Office and ESB. The first of these is a bit after 5 o'clock on the afternoon of 14 January. The participants are Mr Mason and Mr McRae.

(A telephone conversation was then played)

MR LASRY: The next one, your Worship, is a bit after 8.10 the following morning, on 15 January, involving some corrections to the forecast.

(A telephone conversation was then played)

MR LASRY: Just before I go to the next one, Mr Davis, who was the voice at the weather bureau on that last one?
A. James Caust. He was the meteorologist on duty at the time.

MR LASRY: Thank you. The next, your Worship, is 8.25am the same morning, again Mr McRae and Mr Mason.

(A telephone conversation was then played)

MR LASRY: The next is at 9.30 on the morning of the 15th, your Worship. It's Mr Mason, who has by now gone to ESB for the briefing. He's then ringing back to the weather bureau.

(A telephone conversation was then played)

MR LASRY: Next is at about 2.45 in the afternoon - Mr McRae ringing into the weather bureau and to Dave. Who is Dave Williams?
A. Dave Williams. He was the fourth member of the staff.

MR LASRY: Okay.

(A telephone conversation was then played)

MR LASRY: Some of the files, your Worship, - they seem to have run out of space, so we should have started with the second one. So you can run it forward to the point where the other one stopped.

(The telephone conversation continued)

MR LASRY: I think that's it. Your Worship, on the disk there are some other conversations which people can listen to at their convenience. There's, for example, at 4.30 a liaison between the bureau and the 'Canberra Times' in relation to the weather, but I perhaps will restrict the playing to the ones that involve matters relevant to outside agencies. So, if we can go to 16 January now, 7.17am, Mr Bartlett from ESB inquiring about when the cloud might break up and aircraft deployment. I might say, your Worship, I think there are two files here. There's one short file and the conversation continues in the second one.

(A telephone conversation was then played)

MR LASRY: Your Worship, there's another conversation which is really a formality about getting special fire forecasts forward, which I won't play. The next one of any significance is at 1.30 on the 16th. It's a discussion between Mr Mason and Mr McRae.

(A telephone conversation was then played)

MR LASRY: Next is about an hour later, I think. This will be on a separate disk. This is at 2.42pm on 16 January, a discussion between Mr Mason and Mr Lucas-Smith from the Emergency Services Bureau.

(A telephone conversation was then played)

MR LASRY: Your Worship, I may have missed one along the way, which might be separate, for the 15th. It's a briefing for 15 January, but perhaps I can come back to that later, if it's not immediately apparent to the operator. Perhaps we'll keep going in order and I'll come back to it.

Next is on 17 January. There's only one that I had proposed to play for that day. As I follow it, it's a briefing involving James Caust from the bureau in Canberra to a number of personnel from New South Wales. It occurs at about, I think, 5.19pm.

(A telephone conversation was then played)

MR LASRY: I might interrupt at that stage. There's been a discussion there about Sunday. Did you have a point you wanted to make?
A. Yes, a point of clarification. That was a voice tape of James Taylor, who was operating in the Sydney regional office, Sydney weather section.

THE CORONER: James?
A. Taylor.

MR LASRY: So that's coming from Sydney, not from Canberra.
A. That's correct.

Q. Nonetheless, the information remains obviously relevant?
A. That is correct.

MR LASRY: Your Worship, we'll go now to the 18th. There are, as you can imagine, a large number of phone calls on the 18th but I'll just pick out the ones again that involve outside conversations. The first of them is a conversation between this witness, Mr Davis, and Phil from the fire brigade at 3.21am on the morning of the 18th.

(A telephone conversation was then played)

MR LASRY: That was you obviously, sounding remarkably articulate at 3.21am. The next is at 10.08am. This is Mr Webb to the New South Wales Rural Fire Service. It's about halfway down the next page.

TAPE OPERATOR: The 10.08 is not there.

MR LASRY: We'll come back to it. The next one is at 10.30. It should be a conversation between the witness, Mr Davis, and Mr Webb.

(A telephone conversation was then played)

MR LASRY: If I might interrupt there. I think much of the rest of that conversation was about whatever IT problem you were encountering. What was the problem? What was it?
A. It was essentially some of the forms had been changed up in Sydney but hadn't been loaded on to our machine.

Q. Okay. What you were endeavouring to do, or what you were discussing doing, was preparing this special fire weather forecast for 800 metres for the Canberra area. Did you

ultimately solve the problem and publish the forecast?
A. Yes, it was eventually solved.

MR LASRY: I'll go to the next conversation, which is about seven minutes later at 10.37, and then I'll ask you some questions about both those conversations.

(A telephone conversation was then played)

MR LASRY: Now, just in relation to those last two conversations, firstly with Mr Webb and then with Mr Mason, they followed your attendance at the briefing at the Emergency Services Bureau?
A. That is correct.

Q. And that was a briefing which had occurred at about 9.30 or so?
A. That is correct.

Q. And you'd taken part in that in the sense of giving information about the weather forecast for the day and for the following days?
A. That is correct.

Q. And in both the conversations with Mr Webb and with Mr Mason I think you used the words "significant risk" when describing what had been discussed at that meeting. You said that there was a significant risk to the urban interface of Canberra, qualified only by the fires being able to be brought under control. Was that the essence of what was said at the meeting?
A. That is my understanding.

Q. Does that convert to, unless we can get control of this --

MR JOHNSON: As to that I'd object.

MR STITT: That is hardly evidence, my learned

friend giving it from the bar table.

MR JOHNSON: It's been indicated, your Worship, what was said. What it converts to ultimately may be a matter for your Worship, if the witness can say something more as to what was said, but it has been made clear, I would submit, and that's the evidence as it stands.

MR LASRY: The witness was giving evidence about his understanding.

MR STITT: Why don't you ask him what his understanding is instead of giving it from the bar table?

MR LASRY: Perhaps my learned friend could stand up when he's objecting.

I'm simply trying to get the witness's understanding, your Worship, and to clarify, but perhaps I'll change tack slightly.

Q. Can you recall actually what was said at that meeting in relation to the western urban interface?
A. I couldn't recall in so many words but there was discussion about the possible run of the fires in towards western Canberra.

Q. Who was speaking? Who was offering the opinion?
A. Rick McRae was one of those that was in the planning room that was discussing the fires.

Q. Was the means by which the fire might be controlled discussed, because on the tape you say if the fires continue out of control, there was a significant risk to the urban interface. Was the means by which control might be going to the fires discussed?
A. Yes, the whole issue of planning and resources were discussed at the planning meeting.

Q. Apart from the change of wind or change of direction of wind to the east, was there any other means of controlling the fires discussed in that meeting that you can recall?
A. Not that I can recall. There may have been some discussion on using water bombing but I can't recall exact words.

Q. As the day went on, did it become clear that what was of significant interest to the Emergency Services Bureau was when the wind would change to the east?
A. That is correct.

Q. And for as long as it continued to blow from the west or the north-west, a risk obviously maintained as far as Canberra was concerned?
A. That is correct.

Q. Was the risk to the urban interface further particularised; in other words, did anyone suggest that the fire front would actually burn into the housing on the western edge of Canberra?
A. I can't recall that that was a definite thought, but obviously, if you're going to have a fire front affecting the urban interface, there would have been some effect on urban Canberra.

Q. Whilst you were present, was there any discussion about what would be done in relation to that risk; in other words, notification to the affected areas, people living in the affected areas, anything like that that you can recall?
A. Not that I can recall as such, but there was discussion about media and talking to the ABC.

Q. And who led that discussion, can you recall?
A. I can't recall, but that was a discussion

that was made - I can't recall exactly who instigated that call, that conversation.

Q. Right. As far as you could see, was there any plan in relation to either discussion with the media or dissemination of the information which had been discussed at that meeting, that you observed?
A. Not that I observed.

Q. All right, thank you.

MR LASRY: There's about another four or five calls to play, your Worship. I'm happy to stop now if your Worship wants to take the morning adjournment, or I'll keep going, whatever suits.

THE CORONER: It's probably just as convenient to take the morning adjournment.

MR LASRY: As your Worship pleases.

ADJOURNED [11.15am]

RESUMED [11.36am]

MR LASRY: Your Worship, for the rest of 18 January, as I said, there are a large number of calls. I only propose to play a handful. Perhaps we'll start with the call at 11.17am, which is a call from the Queanbeyan Emergency Services.

(A telephone conversation was then played)

MR LASRY: Now, the next one, your Worship, is at 1.36pm. As I follow it, this is a person within the vicinity of the McIntyre's fire wanting details of any change in the forecast. And he gives some eyewitness accounts of what's occurring.

(A telephone conversation was then played)

MR LASRY: The next one is at 2.47pm. It's an incoming inquiry from the public about the fire.

(A telephone conversation was then played)

MR LASRY: Your Worship, the last one - we may need to go back in time slightly. The last one that I wanted to play I thought for some reason had been on the 17th, but I am now reasonably confident that it's 15 January. It's the briefing given by Mr Webb to primarily New South Wales at - I'm not sure of the time now - but some time during 15 January. This is probably the longest of the lot. It runs for about 18 minutes or so.

(A telephone conversation was then played)

MR LASRY: That completes the tape recordings, your Worship. Mr Davis, do all those conversations give us a reasonable picture of the way in which the bureau interacts with the agencies it has to deal with during the fire season and the way in which information is imparted?
A. Yes, it does.

Q. And, wherever possible, obviously the information is imparted in as much detail as it can be, given what you know?
A. That is correct.

Q. Now, I just want to go back to the briefing that I asked you about before the break. I have just one other question that I should have asked you about that. As you said in the telephone conversations with Mr Mason and Mr Webb, there had been a concern about a significant risk to the ACT urban interface. To your memory, in the course of those discussions was anyone able to estimate, or was an estimate discussed, as to when in fact the fire might impact on that part of Canberra - that is, at what time during the day?

A. From what I can recall, the threat was going to be considered later in the afternoon.

Q. Later, yes. Did you take part in that discussion as well?
A. Not directly.

Q. No. But am I right in saying that the special forecast for 800 metres was a forecast which was hopefully going to inform that discussion; in other words, the more that you --

MR STITT: I object to this. Really, it's important my learned friend ought not to be leading constantly. It makes the probity value of this evidence almost nil unless it's being led properly.

MR LASRY: Well --

THE CORONER: I can't see that it's not being led properly at this stage, Mr Stitt. I'll allow Mr Lasry to keep on questioning in the manner that he has been.

MR LASRY: Mr Davis, all I'm really asking you: was the special forecast which was being issued for the 800-metre level a forecast which was relevant to that discussion, as far as you were aware?
A. Yes.

Q. Did that mean that that forecast would give particulars about the particular weather conditions in the Canberra vicinity, in the immediate Canberra vicinity?
A. Yes, what it was is that the forecast that we were issuing was for a high level, so if you're issuing it for 800 metres, you would then change the parameters to which we were forecasting.

Q. Yes. And the variations between 800 metres and the higher level forecasts, I take

it, were variations that included variations in wind - direction and strength?
A. Wind, temperature and dew point.

Q. And at the time that the discussion was being held in relation to the timing - the time at which the fire might affect the Canberra area - had that special 800-metre forecast been issued?
A. No. We couldn't issue it until I got back to the office to inform the rest of the staff.

Q. Okay. And how long after you got back to the office, which I think was probably some time after 10.30, wasn't it?
A. I got back to the office at 10.30.

Q. And how long after that was it that that special fire weather forecast for 800 metres was issued?
A. I actually finished work at 11 o'clock. I think it was around 1 o'clock that it was issued.

Q. Thank you.

MR LASRY: Your Worship, I don't have any further questions. Mr Davis hasn't been asked any questions by anybody else at this stage, of course, and the other problem that might be confronting my learned friends is that, whilst they've heard the conversations, they don't yet have the CD, and there is no transcript of these discussions yet. So, with that caveat, I ask no further questions.

THE CORONER: Yes, Mr Johnson?

MR JOHNSON: Yes, at this stage I don't have any further questions, your Worship.

THE CORONER: Mr Stitt?

MR STITT: Just a couple.

<CROSS-EXAMINATION BY MR STITT:

MR STITT: Mr Davis, you said you attended the meeting on 18 January as a representative of the metropolitan weather bureau, if that's the correct name?
A. As a representative of the Bureau of Meteorology, Canberra Meteorological Office.

Q. And were you there as a weather expert?
A. Yes, I was.

Q. Was there any other expert there that had expertise in the weather, apart from you?
A. Not that I can recall.

Q. And you said that there was a discussion about a wind change, and I think you said the critical thing was the easterly wind change. What was the significance of that?
A. When you have a wind change, it can have a significant effect on a fire.

Q. But what was the significance of it coming and being an easterly wind change?
A. Well, it's a completely different direction from the normal wind speed - winds we were forecasting. Once you start to get a wind change, you can get a lot of effects around the fire itself and it can change the direction of the - of which way the fire is burning.

Q. But at the time of this meeting, the fire was subject to wind from the north-west or west, was it not?
A. That is correct.

Q. And that was driving the fire towards Canberra western suburbs?
A. That is correct.

Q. Well, what was the effect on the fire from your point of view of an easterly wind change?
A. Well, it would be on the timing of when that easterly would be hitting the fire front.

Q. Well, was that discussed?
A. I can't recall any discussion on that.

Q. But wasn't the question of when this westerly-driven fire might reach the western suburbs of Canberra an important topic?
A. From what I can recall, the discussion was to do with later in the afternoon.

Q. But wasn't it an important topic?
A. I can only provide the information on the weather that we were expecting. I'm not an expert on fire behaviour.

Q. No, but wasn't it an important topic?
A. It was a part of the forecast that was given in terms of the timing of the change.

Q. Well, didn't the timing of the change depend upon prevailing winds?
A. The easterly change was a result of the overall synoptic pattern, with a front moving through the coast. We were anticipating the easterly to come into Canberra at the airport about 8 o'clock that night. The easterly actually came in at about 7.30 in the evening to the airport.

Q. But what did you understand the effect of the easterly wind to have on the fire as at the 18th, whenever it arrived?
A. As I said, I am not an expert in fire behaviour. All I can do is give a prediction of when the winds were going to arrive.

Q. Well, do you say that you didn't take part in any discussion at that 18 January meeting in the morning as to when the fire might arrive at the western suburbs of Canberra?
A. I did not take part in that discussion.

Q. So you have no idea in your mind when that fire might have arrived at the - and I hesitate to use the word - urban interface?

A. I can only give you what my recollection of the discussion was.

Q. Well, was there a discussion in which you took part as to when the time that the fire might reach the housing in the western suburbs was likely?
A. I did not take part in that discussion.

Q. Well, did you hear any discussion taking place?
A. All I can say is, from what I can recall, the discussion towards the effect on the fire on the interface was later in the afternoon. That's all I can recall.

Q. But did you contribute your view as to the prevailing wind conditions and whether they might change in that discussion or did you sit mute?
A. By that stage I already had given my briefing as to what was expected in terms of the wind speeds and the wind directions and the timing of the change.

Q. Well, did you express a view as to when the fire might reach the urban interface?
A. Again, all I can say is I am not an expert in fire behaviour and I could not give that information.

Q. But did you in fact volunteer it?
A. As again I said, I am not an expert in fire behaviour. I did not volunteer any information regarding fire behaviour.

Q. Well, did anybody ask you when you thought the wind might change?
A. Not that I can recall - well, I indicated the expected wind change in my briefing, which was we were expecting it at the airport at 8pm in the evening, and that was a part of my initial briefing.

Q. So you didn't have any view at all as to

when the fire, which was then being driven by a westerly wind, might reach the urban interface?
A. No, I did not.

Q. And you didn't express that opinion to anybody at that meeting; is that your evidence?
A. I am not an expert in fire behaviour --

Q. You've told us that, but I'm interested to know what you actually said, you see. Are you saying that you did not express any opinion at that meeting as to when the fire might reach the urban interface?
A. Not that I can recall.

MR STITT: Thank you, nothing further.

THE CORONER: Yes, any re-examination, Mr Lasry?

<RE-EXAMINATION BY MR LASRY

MR LASRY: Did you actually have an opinion about the timing - whether or not you were a fire behaviour expert, did you actually have any opinion about when the fire might reach Canberra?
A. No, I did not.

Q. So, in so far as there was a conversation about that in your presence, you didn't take part in it at all?
A. Not that I can recall.

Q. Or offer any opinion?
A. Not that I can recall.

MR LASRY: Yes, thank you, your Worship. I don't have any further questions.

THE CORONER: Yes. And is that all the evidence that we require from Mr Davis? Can he be excused?

MR LASRY: Indeed, your Worship, unless there's

any reason - and I asked that Mr Mason and Mr Webb also remain in case questions arose from the telephone conversations. If none have, then I'd ask that they all be excused.

THE CORONER: You're excused, Mr Davis. Thank you very much for your assistance. I'll just ask counsel whether or not any counsel wish to ask any questions of Mr Webb or Mr Mason in relation to the tapes.

MR JOHNSON: No, thank you.

<THE WITNESS WITHDREW

THE CORONER: I appreciate it's been difficult to hear the quality of some of the tapes.

MR JOHNSON: I certainly don't have any questions, your Worship, but, as may arise from time to time in the inquest, if an issue does arise, of course, we would talk to counsel assisting if there is any issue, but I certainly don't at this stage.

THE CORONER: Thank you, Mr Johnson.

MR STITT: I don't have any questions, but I take it that my learned friend has satisfied himself about the Listening Devices Act with these recorded phone conversations and whether he needed to deal with that aspect, but that's really a matter for him through any of those witnesses. But I don't have anything.

THE CORONER: Thank you, Mr Stitt.

MR LASRY: Well, your Worship, I must say, I haven't. The weather bureau is one of those government instrumentalities that records conversations as a matter of course and, if there's a consequence under the Listening Devices Act, I'll have to deal with it, I suppose, but it hadn't crossed my mind to look at it. But I'm grateful to my learned friend

for his assistance.

Your Worship, Mr McBeth is the next witness. Mr Woodward will take his evidence.

MR WOODWARD: I call Mr Howard McBeth.

<MR HOWARD RICHARD MCBETH, AFFIRMED

<EXAMINATION-IN-CHIEF BY MR WOODWARD

MR WOODWARD: Mr McBeth, could you tell your Worship your full name please.
A. Howard Richard McBeth.

Q. And your address?
A. It's Lot 8, Frank Barker Road, Humbug Scrub, One Tree Hill, Adelaide.

Q. And your present occupation, Mr McBeth?
A. I'm retired.

Q. Mr McBeth, you prepared a report dated 29 September 1994 in relation to fuel management in the ACT. I want to get to that in a minute but, before I do, I'd just like to ask you a little bit about your qualifications, in effect, at the time at which the report was prepared. You've provided - and it's included in the brief - a CV. It's at [AFP.AFP.0087.0061]. While that's being brought up on to the screen, Mr McBeth, I'll just ask you - your positions held, as disclosed in that CV, are between 1981 and 1986, you were head of fire management with the Department of Environment and Planning with the National Parks and Wildlife Service, the state Planning Authority Lands South Australia. Is that correct?
A. Correct.

Q. Is that all one organisation, Mr McBeth, that's described in that - perhaps if you could move to 0062, the following page?
A. The National Parks and Wildlife Service is

a division of the Department of Environment and Planning, and the State Planning Authority was one of the agencies under the same group of Acts and, effectively, I headed the umbrella which managed fire for all lands in South Australia, which were managed by the government other than for commercial forests.

Q. So it's essentially a land management authority concerned with national parks and the like; is that correct?
A. It is.

Q. And between 1986 and 1994, you were a deputy chief officer with the South Australian Country Fire Service?
A. Yes, I was the chief operations officer for the state's fire service and the deputy chief officer.

Q. I see. Were there more than one deputy chief officer at the time?
A. No. There wasn't a chief officer either.

Q. I see.
A. There was a chief executive officer. So, effectively, I was in control of rural fires for the state.

Q. I see. Can I just ask you this: are you familiar, broadly, with the structure of the Emergency Services Bureau in Canberra?
A. As it now stands, no.

Q. Well, at the time?
A. I had a vague understanding of it.

Q. I'm just trying to perhaps, for the sake of her Worship, get a comparison. What would your equivalent position be in the ESB, for instance?
A. I think --

MR JOHNSON: I think the witness is indicating he has no understanding of how it is presently

fashioned and only a vague one as to the past. It may be not very helpful to seek a comparison with an organisation to which he has a limited current understanding. I'm not being critical of the witness. It's just a question of whether this will be helpful to your Worship at this stage.

THE CORONER: We'll just see what information is drawn.

MR WOODWARD: Mr McBeth, you said you were the chief operations officer. I was hoping to short-circuit this, but perhaps if you could explain what the role entails.
A. The chief operations officer's role was to effectively manage all fire in rural areas of South Australia, report to the minister and the Commissioner of Police under the state disaster provisions in South Australia. The position that the chief rural fire officer here operates under is similar to that of, or comparable to that of, a region in South Australia from a resources allocation perspective.

Q. You reported to the chief executive officer within the Rural Fire Service --
A. I did.

Q. -- the Country Fire Service, I'm sorry. And what, in essence, was the difference between your role and that of the chief executive officer?
A. The chief executive officer's role was to manage the board and the provisions of the Act vis-a-vis funding and administration. My role and accountabilities were the control, prevention and management of all incidents throughout the state pertaining to rural fire, hazardous chemical spillage, structural fire, et cetera, et cetera.

Q. I see. So at least by 1994 your experience combined both time with a land management agency, and a considerable period of

time, but also extensive experience in a body responsible for fire suppression?
A. Yes, I believe I'm right in saying that I'm the only officer that has held the chief operations officer position in a conservation agency for fire, that range of responsibilities, and then that of a state fire service.

Q. Now, since 1994, you've indicated in your CV that your role has been as a consultant on fire issues, and I think in your CV you've described - there's no need really to go to this page, but you've referred in page 7, which is 0068, to a number of roles you've had as an expert witness and adviser to various organisations; is that correct?
A. Yes. My sort of status as an expert witness occurred as a consequence of the February fires on Ash Wednesday 1983, where I suggested to the then Country Fire Service that they might like to crank things up a bit two days before the event and then, on the day, I suggested to the police that they might like to close some roads because deaths would occur if they didn't. They failed to close the roads, deaths occurred, and I was involved in the coronials from then on.

Q. I see. Now, the following pages of your CV, Mr McBeth, refer to a number of documents you've authored. I don't want to go to each of those, but I suggest to you that they have been largely documents to do with the development or articulation of various different fire management policies. Is that a fair summary?
A. That's correct.

Q. Mr McBeth, one item that's omitted from your CV, at least as provided to the inquest and forming part of the brief, is your role as a fire commander - in a command and control position.
A. Right.

Q. I just want to put these to you and, if you'd just confirm if this summarises your role as a hands-on firefighter, if I can put it that way. Between 1976 and 1980, you were a sector controller or fire boss and in excess of 80 events?
A. Correct

Q. And, between 1980 and 1981, you were a fire controller or fire boss in excess of 49 events?
A. Correct.

Q. And, between 1981 and 1986, you were the South Australian state controller in respect of - that is, with the Department of Environment and National Parks - in excess of 130 events?
A. Correct.

Q. Between 1986 and 1994, you had the role that you've described as South Australian Country Fire Service chief operations officer in excess of 4,000 events; is that correct?
A. Correct.

Q. And you also had a role as a task force commander in the 1994 New South Wales fires?
A. Yes, I took 1,000 vollies down there for 14 days, with with 70 fire appliances.

Q. 'Vollies' being a slang for volunteers?
A. Indeed.

Q. Thank you, Mr McBeth. I just want to briefly cover the circumstances in which you were asked to prepare the report that's included in the brief. At page [AUS.AFP.0040.0089], in the brief, there's a letter from Mr McArthur - I beg your pardon, from Mr Garry Crostin, General Manager of ACT Parks and Conservation Service, to Mr D McArthur, chief executive officer of the South Australian Country Fire Service in relation to the report.

But perhaps, before I ask you a question about that, I should indicate to your Worship that this and another half a dozen or so letters are not included in the volumes of the brief which were originally distributed. However, I've provided, I think, to all parties a set of these, as well as to your Worship, and also a CD has been distributed this morning with copies of these documents burnt on to that CD, so they now form part of the first phase brief.

Do you recall - I think we're having trouble bringing that up. The letter indicates that there had already been some contact and your name had already been put forward as a person appropriate to write that report. Do you recall the circumstances of that?
A. I have a vague recollection of the circumstances in that. For the previous three or four years I'd given numerous papers at various AFEC and ARFA conferences --

Q. Perhaps for the moment at least you had better give us what those acronyms mean?
A. The national body for the Association of Rural Fire Authorities, which the ACT Parks and Fire Service were members of, together with the Met Bureau and all the analysts around the Commonwealth who have got something to do with fire.

At those conferences I'd given papers. I'd also handed out what we believed at the time were relatively innovative processes for the management of fire - the relationships up and down chains of command, incident management system philosophies, the use of prescribed fire in native vegetation, standardisation of fuel breaks and access tracks, and a lot of these documents were taken up as models, if you like, by some agencies around the Commonwealth. And, with the knowledge that I had, it was considered that either myself or a guy in the west were appropriate for the job.

Q. And you were effectively appointed by Mr McArthur, the chief executive officer of the CFS?
A. Indeed.

Q. What I might do in the absence of the documents on screen is hand to you the same bundle, if I may.
A. Thank you.

Q. That has at the front the letter to which I've just referred, which includes a specific request that the assistant chief officer, Howard McBeth, be released to provide an opinion as sought by Minister Wood, and it attaches, Mr McBeth, what appears to be a set of terms of reference in relation to the report for you to prepare. Are you familiar with that document?
A. Yes, I am, and those are basically the terms of reference.

Q. Yes. I want to return to those in a minute, but the next document in the bundle you have there is a document dated 21 June 1994, which is a letter from you to Mr Crostin, following your visit to Canberra in the week of 30 May, 1994, to 3 June 1994. You've raised some concerns about the nature of the report you were being asked to prepare. Are those matters that you discussed directly with anyone before you embarked upon the report - that is, the concerns you referred to in that letter?
A. Yes, I expressed my concerns basically from the first day of arriving to give this opinion, in that, when I arrived, a program hadn't been established for the week. There was no office accommodation available and this was sort of symptomatic of the way the matter was being handled, so I expressed my concerns from --

Q. Who did you express those concerns to?
A. These concerns were expressed to Dianne Garude and Garry Crostin.

Q. Could you spell 'Garude', is that Ms Garude, there's a reference to that in the letter?
A. Yes.

Q. What was her position at the time?
A. I don't recall.

Q. Did you have discussions at that stage about the nature of the terms of reference that we've referred to already?
A. Yes, I did. I had a meeting on I think it was the second morning with the executive of the department and I suggested to them that the terms of reference were flawed in that the ACT parks could not be considered in isolation of all the other lands surrounding Canberra because white man's cadastral lines on a map mean nothing to fire behaviour and fuel management.

Q. Could you just repeat that - the first part of that last answer? I think you said "white man's cadastral boundaries". Could you explain that?
A. Yes, lines on a map. You have a line around Namadgi, you have a line around parts of the production forests, and that's where one set of responsibilities finish and another start, or the other way around. And of course, where fire management is concerned, the fuels are contiguous and, therefore, the areas of land and topography from a fire perspective should be managed in a homogenous way, and they weren't.

Q. Your concern was, as I understand it, that the brief only extended to those lands under the control of ACT Parks and Conservation Service?
A. That's right.

Q. Which comprised national parks and the like?

A. Yes.

Q. But, importantly, excluded the pine plantations under the control of ACT Forests; is that correct?
A. That's correct, and I was insistent that I would have meetings with the forest service to discuss the concerns.

Q. And what was the response to those concerns at the meeting you referred to?
A. Well, it's very difficult to recall now. It's nearly a decade later. But basically the impression one got was that this wasn't the concern or level of interest or degree of complexity that I thought, in that the ACT hadn't been subjected to fires for many years, it hadn't been subjected to the Ash Wednesday events or the fires of New South Wales, and there was a philosophy that sort of pervaded everything that it's not going to happen here or it's not going to happen to us. And it was actually put to me on one occasion that I really didn't know what I was talking about, and that my concerns about fires coming down out of the ranges as a result of whatever source of ignition really weren't valid and that we had a minor fire the year before at a place called Curtin, I think it was --

MR JOHNSON: Could I at this stage object, your Worship, on this basis - there's no statement or interview from the witness and, of course, evidence has been given about events and conversations which are nearly 10 years old, as the witness has indicated. Clearly, as part of the history, the worth of this witness is important and it will be understood as so.

There will ultimately be a question as to what's happened since 1994 and 1995 as to which a number of other witnesses no doubt will give evidence, and in particular what the state of affairs was as to land management practice and the organisation of the fire services in 2003,

and also as to what the particular conduct and behaviour was of the 2003 fires, which of course is a matter for evidence to come. This is the second day of the first phase of what will be a lengthy inquest.

I say all that because this is clearly part of the history, the role of this witness, and indeed the report and the additional correspondence puts that in place. There's the Glenn report, which is also before your Worship, and no doubt there will be evidence about action taken in response to that.

In so far as evidence has been given as to what was said by some people - and there is some question as to who they are who are making these comments - there's reference to a briefing at which Ms Garude and Mr Crostin were present, but there seems to be a movement - certainly it's unclear as to who the comments which are being referred to now are said to have been spoken by and when.

If the evidence is to have any use, and in my submission it may be that, as a matter of history, there is limited use in going into all the detail here - it's quite apparent that there is a report, there is some controversy as to its content, there's correspondence as to that. As was raised by counsel assisting in the opening there was something said in the context of an 1995 election that led to the Glenn report. These are matters of history, which are essentially to be read and will speak for themselves. If the court goes into some detail about what may have been said at this stage by unspecified persons on occasions almost a decade ago, it may open up lines of inquiry which may further complicate an inquest which will be lengthy in its terms in any event and, bearing in mind these are conversations said to have taken place in 1994, there is a question of whether it is useful to the court to go back this far at this time.

As to whether at some future time the present witness might be called perhaps to give evidence after there is further evidence which has been given as to the conduct of the 2003 fires and as to the events which have occurred concerning the land management practice and things of that sort, that's a separate matter. That, of course, bearing in mind he had a role to play in 1994, may be a view that could be taken, but that could only be taken when there's some facts as to what occurred in 2003 which the witness could comment on.

For the witness to essentially talk at considerable length about the events in 1994 and, in particular, in the way it's happening now, in my submission, is not helpful to the court. As I indicated to counsel assisting yesterday, if there is evidence of conversations and such that are to be given by the witness because there's no statement, I will need to have an opportunity to seek some instructions in any event as to whether there is controversy. That task becomes even more difficult when conversations are given in a rolled up way without it being clear who's speaking and when.

All of that perhaps is a combination of submissions which I would put to the court to essentially submit that the role to be played by the present evidence is essentially historical. It is significant - I don't say to the contrary. It's largely documentary. And in my submission, given the nature of this inquest, it is not necessary to engage in lengthy questioning about what was said, and it may be that the court could form the view that the documents largely speak for themselves.

As to whether as I say at a later stage, when there is some factual foundations that may be there for the witness to be asked further questions is a separate matter, but at this

early stage, in my submission, evidence of this sort is unhelpful and will complicate the process of the inquest.

THE CORONER: Thank you, Mr Johnson. There is something in what Mr Johnson has submitted, particularly - and I appreciate the difficulty that Mr McBeth has, trying to recall conversations, and I think you yourself said, Mr McBeth, that you can't remember exactly what was said. You just have a general impression of the attitude that that --
A. Yes. But --

Q. I don't know that we can take that much further.

MR WOODWARD: That was my last question on that.
A. Your Worship, in a nutshell, to come back to the end of that discussion --

MR WOODWARD: Mr McBeth, perhaps I should just --

THE CORONER: There is merit in what Mr Johnson says.

MR WOODWARD: I accept that, your Worship, and I wasn't proposing to take the matter any further. The only reason I raised it was I anticipate there may be some cross-examination of Mr McBeth in relation to his departure from the terms of reference, and it seemed to me that it was only fair he at least explain the circumstances in which that arose. But, as far as I was concerned, I wasn't going to take the matter any further than that last question. So, if my friend allowed the answer to be completed, I think we would have been moving on.
A. I'd like to finish my response, if it's possible.

Q. Perhaps you could indicate at least at this stage - you were referring to comments

made. Are you able the identify who it was that was making the comments you've been referring to?
A. The person I was making these comments to specifically was Garry Crostin, and my request was would he please provide me with the policies of the department which produced the annual and recurrent work programs of fuel management, particularly on the urban rural interface.

Q. All right. I do want to come in a moment, Mr McBeth, to what documents you were provided with, so if we can hold on to that for the moment. In relation to the preparation of the report, Mr McBeth, at page 12 - and this is document [AFP.AFP.0087.0005] That's the document. At page 12 of the document, which is 0018, you set out a summary of, if I may call it, your program for the visit to the ACT in that period in late May, early June of 1994, with a daily breakdown of the visits you made and what you observed.

Could I ask you just, if you could briefly - and again I accept that your recollection of this may be a little bit hazy - give an indication to her Worship of your impressions, or perhaps a word picture, of what you did observe in terms of particularly fuel loads and other matters relevant to fuel management during that visit? Page 1 of the report.
A. Page 12. That helps a great deal, thank you.

Q. I don't want you to go through day by day, but if you could just give a general impression of what you observed at that time at least about the matters that were relevant to your report, in particular fuel loads.
A. Yes. Firstly, the parks service and forest service were unable to provide me with the policy documents which I could examine to determine whether the departments concerned were doing appropriate things under the

legislation under which they operated. It became rapidly apparent to me that they weren't, inasmuch as the fuel management in the areas I had viewed was less than satisfactory or less than what could be deemed reasonable by agencies operating the care and control of these lands in regard to protection of conservation assets and the public.

I viewed areas where backyards had extended into dedicated parks, where these backyard extensions had gone across fuel zones and thus increasing the fuel load or quantity in those areas, also backyards which have extended across fire breaks or fire access tracks, thus rendering them useless. So obviously I had grave concerns about these matters.

Q. Could you just explain that briefly. When you say backyards extending, are these private residents who have effectively encroached - allowed their property to encroach beyond what they own into government land, in effect?
A. Yes, absolutely.

MR JOHNSON: Your Worship, these are apparent observations from 1994. This fire occurred in 2003. There are questions being asked and answers given about unidentified backyards in parts somewhere in Canberra, apparently. I would submit that, unless there is some identification, it is not going to be helpful - and, indeed, even if there is identification, at this point in it's not helpful. The court does have the report of Mr McBeth. It has the surrounding correspondence. It has the Glenn report, and undoubtedly there will be witnesses called who were involved in the Glenn report and what's happened since.

The question ultimately will be what was done in particular since 1995 and what was the state of affairs as at January 2003 - a matter as to which I would submit is of critical significance, but as to which this witness

cannot make any contribution. This is not to be critical of the witness because he played this role in 1994. It is set out what the circumstances were as to that and I would submit that this is simply not helpful at this time. Even with clarification as to the premise, it would not be helpful.

THE CORONER: I wish to hear this information, Mr Johnson. Certainly the court has the report. The court has all the reports and the court has all the briefings and, I suppose, to take your argument to its extreme, Mr Johnson, the court would not need to hear evidence from any witnesses. Maybe you have had an opportunity to read every part of the report, Mr Johnson. I have not in any great detail. I certainly am aware of what is in the brief, but I do not at this stage recall what I have read in great detail, and I would be assisted with Mr McBeth giving this evidence.

MR JOHNSON: As the court pleases.

MR WOODWARD: Can I add, your Worship, in my submission it is a real issue in this case as to what was in fact done between 1994 and 2003, and it is helpful to your Worship to have, albeit relatively general, some impression of the level of fuel management that had been undertaken, what sort of difficulties or what issues there were present in 1994 as observed by this witness, in order to get an impression as to what was done in the period between then and 2003.

THE CORONER: Yes, I accept that.

MR WOODWARD: You mentioned the extensions in the backyards. What else did you observe in the areas that you visited about those sorts of issues, in particular the fuel loads?

THE CORONER: Perhaps just on that point, though, that Mr Johnson raised, when you're

talking about backyards, are you talking about any specific area in Canberra or just generally speaking.
A. Yes, it's mentioned in the report.

Q. What areas were they, for the benefit of those who don't have a copy.
A. I don't know, your Worship, without reading the entire report, but it is specified in there which park was involved in that particular matter.

MR WOODWARD: We may get to that in due course, your Worship.
A. Yes, I also observed vast accumulations of fuel or brash underneath pine forest plantations where flame length propagation would extend out of the forest reserves on to bitumen roads and, in one instance, into the playground of a school.

Q. Do you recall which pine plantation that one was?
A. No, I don't, but I'm sure there's a note in here somewhere about it.

Q. Yes. But those are the pine plantations. What about the nature parks and conservation areas?
A. The nature parks and conservation areas can't be lumped together as some of the forest fuels and others are grassland. However, it was evident to me that there was a degree of neglect or lack of rigour in regard to annual maintenance programs of fuel reduction across all the forest types which I viewed. So insufficient was being done to protect the community and/or the parks. It was quite evident to me that, on the event of a conflagration fire, deaths like Mrs Tenner's would occur.

MR JOHNSON: As to that I'd object, your Worship. This involves the very question of whether the witness making observations in

1994 can express any opinion about the events of 2003. There are nine years difference. There are events that ultimately - it may be that he's able to do it ultimately, but after there is evidence as to one, the circumstances of the fire, the cause and origin; secondly, as to what in fact happened with respect to land management, fuel reduction and firefighting practices in the ACT between 1994 and 2003 - if this evidence is to be adduced, I would submit the appropriate time is later in the inquest.

The problem right now is - and I'm conscious that what's happening is that questions are being asked by my friend and the witness in fact is perhaps going further with the answer. That perhaps illustrates the very difficulty. I'm conscious of what the court said about wishing to find out what the factual position was in 1994, and, if the witness can identify with some specificity what he observed in different places, that may assist the court. But what's going beyond that right now is the very problem that I sought to identify in the earlier submission, I put to your Worship, and it's to be guarded against in what would be a lengthy inquest because it can only complicate, I would submit.

THE CORONER: Yes, thank you, Mr Johnson.

MR WOODWARD: At page --
A. Could I just finish on that?

Q. I want to come to specific references in the report, Mr McBeth, where you talk about your concerns as to what might happen on the conflagration event, and perhaps that might be an appropriate time at which to go back to that issue.

In addition to the program that you've outlined at pages 12, 13 and 14 of your report, you also requested submissions from agencies in relation to the practices then being undertaken, and

these are referred to at page 15 of your report. But, as I understand your report, the only submission you did receive was a submission from the ACT Bushfire Council; is that correct?
A. That's correct.

Q. And that's an attachment to your report?
A. It is.

Q. And in your report, you - and I want to come to this briefly later - you set out, if you like, a commentary on the various paragraphs of that Bushfire Council submission?
A. I did.

Q. And you received no other submissions; is that correct?
A. That's correct.

Q. Finally, in terms of preparation of your report, Mr McBeth, at page 20 of your report, which is at 0026, you refer to down the page towards the bottom, "Public perceptions and a socio political perspective", that heading:

> After discussing the issues with departmental staff, I considered it appropriate to seek the opinions of rural urban interface residents. Therefore, during the evenings of 30 and 31 May and 1 June 1994, I visited a number of suburbs where interface issues arise.

You set out in the following four pages a summary of what you learnt from those discussions that you held with those residents; is that correct?
A. Correct.

Q. And you set out also at the top of page 21, which is the following page in the document, the areas visited, and the first of those is Stromlo Pine Forest, houses off

Warragamba Road. Why did you choose that area, Mr McBeth?
A. Because it was blatantly apparent to me, with the knowledge that I have, that it would be one of the first places to disappear in a conflagration event.

Q. The other places - your selection of the other places, was that for similar reasons?
A. Yes.

Q. Finally - I think I said finally last time, but I forgot to mention the documents that you also looked at, and those are listed at appendix 1 of your report, following page 35. Were those documents incidentally documents that you were provided with, or did it provide a combination of some that you were given and others that you took upon yourself to find and review?
A. It was a combination of both.

Q. Yes. Does that in effect summarise the work and research you under took for the purposes of the preparation of the report, those four areas of investigation?
A. It does.

Q. I don't want to go to the report in minute detail, Mr McBeth, but there are some issues I'd like to ask you about. Starting on page 2 where you set out what I understand to be - and this is at 0008 of the document and over the page, you set out verbatim, I think, the terms of reference that were provided to you; is that correct?
A. This is page?

Q. It's page 2 of your report.
A. Yes.

Q. Under the heading "The project and the process".
A. Correct.

Q. That is just a verbatim statement of what appears in the attachment document we referred to earlier?
A. It is.

Q. Perhaps if you could explain, because it's relevant to what you then did, what you understood by the ambit of those terms of reference?
A. Well, I understood my role to be that of an examination of what the Parks Service effectively did to reduce the impact and spread of fire throughout its lands within the ACT and the associated impacts that could occur on built assets and people.

Q. And so in that sense you were looking at the practices that were then currently in force; is that correct?
A. Yes.

Q. And were you asked - I think in paragraph 3 - did you understand that to be asking you to reflect upon how effective those practices were?
A. Indeed.

Q. And finally, over the page, under the heading "The outcome", there's a list of bullet points, concluding with the expert's recommendations. It's not apparent to me from the terms of reference, Mr McBeth, what sorts of recommendations were you being asked to give, as you understood it?
A. As I understood it, I was to give a set of recommendations which would improve the effectiveness of the ACT Parks Service through examining the bushfire continuum as it applied to them, which is prevention, protection, control, suppression and management and recovery from bushfire scenarios.

Q. So in other words to the extent that you found that the practices which you identified may not have been effective, as you understood

it you were being asked to suggest ways of improving those practices?
A. Absolutely.

Q. At the top of page 4 of your report, Mr McBeth, I think you set out, in effect, what you referred to earlier - that is, your concern at least that - or at least the theme that dominates the report, I suggest, that bushfire has not recognised nor conformed to cadastral boundaries being lines on maps, fences and property boundaries. You there set out in capital letters:

> Therefore, the author contends that no portion of land within the ACT should be considered, treated or managed in isolation of the whole.

That, in effect, permeates the balance of your report; is that correct?
A. That's correct.

Q. You then deal with some issues relating to fire fuels, but, over the page, on page 6, which is 0012, you make some reference specifically relevant to the ACT. If I just read this to you and then ask you to perhaps elaborate to some extent on what message you were trying to convey:

> Fires of the intensity described and far greater are beyond the capacity of any fire service to contain or suppress, irrespective of the service's physical volume, equipment resource or competence. Fortunately the ACT urban rural interface does not contain significant escarpment or ridge line residential area, where fire intensities generated by fire running uphill can be far in excess of the conditions described for the ACT.

And you refer to Mount Macedon and so on.

Could you perhaps explain what you mean by that and how it's relevant to the fuel management issue?

A. Well, the way Canberra has been laid out lends itself to very, very effective bushfire prevention protection, on the proviso that the fuels are managed. It was my view that the fuels weren't being managed appropriately.

Q. So you weren't saying there that it followed from that that fuel management was a lesser concern than perhaps in the areas that you've referred to?

A. No, what I'm saying is that, if the fuels were managed in a reasonable and appropriate way, as they were, for argument's sake, in Victoria or South Australia, then the likelihood of severe impact would be reduced significantly when you get conflagration fires occurring. If you've done the prevention work in terms of fuel reduction and you've got an adequate access track network, plenty of access and all this work completed, then it's far easier to put into place strategies to reduce the likely spread and impact of those fires through controlled burning, additional prescribed fire, whatever.

Q. And again, in the following paragraph you make a point that I think you make elsewhere in the report:

> To reduce the impact of the type of fire disaster that will occur in the ACT, resulting in the loss of life and significant property damage, individuals, families, street communities and government agencies as a whole must manage the only manageable component of fire physics, in a collective cooperative manner.

Then you go on to describe what the fire physics are. Just focussing for a minute on the issue of cooperation between those various

groups identified, was it your observation at the time that that had been occurring?
A. No, it was my observation that it was the reverse, that agencies were effectively doing their own thing in isolation of others and, more importantly, the community was completely naive or uneducated about the likely degree of impact that would occur as a result of conflagration fires.

Q. Were you given any information about the community education or any community education campaigns that might have addressed that at the time?
A. Yes, I was. And there was an admission from those who gave me that information that the major program had failed.

MR JOHNSON: The question is if something is handed over, something is said, who and when. If this evidence is to be heard by your Worship, and I've already placed an objection on the record, but it is a question - and there isn't a statement that's coming forward. I'm conscious that what'shappening is my friend is asking the witness to speak to a report, but there are degrees of elaboration, and if they are to be at all helpful and if I'm to have any chance to get any instructions between now and a future time if this witness is to return, there has to be some clarity.

THE CORONER: I agree with that, Mr Johnson. That's a fair comment. If Mr McBeth does have this information, it would be helpful.

MR WOODWARD: There's a specific reference later in the report to that very program and I was going to ask Mr McBeth about that in more detail. But if it assists your Worship, that was the community - I'm trying to get the name of it up, and you do refer to it later in your report. Just excuse me for a moment, your Worship. Yes, there's a reference on page 0048, which is actually in the submission from

the Bushfire Council in paragraph 15. I'll read that to you:

> Council is also aware that the ACT Parks and Conservation Service and Forests use volunteers for a wide range of purposes including areas related to fire management such as education about fire management; fire trail maintenance and neighbourhood firewatch. They are not Rural Fire Service members and are not trained firefighters.

In your comments in response to the submission you say:

> I'm advised that the neighbourhood firewatch project failed some time ago.

Who advised you of that?
A. Peter Lucas-Smith.

MR WOODWARD: If that's a convenient time, your Worship.

THE CORONER: We'll take the luncheon adjournment and resume at 2 o'clock.

ADJOURNED [1:01pm]
RESUMED [2:00pm]

THE CORONER: Mr McBeth, you're still under the oath that you took this morning.

MR WOODWARD: Before the luncheon adjournment, Mr McBeth, I'd referred you to passages in your report at page 6 which deals with the - under heading "fire fuels". You conclude that section of your report on pages 8 and 9, and if I can just read to you those few paragraphs and then I'll ask you to provide some comments:

> As a psychological consequence of not

> being subjected to the traumas of fires such as Hobart 1967, the Ash Wednesday events of South Australia and Victoria 1983 and latterly the milder 1994 fires in New South Wales, the collective ACT psyche subconscious says "it won't happen to me or mine" as the community has not been directly impacted by a single fire disaster or multiple wildlife conflagration event for a significant period of time. The author contends it is not if such conflagration fire disasters will occur in the ACT and on its urban rural interface, but when. The only effective strategy to ameliorate the impact of such an event or events in the ACT is to resource the bushfire continuum functions appropriately. The ACT Parks and Conservation Service is but one component of that process.

So in that section you're again referring to your concern that it's simply not possible to provide an effective bushfire fuel management by dealing with one agency in isolation?
A. Absolutely, correct.

Q. And you referred earlier to your expectation about what was going to happen, and that's reflected in that paragraph as well?
A. It is.

Q. We then move on in your report, Mr McBeth, to what you've headed up "The Process Environmental Policy Matters", and I don't want to read this section, but at page 10 of your report, 0016, on the second half of that page, you set out in the paragraph commencing:

> The bushfire management practices activities and programs...

Et cetera. Is it correct that that is in effect your response to the terms of reference

to the extent they asked you to comment on was what they were doing effective?
A. Yes, that was my understanding.

Q. And in response to that you said:

> The effect of the programs implemented by the service and other ACT land management agencies does not, in the author's view, provide adequate safeguard against the impacts of major single or multiple (conflagration) wildfire events in the ACT.

A. Correct.

Q. And you then later on in the report provide some recommendations which you believe addressed those issues?
A. 40 of them I think.

Q. Yes. Over the page, Mr McBeth, you refer and in effect adopt a report by Mr Phillip Cheney on the Hannon Group report which deals with the structure of the ACT Bushfire Fire Council and other matters, and you actually attached that, Mr Cheney's report, to your own report; is that correct?
A. I did.

Q. I want to ask you about some passages that appear in Mr Cheney's report more specifically and ask you to provide more specific comment other than just adopting that in its entirety, as to your view in relation to the matters referred to by Mr Cheney. Mr Cheney's report starts at page 0052 and it's attachment 2 to your report. Do you have it there in front of you?
A. I'm sure it's here somewhere. Right, I've got it.

Q. Under the heading "Summary" at 0052 on the second half of the page, the second last bullet point on that page, Mr Cheney's report says:

> Because land managers do not have authority over fire suppression, the organisation of rural fire protection in the ACT is fundamentally flawed. It has been flawed under the organisation of The Bushfire Council and the formation of the Rural Fire Services and it will continue to do so under any of the options of the Hannon Group Report.

What were your observations in relation to that issue at the time you prepared your report?
A. My opinion on that matter is exactly the same as Mr Cheney's.

Q. That is, there needs to be a coincidence of fire suppression with the land management responsibility?
A. Yes.

Q. I'll take you to a couple of the reasons Mr Cheney refers to as to why he had that view and ask you again to comment. Over the page, 0053, again in the bottom half of the page, at paragraph 4, Mr Cheney says:

> Because the consultants [that's the Hannon Group] were from a fire service background within metropolitan fire brigades and not from a land management background, I believe they adopted the attitude that the most appropriate policy for the whole of the ACT is to suppress all fires at minimum area.

Again, Mr McBeth, what was your observation in relation to that issue?
A. Well, that's an ideal which is inevitably not possible.

Q. Not possible in the context of wildfire?
A. Exactly. Unless you have inordinate

amounts of resources and you can respond to an incident on an even moderate day within 20 minutes, you probably won't contain it.

Q. He goes at the end of that paragraph to say:

> A more effective alternative is to place the prime responsibility with the landowner and include a cooperative action between individual home owners and land managers.

Do you agree with that?
A. Absolutely. But I would add that I think that needs to be legislated for.

Q. That is, the cooperation needs to be legislated for?
A. Yes.

Q. And you made some recommendations in this regard in your report?
A. I did.

Q. Again, in a similar vein, on page 4 of that document, which is 0055, again in the second half of the page, Mr Cheney says:

> However, the current arrangement [that is, the arrangement within the Bushfire Council and the Emergency Services Bureau] has further distanced the land managers from their responsibility to put out fires on their own land and left the ACT with a Rural Fire Service which has no land management responsibility and in practice and philosophy differs little from the urban fire brigade.

Further on he says:

> If this occurs it will reinforce the philosophy of a fire brigade to

suppress all fires at minimum area. This philosophy is not appropriate for the suppression of rural fires or for fire management in rural areas or for planning defence against conflagration fire in order to minimise fire damage.

I take it from your comments earlier that you'd agree with that --
A. Yes.

Q. -- for that reason?
A. Yes.

Q. Two pages further on, at paragraph 13 of Mr Cheney's report, 0056, the top half of the page, part way through paragraph 13, he says:

> This is why the responsibility for fire suppression must rest with the rural land manager. Our recent experience within the ACT clearly demonstrates that if the land managers do not have the responsibility for fire suppression, then they will be recalcitrant about fire management and not take the appropriate actions to help reduce the intensity of a fire which may burn through areas under their control. Although the BFC [Bushfire Council] has been requesting land managers to undertake fuel reduction, practically nothing has been done over the last decade.

Again, Mr McBeth, is that consistent with your own observations?
A. Completely consistent with what I found when I came here.

Q. Perhaps dividing that up, the reference to recalcitrant, is that something you observed?
A. It was.

Q. And did you have any direct experience of

requests by the BFC or for that matter anyone else in relation to attempts to improve the fuel reduction regime?
A. The only people that I recall had the level of anxiety about the issue that I thought was appropriate were Peter Lucas-Smith and his technical support officer, whose name escapes me immediately.

Q. Mr McRae?
A. Mr McRae. I found that both forests and parks lacked the degree of understanding and the emphasis on this issue that is required when you've got an enormous urban population next to these fuel loads.

Q. And was it your impression or opinion at the time that that resulted from the fact, at least in part, of this failure to have a coincidence of interests between those responsible for fire suppression and those responsible for land management?
A. I'm sure it is.

Q. Did you have discussions with Mr Lucas-Smith about that?
A. I did.

Q. Perhaps I should ask you what you said earlier. Is that the essence of what he expressed - the views he expressed to you about this matter?
A. Yes.

Q. Unfortunately this is rather a long passage but I do think it's of assistance to your Worship for me to read this section of Mr Cheney's report. It commences in paragraph 18 on page 0057, which is page 6 of the document you have, Mr McBeth. Down at the bottom of the page, under the heading "Potential for Conflagration":

> The fundamental basis for disaster management, which includes bushfires

in Australia, is to carry out an analysis of the worst-case scenario.

Pausing there, is that the approach you took to your report?
A. Yes.

Q. Our knowledge of fire behaviour and fire weather is adequate to realistically put a worse-case scenario to the people of the ACT and perhaps to estimate a frequency of occurrence and to estimate the damage which is done. We know that, no matter how good a fire prevention program we create, we cannot eliminate all sources of ignition. Even in a perfect world where there is no malicious lightning and no accidents, there would still be ignitions from lightning.

I think that should be "no malicious lighting".

We also know that fire weather conditions will occur periodically over the ACT where a single ignition will be uncontrollable by any means and regardless of the efficiency of the fire suppression organisation in place, an extensive area will be burnt.

Again, pausing there, was that your view at the time?
A. It was my view at the time. However, if the measures that have been recommended in this report of mine had been put into place, the intensity and impact and spread of some of those fires would have been significantly altered.

Q. In the next section, Mr Cheney deals with the very issue we spoke of earlier, namely the capacity of even the world resources fire suppression unit to deal with this type of

fire. He says commencing at paragraph 20:

> My estimate is that a one-fifty-year conflagration fire will burn a total area of around 60,000 hectares in one day and severely damage suburban dwellings where they are adjacent to forests, hill parks and nature reserves. Under this scenario, the firefighting resources of the ACT will be totally overwhelmed. They will not have enough tankers or pumpers to attend every house threatened, and by and large destruction will be limited only by the action that residents themselves take both before the fire occurs to reduce the fuels around their homes and during the fire to suppress embers and spot fires starting in their gardens and dwellings.

He says:

> In a year such as this summer [that is the summer of 1991 - I presume 1990/1991, when his report was written] it is easy to develop an apathetic attitude towards bushfires. However, it is not the average fire season which does the major damage. It is that season where you get a combination of drought, high winds, high temperatures, low humidities and an ignition source combined a pre-existing heavy fuel load that lead to conflagration fires which in over all do 90% to 95% of the total damage of all fires.

From your own considerable experience, what would you say about those observations?
A. I agree completely with what Mr Cheney has written.

Q. I won't read the next three paragraphs, Mr McBeth, but I will just mention that they provide a summary of a fire that occurred in California, which, according to Mr Cheney, has one of the most advanced firefighting capabilities and yet led to serious loss of life and property on the urban rural interface. He says at the conclusion of paragraph 23:

> Now, a number of fire authorities in America have been forced to recognise the concept of defensible space in which a key to providing protection for home units in the suburban/rural interface is a neighbourhood program which coordinates activities to reduce fuels, control tree planting and provide for an urban development in which firefighting and individual home protection can be undertaken by the residents themselves.

Do you have any direct knowledge of that fire and the response to it as outlined by Mr Cheney? I was going to say direct knowledge. Is that within your area of experience in terms of your expertise in the area?
A. I believe so. The South Australian Country Fire Service has established such bushfire prevention programs and processes with local communities at a street level and at a community level and then at a town level and then regional level. So I concur with what he says.

Q. Just before the break, we referred to the program we were told about at the time of your research. Apart from that program were you given any information about any other community education programs that were being pursued at that time?
A. No, I wasn't, and I don't believe there were any other programs being pursued at that time.

Q. Was that belief based on the discussions you had with residents in areas that you preferred to deal in?
A. It was as a consequence principally of discussing the matters with officers in parks and Peter Lucas-Smith and his personnel.

Q. Mr McRae --
A. And also with discussions I had with local people out in the community.

Q. Finally, he says:

> In the ACT we have been moving away from the traditional Australian model, whereby rural fires are fought by the cooperative action of individual land-holders organised into volunteer fire brigades and moving towards replacing them with a full-time, paid firefighting service. If we continue to do this we will soon take all incentive away from individuals to protect their homes.

What's your view on that issue?
A. My view is that the populous of Canberra, by comparison with all the other cities I've worked in, have an almost belief that the government will provide, and that it isn't really their responsibility to get involved in this sort of work. It's the responsibility of the authorities to provide the community with that level of protection, which of course is totally inappropriate.

Q. I take it you say it's inappropriate for the reasons referred to by Mr Cheney in his report?
A. Yes.

Q. Just returning to your report now, Mr McBeth, on page 14 of the report, which is 0020 in the brief. I think the very point you have just made appear in the final sentence on that

page:

> It is alarming to find that the apparent levels of complacency, ignorance or intransigence that appears to pervade ACT Government agencies charged with land management bushfire-related accountabilities.

Although that's a reference to the land agencies, not the residents; is that correct?
A. Yes, that's correct.

Q. So you had a similar concern about those agencies?
A. I had the same concern about the residents and their attitude or level of understanding as I did for the agencies concerned. Exactly the same concern.

Q. Commencing on page 15 of your report, 0021, you deal with the ACT Bushfire Council submission. Can I ask you about the passage that appears in the middle of that page, where you say:

> It should be noted that some council members did not participate in the drafting process of councils' submission nor necessarily agree with, or have sighted, the final document prior to it being submitted to me.

A. Correct.

Q. How were you aware of that?
A. I was told by a number of people that they hadn't had an input and they weren't aware that I had received the final document.

Q. When you say a number of people, you mean members of the council?
A. Yes.

Q. Can you recall who?

A. No, I can't. But it was at least two.

Q. Just excuse me for a moment. (Pause) Mr McBeth, and I won't ask you to read this part of the page, but so you Worship is aware of it, on page 23 under the heading "Conclusion", you deal there in particular with aspects of the nature of the ACT or Canberra community and how that may have contributed to there being a less than adequate appreciation of the risks faced by the community and in particular you mentioned the vast majority of these people came from other urban communities with no tradition, experience or understanding of living in the bush or with successive bushfires. And was that a view you formed based on again discussions with people within the community?

A. With those people that I talked to as I went around to all those inspections, yes.

Q. You commence your summary of your findings on page 24. We've covered much of this already, but I just want to ask you about what appears at the very end of that summary, page 26 to 27, where you say this:

> Culturally, socially, politically and departmentally, the ACT community is and has been lulled into a sense of false security with regard to ravages of bushfire. If the existing government statutes, departmental structures, reporting relationships and programs of wildfire mitigation works continue as currently structured, it is inevitable that significant loss of assets will accrue, together with loss of life during the next single, multiple or conflagration fire event. The urban rural interface will obviously bear the brunt of such losses.

Over on page 27, which is 0033:

> The author stresses a set of climatic conditions will eventuate producing fire weather conditions of such an intensity that such losses will occur. It is not if such a disaster will occur, but when.

You then comment on the next current fire season. Mr McBeth, comments have been made in the press and elsewhere in relation to the events of January 2003 that the extent of the damage caused by those fires could not have been predicted. Based on what you've said in your report, what's your response to that?

MR JOHNSON: As to that, this is an issue that I raised earlier, you Worship. The witness has been asked to comment on statements in the press. What the witness is really being asked to do is to express an opinion based upon his observations and opinions in 1994 with respect to events in 2003, which must have regard to a whole lot of factual information, fuel loading, land management practices, the fire behaviour, quite apart from the question of the current approach in 2003 to fighting bushfires. He's really being asked to express an ultimate opinion about the 2003 fires, and although it's being asked in the way it is, that's really what's being asked, and in my submission, if that question is to be asked, it ought to wait to a time in this inquest when there is a body of evidence before this inquest which may provide a factual foundation for the answer. To ask the witness to comment in that way, in my submission, is to seek his opinion on the actual fires this year when, as I understand it, he hasn't been commissioned to prepare a report. We've seen no further report on those matters where he has regard to the factual conditions as they are now, including the approach to fuel management since 1994.

So I would submit that it is a question which

should not be allowed. There is of course a question as to the inter-relationship between the opinions expressed, the views expressed by the witness in 1994, which can ultimately be tested against the body of evidence which will be before the court, and there is scope for argument to take place perhaps, witnesses to be asked questions, ultimately experts will be asked questions as to whether what was identified by the witness in 1994 is applicable to what occurred in 2003. But in my submission, on day two of phase 1, at the very preliminary stage of this inquest, this is not the appropriate time to ask the question. That is not to say it should never be asked, but at this stage it should not be allowed, I submit.

THE CORONER: What do you say, Mr Woodward? I'm just thinking whether or not it's fair to ask Mr McBeth that question.
A. I'm quite happy to answer it.

THE CORONER: I'm sure you are.

MR WOODWARD: I'm sure he's happy to answer it. You Worship, this is an inquest and in those circumstances, ultimately it's a matter for you Worship to attribute weight to evidence. This is an early stage in the inquest. It happens to be the point at which this witness has been called. He has considerable expertise. If ultimately the evidence is that the nature of the threat was so changed between 1994 and 2003 that any answer that he gives to this question is of no use to you Worship, then so be it, but as things stand at the moment, in my submission, if the evidence is to the contrary, namely that little had changed, then you Worship will be assisted by an answer from this witness, who is clearly an expert in the area, and has expressed views in 1994 which are relevant to the very issue that I put to him; namely, was this predictable?

MR JOHNSON: Could I be heard further on that?

What ultimately has been put by my friend is to reverse the role of an expert witness. An expert witness either has certain facts which he identifies or is asked to assume, which would provide quite detailed factual foundation before an opinion is to be expressed about an event, in this case an event in 2003. What's just been put is that the witness should be asked to express an opinion based upon his observations in 1994 as to what occurred in 2003 and that that opinion should be given now unless a factual foundation for a contrary view is somehow put forward in the future. It demonstrates the danger and, in my submission, the objection to what's sought to be done. If what my friend wanted to do was to seek an expert opinion from Mr McBeth, a report could have been obtained, perhaps which set out a whole series of factual assumptions, which at least would provide a factual substratum for the opinion and put those of us at the bar table who were hearing it in a position where we could consider what the factual substratum is and determine whether we wish to test it at this stage. What's happening now is not that, I submit, and I would submit it should not occur at this time. To ask the question in this way, without factual assumptions, based upon known facts as at January 2003 ought not to be allowed, in my submission.

THE CORONER: I understood what Mr Woodward was suggesting to be slightly different to perhaps the way that you understood it, Mr Johnson. I don't know which one of our understandings is probably more accurate. But I would welcome and value what Mr McBeth has to say in relation to any comment that he wishes to make on what happened in Canberra in 2003, based on the information that he had on what was happening in Canberra in 1994 when he indeed examined the area. If it's shown through the course of this inquest that all the information and all the - I suppose the evidence shows that different planning occurred from 1994 to 2003, then Mr

McBeth's opinion perhaps on this question is not worth much - not much weight can be given to his ultimate conclusion, but if on the other hand that situation is not so, then his opinion does have some value. So I'll allow that question to be answered, Mr Woodward.

MR WOODWARD: Mr McBeth, I think you've already given an answer, but if you'd like me to repeat the question.
A. I'd like you to repeat the question again.

Q. What I asked you was whether - and perhaps I'll put it in a slightly different way. Based on what you observed and the inquiries you made in 1994, do you think an event such as that that occurred in 2003 was predictable?
A. Totally predictable, based on pure fire physics, the fact that there was a drought, the weather conditions on the day, the available fire fuels, spotting distances. It's all documented. It all indicated basic fire physics, basic fire management, basic - it's fundamental. It's basic to the whole process of managing and predicting fires. And I visited the ACT on a number of occasions between 1994 and 1999 and I saw no material difference in the way the forests were being managed or the fuels were being manipulated.

Q. Thank you, Mr McBeth. The recommendations - as you say there are 40 of them - are very detailed and they're all available to be read. I don't propose to go through them because to some extent - I don't mean by doing that to in any extent diminish them - but to some extent at least in this regard your report was overtaken by events. But I did want to ask you a little bit about the aftermath of the report. Your report was submitted in about October of 1994; is that correct?
A. It was.

Q. And how was it received, Mr McBeth?
A. If I could go back one step, I advised the

parks service that I would be providing a report which didn't meet the conditions that they'd set down as the terms of reference, that I had to go outside them because of the level of risk and hazard to the community. I wasn't at all surprised at the response when they effectively refused to receive the report.

Q. And that refusal was in the form of a letter to you dated November 1994, which is in that bundle of documents that you have there?
A. Correct.

Q. It's [AUS.AFP.0076.0166], from Mr Crostin. You received that letter?
A. I did.

Q. He says in the second paragraph:

> Your report has moved beyond the agreed scope at the expense of providing 2 required specific recommendations which we were seeking.

Two questions about that, Mr McBeth - I think from what you have said before, you agree that your report went beyond the scope of the terms of reference?
A. It did and it had to.

Q. Yes. What did you understand to be the specific recommendations which you were seeking, having regard to the fact that the terms of reference don't actually set out what recommendations are being sought?
A. Well, yes, that's a problem in itself. I believe that I had looked at, as well as possible, what needed to occur within the parks service under its legislative responsibilities and so I had met all the prerequisites, if you like, and then gone beyond them, including everything else.

Q. I see. He then goes on to say:

> I request that you resubmit your report, including only detail on the current management practices of the parks and conservation service and how these can be improved within the existing government structure.

In your view, Mr McBeth, was that possible; that is, to improve materially the management practices of just that service within the existing structure?
A. No, it wasn't, and I believe that ultimately when this event occurred, which we're now sitting in, I would have been found to be culpably negligent myself if I hadn't pointed out everything that I did.

Q. Did you have any discussions about that issue after that letter was received?
A. Yes, I had a number of discussions. Effectively, the department was asking me to remove certain sections of the report and I refused, again for the same reasons of having to face a coronial and possibly civil litigation later. And I said that my report would stand as it was and I wasn't prepared to alter a word.

Q. You then had some correspondence, I think, with both Mr Crostin and also you sent a letter to Mr Lamont, the Deputy Chief Minister and Minister for Urban Development, on 25 January 1995, which is in that bundle, [AUS.AFP.0040.0068], where you explain the circumstances in which the report was prepared. You say in the final paragraph on page 2:

> I would suggest that you discuss this matter with the Chief Fire Control Officer for the ACT, Mr P Lucas-Smith, who is in a position to elaborate first-hand the frustrations and difficulties that exist in some quarters concerning the assistance given to the author in developing this

> opinion and the potential civil litigation implications if the ACT Government fails to act on the recommendations contained within the author's report.

Did you have some discussions with Mr Lucas-Smith to that effect?
A. Yes, I did. Peter and I have known each other professionally for nearly 20 years I think and obviously we discussed all these issues in great depth.

Q. And what frustrations are you referring to that Mr Lucas-Smith could assist with?
A. I don't recall the detail now.

Q. You received a response from Mr Crostin on 9 February, which is a document in that bundle which concludes:

> As I believe that the services provide all of the required information [that is information to you] and given your reluctance to resubmit the report as requested, I unfortunately have no alternative but to withhold payment and seek the provision of another fire management expert opinion from elsewhere.

That's what happened, isn't it, Mr McBeth, you weren't paid for your report?
A. No, I wasn't paid for that report by that government.

Q. At that time?
A. Yes.

Q. Shortly after that time, Mr McBeth, and it's the second last page of the bundle, there's a press release from ACT Parks and Conservation Service, which refers to the circumstances in which your report was rejected and it concludes, and this is at

[AUS.AFP.0040.0063]:

> The service has recently assessed its fire management hazard product practices in conjunction with the Department of Urban Services and both organisations are satisfied the current practices are effective.

Are you aware as to what that assessment comprised?
A. No, I'm not. It certainly wasn't based on my report.

Q. Finally, Mr McBeth, there's a report in that bundle you have, a report in the 'Canberra Times' of Thursday, February 16, 1995, where you're quoted as making some comments, and I hope I don't offend anyone by asking you this question, but I'll read to you those quotes and get you to comment on whether or not those are accurate quotes as best you can recall. You are said to have said:

> There are profound problems in Canberra that need to be addressed concerning bushfire prevention. I admit I might have gone further than the terms of reference, but that is because there were problems that had to be pointed out. The money they owe me is the least of my concerns. My concern is that I have seen many firefighters lose their lives and I've seen people and children burnt and I don't want to have to appear in a Coroners court in the ACT in the next year or so and say, "Well, I told them so".

Do those accurately reflect the comments you made to the 'Canberra Times' reporter?
A. They do.

Q. Just one final matter, Mr McBeth, and if I

can just introduce this by referring your Worship to the Hansard for the Legislative Assembly for the Australian Capital Territory at page 3646 for week 11, 26 September.

MR STITT: Is there a copy of that available?

MR WOODWARD: There isn't a copy available, your Worship. It's of 1996. My learned leader referred in his opening to the change of government leading to the payment for the report. I just thought it might be a convenient way to introduce this topic by just reading from that Hansard extract. As I understand it, it's not at all controversial:

> Members of the Assembly will recall the serious impacts of the bushfires in Sydney...

I beg your pardon, your Worship, this is a speech by a Mr Humphreys, I believe, following the change of government in 1996 and introducing amendments to the Bushfire Act:

> An independent consultant engaged by Parks and Conservation Service was critical of some of the bushfire fuel management practices followed by land managers. That report was undertaken by the former deputy chief of the South Australian Country Fire Service, Howard McBeth. Mr McBeth's report was never accepted by the former government and was put in the bottom drawer, never to be seen again - until the election that is. During the 1995 election campaign, I released Mr McBeth's report. Not only had its contents been ignored and suppressed by the Follet government, but to add insult to injury they refused to pay Mr McBeth for his work. Immediately upon coming to government I ordered that payment be made. I also

established the bushfire fuel management task force under the chairmanship of Mr Graham Glenn AO to review bushfire fuel management practices. On 21 August 1995 I released the findings of the task force for comment by relevant agencies, interest groups and individuals. During that consultation process a number of comments were received, adding value to the task force outcomes.

Mr McBeth, at least the establishment of such a task force in effect was one of your recommendations; is that correct?
A. It was.

Q. Did you play any role at all in that task force or in relation to the report that was subsequently produced?
A. No, I didn't.

Q. Were you asked to comment on the report at the time?
A. No, I wasn't.

Q. Have you since had a look at the report?
A. I've looked at the report in the last four days.

Q. Without wanting to go into too much detail, Mr McBeth, I'd ask you to comment on whether or not in your opinion the report meets the concerns raised by you in your report, and if so, what extent?
A. It raises most of the concerns that I raised, but not all of them. And identifies in some depth or detail enabling strategies to improve the situation here, but I have no idea what actually transpired after the report was received by the government.

MR WOODWARD: I have no further questions.

THE CORONER: That was the Glenn report?

MR WOODWARD: That was the Glenn report, your Worship, which for the assistance of parties is included in the brief in folder 1, and it's [AUS.AFP.0041.0001]. And once Mr McBeth leaves the witness box, your Worship, I'll be going through that report, together with some other documents, to provide a summary of some of the relevant parts of that, if your Worship pleases. Thank you.

THE CORONER: Yes, Mr Johnson.

MR JOHNSON: Thank you, your Worship. As I indicated earlier, there have been a number of matters raised by Mr McBeth orally today as to which I need instructions. I should indicate that it's my current view that I would not wish to ask any questions of Mr McBeth. His report is part of the history. He's just given evidence referring to the Glenn report and no doubt the court will hear evidence as to what's happened since that time.

But in so far as he has raised today some specific aspects relating to certain persons, I would wish to have an opportunity to seek some instructions. If the occasion did arise that I did wish to ask any questions of the witness, if I could speak to counsel assisting, that may or may not occur, I have to say, but I do need a chance to get some instructions. Subject to that, the history of what has occurred since as a result of the report of Mr McBeth is clearly a matter that's relevant and I think it will be the next subject taken up by counsel assisting with the court. So I have no questions at this time. If I do, I'll seek to raise it through counsel assisting.

THE CORONER: When do you expect to know whether or not you will have some questions of Mr McBeth?

MR JOHNSON: I would seek to get some instructions. It may take a few days. There are a few individuals that have been referred to. It's essentially because there wasn't a statement, your Worship. And I'm not being critical. There's a lot of documentation and it's a large inquiry. And it may be that there will be no questions. So I'm not asking that the witness be kept in Canberra in some way in a sort of holding pattern.

THE CORONER: You're simply flagging that if there is an issue, that it may be subject to your availability, Mr McBeth. It might be necessary for you to come back, if you're able to do so at some later stage. But not necessarily to stay on now.
A. I'm here until Friday afternoon, your Worship, anyway.

THE CORONER: Well, there we go. But it may well be that in the interim, Mr Johnson's issues might be addressed. We might be aware of that before Friday.

MR JOHNSON: I'll see what I can do, your Worship.

THE CORONER: That's as much as you can take it.

MR JOHNSON: I've placed on the record what your position is. Thank you, your Worship.

THE CORONER: Do you have any questions, Mr Stitt?

MR STITT: Yes, thank you.

<CROSS-EXAMINATION BY MR STITT

MR STITT: Mr McBeth, I want to ask you some questions about fire intensity. Do you agree with this proposition, that fire intensity is a calculated number that represents the rate at

which heat is released from a lineal segment of the fire perimeter?
A. I do.

Q. And is the number expressed in kilowatts per metre of fire edge?
A. Kilowatts per square metre of fire front.

Q. Is that lineal metres or square metres?
A. Lineal metres.

Q. Does that mean that at each metre of fire front, a certain quantity of energy expressed in kilowatts is released?
A. It is.

Q. And is the intensity of the fire able to be measured by the number that that kilowatts represents?
A. It can if you've got the instruments capable of standing in front of it, yes.

Q. And I think that the rate of spread obviously depends upon factors such as wind speed?
A. That's one factor, yes.

Q. Fuel load?
A. That's another.

Q. The type of fuel that's being burnt?
A. Agreed.

Q. And I suppose ultimately the direction at which the wind is blowing?
A. Well, the spatial arrangement of the fuel and the direction in which the wind is blowing.

Q. Now, if the wind is intense, does that add to the fire intensity; in other words, if the wind is strong, does that add to the fire intensity?
A. Well, I'd start my response by saying I'm not a fire physicist and you should ask these questions of one of those, but it is my

experience as a firefighter that either can occur.
A. Well, in your report you talk about fire intensities with various fuel components. Do you agree that the intensity of a grass fire may range from 10 kilowatts per metre for a slow moving backing fire in light fuels to around 60,000 kilowatts per metre at the head of a very fast wildfire.
A. Well, it would depend on the fuel load and I would prefer not to comment on that. As I say, I'm not a fire physicist, but I would say that obviously the larger the fuel load, and the greater the wind speed, generally the greater the intensity.

Q. Well, if one assumes that on 18 January the wind speed varied somewhere between 70 kilometres per hour and possibly as high as 200 kilometres per hour, would that have a relevance on the fire intensity?
A. It would in some topography and it wouldn't in others.

Q. Did you in your investigations or inquiries obtain some indication of the fuel load that was available as at January 2003 in the various parts of the ACT where this fire traversed?
A. Yes, I --

Q. What was your assessment of that fuel load?
A. Well, there wasn't one. There were many, because of A, the types of topography and, B, the types of vegetation associations that the fuel loads were in.

Q. Did you make more than one assessment?
A. I did.

Q. What were they, please?
A. They were that if one can generalise, the fuels which were going to impact on the urban rural interface were far higher than they

should have been.

Q. Of what order?
A. I couldn't now give you an order. I didn't physically measure the fuel loads. I should have.

Q. But that also would be a relevant factor, having regard to the question of the intensity of the fire on 18 January?
A. In some areas, yes.

Q. You may not wish to comment, but is it likely that as at 18 January, under the conditions then prevailing in the afternoon, that the fire intensity was as much as 100,000 kilowatts per lineal metre?
A. Well, if that had been the case in the suburbs, nobody would have survived. It may have been the case on the peaks of the up slopes and some of the heavily forested topography.

Q. Have you seen the anecdotal evidence that suggests that things like aluminium boats were utterly charred into dust? Have you seen that anecdotal evidence?
A. I haven't seen it on this fire, but I've experienced similar phenomena in many, many other fires.

Q. Assume that there were anecdotal evidence of aluminium boats being charred to dust. What sort of temperature in your judgment would that indicate the fire possessed at that time?
A. Again, I'm not a fire physicist. You'd need to ask somebody like Caird Ramsay that question. However, again from my firefighting experience on Ash Wednesday in particular, aluminium structures were melting at in excess of 400 kilowatts per square metre of fire front.

Q. I'm sorry, in excess of 400?
A. In excess of 400. It might have been

less.

Q. I see. If there is anecdotal evidence that motor vehicles were burnt right down to the chassis, so that there was only a metal structure left, what sort of temperature would that indicate that the fire possessed at that time?
A. You'd have to ask somebody else that question.

Q. You couldn't comment?
A. No. Pretty damned hot.

Q. In terms of distance travelled, is it a matter of commonsense that the higher the wind, the faster and further the fire will travel, or are there other factors which affect it?
A. There are other factors which affect it.

Q. Such as?
A. Well, the topography, the available fuel, the spatial arrangement of the fuel. Those are some that immediately spring to mind.

Q. Have you investigated at all the pattern of this fire, particularly on the 18th, so far as distance travelled and time within which that distance was covered by the fire?
A. No, I haven't.

Q. So you wouldn't be able to comment as to whether it was quickly approaching Canberra or whether it was slowly approaching Canberra or whether there was a reasonable judgment to be made about its likely arrival at the Canberra suburbs?
A. I would say it was travelling at the speed that most conflagration fire events travel at, which is relatively fast.

Q. I'm sorry to press you, but can you give us some indication of what you mean by "relatively fast"? How fast is "relatively fast"?

A. Again, I can only speak from experience and relatively fast can be up to about 45, 46 kilometres an hour, with a spotting distance of only 600 metres.

Q. And what sort of wind intensity would generate that degree of speed of travel of fire?
A. Consistently over 60 kilometres an hour, gusting over 80.

Q. Are you familiar with the concept of down bursts?
A. I don't know the term.

Q. Are you familiar with the concept of intense vortices around the fire?
A. Oh, yes, absolutely.

Q. And the fire sometimes itself generates additional wind conditions; is that so?
A. I would contend that all fires do that. It's just a degree of magnitude.

Q. I see. And is that a factor that needs to be taken into account when making assessments as to the distance over which the fire might travel and the speed at which it might travel?
A. It always has to be borne in mind that that sort of event may be occurring or about to occur.

Q. So you say it is a factor that you should take into account?
A. You should attempt to, but it's very difficult to predict where vortices or firestorms of some form are going to occur.

Q. So would you say it would be extremely difficult to make accurate prognostications about the rate of travel of a fire or the speed at which spotting occurred?
A. No, that's relatively easily calculated.

Q. Why do you say that?

A. From the modelling that's been done since about 1971, models are available whereby you can put into the machine, for want of a better term, all the known parameters and have the rates of spread and spotting distances and the general levels of kilowatts per square metre of fire front thrown out.

Q. Did you make any inquiries as to the spotting distance of this fire, particularly on the 18th of January, in the prevailing conditions?
A. No, I didn't.

Q. Did you obtain any anecdotal evidence that the spotting was many kilometres ahead of the fire front?
A. I've heard anecdotal evidence which suggests that it's no different to any other major fire event.

Q. Which was what?
A. Again, we're generalising, but spotting distances on some of the Ash Wednesday fires were recorded at 12 kilometres and the greatest known spotting distance that I'm aware of is 21.

Q. And what sort of wind prevailing conditions would be present to create that sort of spotting?
A. Over 80 kilometres an hour.

Q. Sorry?
A. Over 80 kilometres an hour possibly. But again I'm not a fire scientist.

Q. You have some familiarity, I understand, with the South Australian Ash Wednesday fires in 1983.
A. Considerable.

Q. Was that a fire which generated an intensity of 100,000-plus kilowatt per square metre?

A. There were over 25 in all and I don't recall the specific intensity levels that were reached on any fire. Suffice to say that they were over 400 kilowatts per square metre on one area that I was physically at on the day.

Q. Well, 100,000 is considerably in excess of 400, isn't it?
A. Oh, yes.

MR STITT: Yes, nothing further. Thank you, Mr McBeth.

<CROSS-EXAMINATION BY MR LOWE

MR LOWE: Your Worship, can I just ask two questions, please.

THE CORONER: Yes.

MR LOWE: In your report you cover the aspects of the equipment and facilities available to firefighting. At that time you made your report, if you could comment generally perhaps to assist on the use of fire suppressants and the impact that they might have on the safety of the fire crews, the efficiency of dealing with the fire itself and the cost-effectiveness of the use of fire suppressants, that might be of use.
A. Fire suppression agencies, your Worship, are used in many different and varied circumstances from aerial bombardments through to personal protection on light- or fast-attack vehicles. Suffice to say that to the best of my knowledge - well, definitely both the State Forest Service in South Australia, that's the commercial government State Forest Service, and the National Parks Service, all use fire suppressants as front-line defence in all their vehicles all the time, and have done for probably 10 years to great advantage.

Q. That use would have been - at the time of the 1994 report, that would have been in use

then?
A. Yes, they were being introduced to fleets of vehicles back then, yes, and the technology was out there. Everybody was aware of it throughout AFAC, so all the fire authorities around the Commonwealth were completely aware of this technology. Most of them were trialling it or if they weren't trialling it they were starting to implement it into fleets of vehicles.

Q. I note from your expertise that you have continued in fire work since 1994 and --
A. For a short time.

Q. And are you aware of a technique called foam and go or roughly like that to protect assets in rural or urban areas?
A. Yes, I am.

Q. Can you explain that?
A. Foam and go is basically - the retardant agent is housed in the water-mixing tanks on a fire appliance and it's laid out around a building or along the edge of a fire track or across a fuel reduction zone to reduce the rate of spread of fire and intensity of the fire and to slow the fire down.

Q. And that has an effect on asset protection?
A. It does have an effect on asset protection and it certainly is useful in the protection of ground crews.

Q. Could it also have an effect on the fire breaks? I noticed earlier you mentioned your evidence in standardised fire breaks throughout August in setting up standards for that. Could you use the fire suppressant there?
A. You could certainly use it as a tool, whilst you were attempting to put in a backburner, for example.

MR LOWE: That's all the questions on that.

Could I ask one other question?

THE CORONER: Yes.

MR LOWE: I hope it's not out of order but tell me if it is.

THE CORONER: Somebody will tell you I'm sure, Mr Lowe.

MR LOWE: You mentioned that you had a discussion with Peter Lucas-Smith about some of the frustrations that he was experiencing and you couldn't remember in detail. Is one of the situations in the ACT that the Chief Fire Control Officer, which Peter Lucas-Smith is, is able to give directions to some land-holders to undertake fire mitigation and hazard control works but is unable to give that direction to land agencies under the control of the government?
A. Oh, absolutely.

Q. Would that be one of his frustrations, do you think?
A. Definitely, and it was covered in the recommendations in my report. The lack of a single chain of command in major or multiple fire events is a recipe for adding to the disaster.

Q. In terms of the fuel hazard reduction programs, that provision does not allow the Chief Fire Control Officer to give direction to hazard reduction; is that correct, on government lands?
A. I think we might be at cross-purposes here to a degree. Obviously if the chief fire officer for all rural lands in the ACT had the power to coordinate and manage the annual fuel reduction program, that would be the ideal circumstance for the ACT.

Q. Thank you. The point I'm trying to make is my understanding is that one of the

frustrations in dealing with the structure is that whilst the rural lands can be directed to do certain things in hazard reduction, those lands which are under the management of the ACT Government are beyond the direction of the Chief Fire Control Officer?
A. That's correct.

THE CORONER: And that's to your understanding of the situation today.
A. Yes, in 1994, yes.

THE CORONER: Yes, Mr Woodward, any re-examination?

<RE-EXAMINATION BY MR WOODWARD

MR WOODWARD: Two matters.

Q. You were asked a moment ago some questions about Mr Lucas-Smith's frustrations in particular directed to the question of ability to force fuel management by government land management agencies. Did Mr Lucas-Smith express any other frustrations to you or what other topics did you discuss with Mr Lucas-Smith in that context?
A. We discussed these issues over many years and we also discussed them during the time I gave this opinion and I got the distinct impression, but you'd have to ask Mr Lucas-Smith, that he was frustrated about every aspect of the bushfire continuum. He was acutely aware what was going to happen at some stage and he was in a position where government agencies in the political process were effectively ignoring what he was saying.

Q. And these are matters he spoke to you about?
A. Yes, indeed.

Q. Were there any other topics covered in your discussions?
A. I honestly don't recall anything specific.

Our conversation ranged across a great deal of material to do with this opinion and on one occasion he sent me out to Hale with his assistant to look at the typical disorganisation between government agencies where fire breaks and fuel access tracks had been established by one agency and another agency had come along and planted eucalypts on it three weeks later. So these are the sorts of frustrations that he and his staff were being faced with.

Q. And he sent you out there specifically to draw your attention to that type of difficulty?
A. He did.

Q. What about resourcing? Was there any discussion about that; that is, the adequacy of resources?
A. Yes, there was discussion about resourcing generally, particularly to support the bushfire prevention process and additional technical people, from memory, to support the development of the statutory obligations that he felt he had and was unable to carry out.

Q. You asked - you were asked some questions by my learned friend Mr Stitt concerning the extent of fire intensities on structures. Structures can also be affected by ember attack; is that correct?
A. They very definitely can.

Q. And that would include motor vehicles and boats and so on around houses, they can be affected by ember attack?
A. Oh, yes. Any structure which has openings, orifices, gaps, particularly at the wind speeds which were present on these fires, or this fire event, it's inevitable that with the wind speeds concerned, rooms can open up, in go the embers or the ash, tiles come down, sheets of corrugated iron fall back then, it sits there and smoulders for 20 minutes or an hour or four hours, there's a wind change and

off it goes or it can bust spontaneously as it goes into the building. There's a whole range of conditions.

Q. The sort of damage that you were asked about can result not only from the effects of the intensity of the fire front but also simply an ember attack leading to the structure concerned actually burning of its own volition?
A. Yes. There are various types of ember attack in any experience. The worst of the lot is pine forest or grass, because the ember load in the atmosphere seems to be far, far greater, and a lot of the material stays alive longer or it is still combusting longer. I'm sorry, I've forgotten the actual point.

Q. More specifically you were asked about the effect on motor vehicle. If a motor vehicle is affected by ember attack and catches fire, what level of destruction would you anticipate would occur or in your experience have you observed?
A. Generally all the combustible materials inside the vehicle burn, plastic materials of various sorts, aluminium componentry, and if the tank doesn't go up, the body remains in a stable condition, but warped.

Q. And if the tank goes up?
A. If the tank goes up, it depends how much fuel is in it.

Q. Total destruction?
A. Oh, yes.

MR WOODWARD: I have nothing further, your Worship. Thank you, Mr McBeth.

THE CORONER: Yes, thank you, Mr McBeth. I won't excuse you, though, subject to Mr Johnson perhaps making some inquiries as to whether or not he has some questions to ask you. For the time being you're excused.
A. Thank you.

THE CORONER: Thank you, Mr McBeth. Yes?

<THE WITNESS WITHDREW

MR WOODWARD: It's now my intention to spend a little bit of time doing the best I can to summarise and refer to only distinct passages of the balance of the material on the issue of fuel management which comprises the latter part of volume 1 of the brief, as well as 2, 3, 4 and 5. I regret that that means that people will probably get sick of hearing my voice, but because of the bulk of that material and the area covered by it, in my submission it will assist your Worship to have identified and for both the public and those participating in the process to have identified those parts of these documents which are considered to be of significance in terms of the future of this inquest. Obviously the matters referred to that I'll be referring to in terms of the evidence are relevant to these issues that will be ultimately a matter for phase 2. I'll be endeavouring, except where I summarise or attempt to summarise extracts, I'll be endeavouring just to identify the relevant sections and read those, which in my submission will assist your Worship.

Your Worship, although we've at least in the chronology moved beyond Mr McBeth to the Glenn report, I did want just briefly to go back to identify two documents in the brief that give at least some impression of the type of regime that was in place before the Glenn report and the fire management manuals that were prepared as a consequence of that report. Your Worship, there are two documents in the brief and in my submission these provide at least some indication of what might be described as the more ad hoc approach to fuel management and I say ad hoc not in any sense to criticise but rather just to identify the fact that it appears that fuel management was being performed on certainly an agency-by-agency

basis and in some respects also an area-by-area basis. There is in the report, your Worship, a document in folder 2. It's at [AUS.AFP.0035.0044], which is fire management plan for the Namadgi National Park as at March 1990. I'll move through this relatively quickly, your Worship, but just to draw attention to some of the matters that were covered by that report for the sake of comparison as to what occurred later on in 1990 and into 2000, into that decade.

Your Worship, the document commences with a summary of the fire management objectives, which inform the report, and that appears on page 0047. Does your Worship have the document?

THE CORONER: I do, yes, thank you.

MR WOODWARD: You will see that the fire management objectives set out there under 1.1 include - I'll read:

> The objectives and practices for fire management are outlined in the Namadgi National Park Management Plan. They are: to protect human life, to protect property within and adjacent to the park from fire, to protect the natural and cultural features of the park from the damaging effects of fire, to protect and ensure the stability of water catchments, to maintain as far as practicable the natural diversity of age, class and structures in park vegetation, and to minimise the effects on other values of any necessary fire protection control works.

Your Worship, it's worth referring to that simply because your Worship will see from the fire management plans adopted in 1998 and thereafter, generally speaking a very similar

theme in terms of the priorities for the fire management objectives, in particular the primary objective being to protect human life and to protect property within and adjacent to the relevant areas.

On page 2 of the report, there's a statement of the administrative responsibility. And there's this passage or sentence that appears at the end of paragraph 2:

> Both the ACT Parks and Conservation Service and the ACT Bushfire Council work closely together. The council being responsible for fire suppression and control, while the service as the land manager is responsible for fire prevention and mitigation.

Your Worship will recall from the extracts of the report of Mr Cheney that I referred to earlier during the evidence of Mr McBeth that that's an issue which certainly he has some concerns about, the division of control between the land managers on the one hand being responsible for land - for land management or fire reduction, and the Bushfire Council and presently the ESB being responsible for suppression.

Jumping ahead, your Worship, to 0055, there's a reference to what are described at the bottom of the page as "intensive fuel management zones". This just gives a general impression of the way in which this plan approached the issue of fuel management. I beg your pardon, your Worship, this is on the bottom of 56:

> There are locations in the Namadgi National Park that require security from the effects of wildfire. Around these areas extends a zone in which specific fuel management is necessary because of their capital and heritage values, sensitivity to fire, high

> public use and location with respect to hazardous areas. In these locations fuel reduction by burning and other mechanical fuel removal will be used to achieve certain outcomes.

I mention that, your Worship, because in particular it refers to burning but it appears to refer to burning as an alternative to mechanical fuel removal as an appropriate form of fuel reduction.

Your Worship, at the following page, page 0058, there's a reference to management trails and your Worship is likely to hear quite a bit of evidence, in my submission, about the importance of maintaining management trails and in due course, no doubt evidence about the extent to which that had occurred as at 2003. But this provides some indication of at least an acknowledgment of that importance:

> The network of management trails exist within the park. These trails are an effective/efficient means of access and can also be used as possible fire breaks. The maintenance of these trails will take high priority. In some cases limited fuel reduction along a narrow strip adjacent to the trail may be justified to maximise its usefulness as a control line. It is intended that the construction of new trails will be avoided. Although fire hazard assessment may indicate the need for minor strategic additions. Where fire trail is physically closed the route will be recorded for possible use in the event of a fire.

Over the page at page 59, your Worship, again under the heading "General Suppression" at the bottom of the page, this appears, in the context of the approach to fires that do occur in the park:

> During periods of suitable weather conditions naturally ignited fires may be left to burn. In practice this will occur infrequently because of the short duration of appropriate conditions. A decision to let a fire burn will only be made after due consideration to the following factors.

And there are listed several factors which are said to be relevant to that decision. It may be relevant, in due course, your Worship, to compare those factors to the decision making in relation to these fires when they first occurred in that park in 2003.

Your Worship, the balance of the report deals generally with perhaps what could be described as for administrative matters including approaches to fire suppression, the appropriate radio channels and the like. I don't propose to go into those in detail. I don't propose to go to them at all.

Your Worship, the second document that falls into this category of pre-McBeth, if I can call it that, and I accept, your Worship, that this is something that's been extracted because it was found as part of the investigations and it may be that other similar documents exist, particularly for the period later in the 19 nineties, but at least at this early stage, in my submission, it does provide some indication of some of the practices that were being implemented in relation to the New South Wales government lease and an approach to training in respect of that. This is the debriefing notes from the Brindabella hazard reduction exercise in April 1992. It's at [AUS.AFP.0079.0121]. It will be my submission, your Worship, important for your Worship to examine whether exercises of this kind continue to be conducted through that decade because clearly, as the

aims and the outcomes or lessons from this report would suggest, it creates a high degree of benefit both in terms of training and in terms of fuel reduction:

> Aims of the exercise are said to be to reduce fire hazard in the lease area between Brindabella and the Territory, providing protection from the full range of fire types likely in the area; comply with the terms of the ACT Bushfire Council's lease; ensure full public safety while the burn is in progress; run an operational exercise where under controlled conditions people can experience real problems and learn from them; practice remote area operations, especially backhoe work, patrolling, drip torch work, overnight work, logistical problems and communications difficulties; practice multi-agency operations with Rural Fire and Emergency Services from the ACT and New South Wales; practice communications procedures, using multiple radio networks, without an ideal set-up in difficult terrain; practice elements of the incident control system.

Clearly all laudable aims, your Worship.

On page 0126, the main lessons are set out. Again, these are illustrative of some of the advantages of this sort of exercise and it will be appropriate to examine how much of this was being done in the years that followed:

> The main lessons learnt from the exercise where, we can handle multi-agency incidents effectively. We need more remote area experience for firefighters, the basic training modules are being forgotten through lack of remote area firework for most

> crews. Our system needs to be reviewed to address this problem. As a result of point 3, the crew leaders need to be trained to a higher standard. If you don't have the right equipment to undertake the task given, advise the fire controller and ask for it to be supplied. If you don't have the experience or fitness to undertake a task given, then, again, advise the fire controller.

Your Worship will see that the author of this document was Mr McRae, who at the time was the planning officer at the Rural Fire Service.

As I indicated, your Worship, there are not many other documents and those will be found and where appropriate produced in the second phase of the hearings but at least that provides some indication of what was happening in the years before the development of the fuel management plans.

I want to now move to the Glenn report, your Worship, which appears in folder 1. It's the last document in that folder. The document number is [AUS.AFP.0041.0001].

Your Worship, the, in effect, terms of reference are comprised in a covering letter that appears at page 0004, where Mr Glenn sets out that the task force was required to review current practices for bushfire fuel management in the ACT and recommend appropriate policies and practices for the future, having regard to the protection of life and property, environment and conservation issues. So again you see, your Worship, the, if you like, allocation of priorities, protection of life and property, environment and conservation issues.

The actual text of the report, your Worship, is not particularly detailed, and it is a report

that's relatively readable. But I do want to go to some passages which may become relevant as the evidence progresses. The first of those is on page 0010, in paragraph 1.2, where the report states:

> The ACT has however developed very effective bushfire suppression arrangements which have been able to control most major fires before any significant damage to property has occurred. These arrangements may need to be adjusted to accord with the anticipated urban expansion.

Perhaps - just noting the fact that that reference is to some extent in contrast to the comments made by Mr Cheney in the Hannon report where he talked about there being certain wildfire conditions where it doesn't matter how good the suppression capacity is, nothing can be done to stop the progress of the fire. It's not clear from Mr Glenn's report whether that was seen or that paragraph was included in a sense to indicate that it was appropriate to or it was relevant in ameliorating the need for more intensive fire fuel management, that is having a strong suppression capacity was somehow relevant to the level of fire management - fuel management that was necessary, but that may be an issue that arises in due course.

Your Worship, the next passage I want to take you to is point 0013 in paragraph 2.4, at the bottom of that page. The report there states:

> While excluding suppression from this review, the task force notes the importance of integrating suppression and fuel management practices. The strong involvement of land managers in suppression activities with the Bushfire Service has helped the development of their fire management

> skills. Additionally involvement and responsibility for suppression activities has given land managers a direct incentive for conducting sound fire fuel management practices and a means of continually assessing the effectiveness of fuel management techniques.

Again, your Worship, that's a sentiment that's similar to those expressed by Mr Cheney about the importance of the coincidence of suppression and fuel management. However, it's not clear from the report whether the report simply acknowledges that as a valid theory or whether he's suggesting that that in fact is what's occurring in the ACT at the time. In either case, the recommendations don't appear to further that cause, that is more closely integrating responsibility for fuel management with responsibility for suppression.

Paragraph 2.8, your Worship, over the page, 0014, just to note that in that paragraph, the task force says:

> The urban interface with rural and bushland areas is identified by the task force as an area of particular concern in terms of fuel management. The task force has inspected a range of sites along the interface, including Narrabundah Hill, Eucumbene Drive and Warragamba Avenue in Duffy and Stromlo Forest and Tuggeranong Parkway.

Clearly identified by the task force at that time as areas of particular concern.

On page 6 and following, the report sets out details of the existing arrangements for fuel management and I don't propose to go to those, your Worship. I jump ahead to page 14 of the report, which is 0023. Just briefly,

your Worship, I would like to mention, because it's the first indication of perhaps the extent of the expense associated with fuel management, because there are set out estimates of expenditure in 1994/95, supplied by land management to the task force, which indicate that a total of $251,500 was expended in connection with activities for fuel management and the comment by the task force in the paragraph following:

> This expenditure is not a major commitment to bushfire fuel management and is insignificant when compared with the expenditure on suppression activities.

Just over the page, your Worship, there's a reference in paragraph 4.3 to:

> The Bushfire Services for several years has monitored the ACT bushfire hazard on a broad scale. The 1994 results are shown in the map at attachment D.

Your Worship, I'll just briefly go to that map, which is at page 0043, page 33 of the document. Your Worship will see that the area along Eucumbene Drive is identified or in that part of Weston Creek, the Weston Creek district, is identified as an area of very high fire hazard. It's perhaps also worth noting that even then, your Worship, there are parts of the urban interface that are identified in south Belconnen and north Canberra that are also very high fire danger and were unaffected by the fires in 2003. Presumably that position pertains today, or that may be a matter of further evidence.

Over the page again, your Worship, back to page 16, which is 0025. The recommendations in relation to the issue of bushfire hazard assessment are set out, and in particular the third bullet point, your Worship:

ACT Government land managers in consultation with residents give priority to fuel reduction and to bushfire safety awareness education for residents in the identified high hazard areas, for example, those referred to in paragraph 4.5.

Which cross references the map to which I've taken your Worship. Your Worship, we're not in a position at this phase of the inquest to provide any general indication of what response there was to that recommendation in so far as it relates to bushfire safety awareness education for residents in those areas, but clearly that will be a matter of great significance for the second phase of the hearing. Similarly, your Worship, it's difficult to discern from the documents that we've reviewed at this stage to what extent residents were consulted in relation to the development of the fuel management plans.

On the subject of fuel management planning, which commences on page 17 of the report, the recommendations appear at page 19. I won't go to those in detail, but in essence, your Worship, they are the primary recommendations that propose the production of fuel management plans to be prepared within 12 months and be reviewed every two years thereafter. I'll be taking your Worship to those plans in due course. It also sets out a process for approval and for reporting on compliance.

It's perhaps worth noting that there's also a reference to the need at least for that process to be coordinated. I will refer to the fact, your Worship, with the plans, at least the 1998 and probably the 2000 plans, although it's clear that the process was coordinated as between agencies, it was later identified that one of the deficiencies in those reports was

the fact that each agency was still publishing its own discrete maps for areas affecting it.

It wasn't until the plan was developed for 2002/2004 that, in effect, composite maps were being prepared that showed fuel management regimes over parts of Canberra, regardless of which agency had responsibility for those areas, and therefore gave a much clearer picture of the total management that was proposed at that stage.

In the area of environment and conservation, which commences on page 21, there's a discussion of what is in effect the balancing exercise that necessarily exists between the importance of fuel reduction and the extent to which that impacts upon environments and conservation imperatives and how that balancing exercise needs to be managed.

The recommendation on page 23, however, in summary appears to be designed to facilitate an increase in the level of hazard reduction burning that had been occurring up to that point, in particular by suggesting amendments which, as I understand it, were subsequently implemented to the Air Pollution Act, which had up until that time been seen as - well, was said to have created a regime under which fuel management by burning was severely limited.

The recommendations on hazard reduction appear at page 26 of the report, and they largely concentrate on the importance of implementing appropriate planning and building guidelines and urban edge guidelines. Although some of the material, your Worship, in the first phase brief deals with that, it will be not until the second phase that we'll be in a position to indicate to your Worship to what extent those recommendations were acted on in respect of new planning that was to go on thereafter and also the construction of new buildings in the areas identified as high risk.

Your Worship, the next thing that happened in the chronology was the development of publication of the Bushfire Fuel Management Plan for 1998. If your Worship will excuse me for a moment, I'll just get a copy of that. It comprises the bulk of folder 2.

I should mention, your Worship, that I do propose to read some passages out of this report, particularly the introductory parts. However, it's a 386-page document and to a large extent it does speak for itself. I will be indicating to your Worship - I do so now - that the fuel management plan for the following period, 2000 to 2002, is almost identical in format, so I won't be going to that one at all, which is why I'll spend a bit more time with this one.

Also, your Worship, at least so far as the work programs are concerned, and the bulk of the document is comprised of the various maps which set out by reference to a legend the various different fuel management treatments that are proposed for the fuel management units - and that comprises in effect the second half of the volume - regrettably it's very hard to get sense of what's proposed by those maps without having them in colour, and they're not available in colour in any of the copies that either your Worship has or that my learned friends have. So it's not my intention to go to in any detail the actual actions that were proposed although I do propose to make some general remarks about that.

The first plan, which was the 1998 plan, your Worship, and this is at page 0005 of the document, which I've not given the number of - I think that might be [AUS.AFP.0033.0001] - it begins with what's described as a ministerial foreword, and I think it is instructing your Worship if I read that in totality:

The incidence of fire in the Australian bush is a phenomenon that many of us have come to associate with our long hot summers. The destructive potential of bushfire requires ACT land managers to think carefully about the management decisions implemented in bushland forests and the other unleased open spaces of the Territory. Fire has also been accepted as a legitimate management tool, useful in facilitating a return of native vegetation and promoting biodiversity. Clearly the challenge is to develop a management framework which safely addresses the spectrum of priorities as it relates to bushfires in our environment. Upon coming to government in early 1995, the Minister for Police and Emergency Services asked for an immediate review of the ACT's bushfire preparedness. Bushfire fuel management task force reported to the Minister and its recommendations have been implemented.

That being the Glenn report, your Worship:

The requirement for government land managers to prepare bushfire fuel management plans became law in December 1996.

That was with the introduction and the amendments to the Bushfire Act 1936:

ACT Government land management agencies are required to prepare and present for public scrutiny this Bushfire Fuel Management Plan covering all areas they manage. The plan, to be biannually reviewed, identifies areas where fuel reduction is appropriate and describes the means by which the control of fuel material

> available to bushfires will be managed. Other measures, such as responsible management of residential properties adjoining the bushfire prone areas, are also important. With this in mind, the Emergency Services Bureau will continue its community education role on bushfire protection matters.

Pausing there, your Worship, it certainly doesn't appear in this and I don't think it was ever intended that these bushfire management plans would extend to community education issues:

> In a city which prides itself on its natural setting and close proximity to bushland, it is imperative that this plan identify practices by which we can continue to provide a high level of protection to life and property, while ensuring important ecological and biological processes are not compromised. In canvassing such issues as fire prevention strategies, this plan will be useful in drawing the community's attention to the concept and need for fuel management. Additionally the plan serves as a reference by which leaseholders adjacent to government managed lands can further consider their own fuel management strategies.

That foreword, your Worship, was signed by both Gary Humphreys, the Minister for Justice and Community Safety, and Mr Brendan Smyth, the Minister for Urban Services. Similar sentiments are found in the first paragraph, the introduction, which appears at page 0012:

> During the 1993/94 bushfire season, there were a number of severe bushfires in New South Wales and a

> number of fires in the ACT which posed a threat to property. The damage from these fires, the impact on air quality that occurs from bushfires, the potential for injury and loss of life, together with the issues of responsibility and litigation and the role of government raised concerns in the ACT community about bushfire fuel management practices. A report was then undertaken by the former deputy chief of the South Australian Country Fire Authority, Howard McBeth, on fire hazard reduction practices in the ACT (in particular those carried out by the ACT Parks and Conservation Service).

More machinery provisions are then dealt with, but just referring briefly, your Worship, so that it's clear, the second last paragraph on that page identifies that the three GLMA, being government land managed agencies:

> ...covered by this plan are Environment ACT, Canberra Urban Parks and ACT Forests.

So that identifies the three land management agencies that are required in effect to submit parts of a plan:

> Within Environment ACT, the government horse paddocks are managed by Conservation and land management. Conservation reserves and associated land are managed by ACT Parks and Conservation Services.

That includes of course national parks and in particular the Namadgi:

> These agencies have responsibility for managing the majority of ACT land.

There's a reference to figure 1.1. If your Worship turns the page, you'll see a pie graph that separates out the level of responsibility for ACT land covered by the land management agencies and in particular that 30% of ACT land that is not covered by the plan. Your Worship, that's picked up again a few pages further on. In fact, at page 0017, just for your Worship's benefit, there's an indication of what comprises that 30%, a little further down the page. Your Worship will see that rural leases, residential, community land, commercial, entertainment, accommodation, industrial, road reserves and roadsides, with a few exceptions, national land and designated areas defined in the National Capital Plan and not managed by the Territory on behalf of the Commonwealth. I think the evidence will show that is actually quite a significant part of that 30%, namely Commonwealth owned land.

Two pages further on, your Worship, 0019, under the heading "1.6.1", there's again a reference to the bifurcation of responsibility:

> The primary responsibility for fire suppression in the ACT lies with the BFES, which comprises both volunteer and government bushfire agencies. Through these agency brigades, the GLMA contribute significantly both in a financial capacity and an operational sense to the suppression and control of fires in the ACT. The primary responsibility of the GLMA in regard to bushfire management relates to the management of bushfire hazard.

So there's an acknowledgment, your Worship, that at least officers of the agency do participate in fire suppression, but the agencies themselves are primarily concerned with managing the hazard.

Your Worship, moving on to some extent to page

21 of the report, it's 0033, the issue of hazard assessment:

> Hazard assessment is crucial if hazard reduction is to be effective. As the following section shows, based on key documents such as rural fire hazard assessment in the ACT, (author being Mr McRae in 1991) fuel and hazard are not synonymous. Failure to appreciate the difference is a factor contributing 20 common misunderstandings about fuel management. Hazard can be defined as follows.

There's then a definition:

> A measure of the potential for fuel to support fire behaviour, it's probability of ignition and the risk posed thereby to identified values.

Further down the page there's a specific element of hazard dealt with, your Worship, in the second last paragraph:

> Fuel load is often considered as a major factor determining hazard, however it is but one variable which contributes to a given fire hazard. It follows that fuel management on its own may only provide a degree of protection for life and property. It is important to realise that there will always be potential for weather conditions such that fires may be so extreme as to make any fuel management ineffective. Likewise fuel management cannot fully compensate for inadequate planning and design of suburbs and buildings or social factors which may contribute to rapidly increasing incidence of arson around Canberra.

There's a further reference to urban planning and design issues on page 25 of the plan, which is 0036. This important point is made in the last part of that paragraph:

> Strategies to minimise hazard need to be undertaken in parallel with fuel management such as appropriate urban planning and design of residential areas, together with public education. Landscape design and construction guidelines were prepared by public works in 1993. These set the basic standards for urban edge design for developers in relation to protection of property in new urban areas.

The issue that will need to be considered in due course is, whilst those plans were prepared, to what extent were they applied in those areas.

A little further down the page, your Worship, there's a reference to various different indices that apply. I want to briefly mention those because of the maps that follow:

> Control Urgency Index is a measure of proximity to assets of various weightings in terms of fire sensitivity. Fire Behaviour Index is a measure of fire intensity and rate of spread in 90th percentile summer weather, assuming typical fuel loadings.

I want to mention these two in particular because if your Worship then goes to the maps - and I regret you won't be able to pick up on the maps in black and white, but I can indicate that the areas on the map which appears at point 0038, figure 3.2 A, that are identified as having an extreme fire hazard index, include the area of Weston Creek and the Namadgi National Park to the west of that area. That

is one of the only extreme areas identified in that map.

Similarly, over the page, the areas designated as having an extreme Control Urgency Index are again the areas of Weston Creek, but also include Tuggeranong, Belconnen and south Canberra, so there's a similarity between that map and the map that's attached to the report by Mr Glenn, to which I took your Worship earlier.

Your Worship, some pages further on, page 42, under the heading "Hazardous Assessment for Fire Management" at page 0044, there's a list of those different types of factors that land managers need to take into consideration when assessing hazard. Then the manual continues:

> Knowledge of specific site conditions is essential in making the best decisions about hazard assessment and fuel management. For example, in some forest and woodland areas, fuels that have not burnt for some time are often in a state of equilibrium, where litter fall is approximately equal to the decomposition rate, giving a steady state fuel load. This steady state fuel load may be at a maximum in terms of fuel weight but will have lower flammability than in the first five to ten years after a wildfire event when the fuel retains less moisture and dries out faster after rainfall and during daily changes in temperature and humidity.

So if I can interpolate, your Worship, the point there being made is forest fuels do reach a stage where the amount of decay is in equilibrium. So there's a point at which the fuel loads will not get any higher. Whilst this acknowledges that that may be a very high fuel load, it possibly is less high than that

which exists after a fire event or after grasses and lower fuels have been able to regenerate. I mention that passage in particular because that concept may be debated, that is this idea that in some circumstances it is appropriate to allow a fuel load to remain at equilibrium, and also that assertion that more extreme conditions can be experienced after fire for about five to ten years. There appears to be a divergence of view about that:

> Planned burning to reduce fuel loads in woodland and forest areas that are in this equilibrium state is only of real benefit to the mitigation of fire ignition and rate of spread in the first six to 12 months post fire, although the potential maximum intensity of a wildfire may be lowered for up to three years. For this reason, burning may not be selected as the most effective or appropriate mitigation strategy in some areas.

Again, your Worship, I'll be taking your Worship probably tomorrow to a report by Mr Cheney in which he comments on a draft of the report that was prepared for 2002/2004, where he takes issue with that concept; namely, that the burning is only of benefit for the first 6 to 12 months post fire.

Just by way of example, your Worship, in relation to the proposed treatment for some particular areas, on page 47 of the plan, there's a reference to Namadgi. This is at 0049 at the bottom of the page:

> A large proportion of the southern part of the park was burnt by wildfire in 1983. That has led to fire regime constraints in some high conservation areas where any further fire at this time may have a detrimental impact on conservation values. Because there is

so little known about the fire regimes required for many of the wildfire communities present in Namadgi, at this stage it is proposed that fuel management in this area will only be undertaken in strategic areas for the direct protection of built assets and to protect sensitive natural and cultural sites. The majority of the south Cotter area of Namadgi National Park poses little hazard to neighbouring lands due to the combination of low visitation, moist vegetation types and local weather conditions. Some units adjoin ACT forest areas and strategic, joint fuel management is proposed in some places for protection of pine forests.

Again, your Worship, in Mr Cheney's report, commenting on the later draft that contains a similar passage, he disagrees with that passage, and I'll take your Worship to his comments. It's also worth noting, or at least confirming that as the fuel management plans disclosed, there's a distinction drawn between burning asset protection, which is where burns are conducted solely for the purpose of protecting assets which are continuous or adjacent to the relevant area burnt, and strategic burning, which is another category of fuel management which involves effectively burning a mosaic of an area to reduce the overall fuel load and therefore the intensity of fire. What, in my submission, that passage reflects is an approach to the Namadgi that says we don't want to do strategic burning, we'll limit our burning in the area to asset protection because of the conservation values at stake.

Your Worship, over the page, or some pages, at page 49, under the heading "Fire Management Policies and Strategies", there follows a summary of the various different approaches

that are to be taken. I mention that only because it sets up two concepts that then find their way into much of what follows, firstly the concept of fire management units, and they're effectively areas on a map which are designated as appropriate for discrete regimes in relation to fuel management. So there frequent references throughout to the different FMUs, being geographic areas identified on the maps, and different treatments are assigned to different FMUs depending on what's in there, whether it's forest or pine plantation and so on.

On page 53, 0056, there's a summary of the different types of fuel reduction activities that are referred to in the various project plans. Your Worship will see over the page, at page 54, 0057, FRA 1, which is fuel reduction activity number one, under the heading "Asset Protection Works":

> ...would comprise burning in certain circumstances; namely burning will be undertaken regularly to meet the above objective, that is, to protect assets. In some fire management units, blocks identified for asset protection, burning in woodlands and forests have been burnt within the last eight years and have fuel levels which meet the above objective. Because of this, not all of the blocks indicated for asset protection burning will be burnt in the first two years.

Just identifying, your Worship, the fact that because burning can have an effect according to this document up to eight years, then it's not something that you would be doing every two years, so that although some burning is identified, it's not necessarily burning that will be undertaken during the life of this plan.

The strategic burning to which I referred earlier is found two pages further on, at 0059:

> Strategic fire management works are undertaken in areas to provide additional protection and to assist fire control and suppression activities.

FRA 2 strategies are defined as in relation to woodland and forest areas:

> FRA 2 burning will be undertaken on a rotational basis to achieve a mosaic of fuel reduced vegetation across strategic blocks and some fire management units. This will result in a variety of fuel levels of identified blocks within the fire management unit between burns. Fuel levels may be high in some blocks and low in others. However, the result in mosaic of fuel reduce the overall potential fire intensity and rate of spread. To achieve the above objectives, the intended interval between burns on any block will be no more than 18 years and no less than 10 years, including previous and future planned burns and wildfires.

Your Worship, the issue that will need to be considered in due course is whether the areas assigned or allocated for strategic burns of that kind were sufficiently widespread and, of course, the broader question of even assuming they were, was enough in fact done?

Your Worship, the balance of the plan comprises the agency specific fuel management plans, a summary of each of the fuel reduction programs, the work programs and the maps which are assigned to each of the FMUs. It's not proposed in this phase, your Worship, to undertake a critical analysis of the adequacy

of fuel management planning as contemplated by this and later plans.

However, perhaps it is worth noting in a very general sense at this stage that those plans do exhibit a strong preference for slashing, mowing and grazing over burning as the preferred form of fuel reduction, and that's consistent with some of the passages of the introductory paragraphs I took your Worship to which suggested a degree of reticence about the concept of using burning too widely as a fuel management tool.

Where fuel reduction burning is provided for, it tends to be for asset protection, and as I indicated earlier, less so for strategic burning, and especially in the native forest areas, including the Namadgi, allocations for strategic burnings are few and far between, and they tend to be concentrated in or near those parts of the forest areas which might then burn out into pine plantations.

Your Worship, it is a convenient time, your Worship, to leave that plan. Perhaps briefly if I can indicate what I propose to do first thing tomorrow. There's some material in the brief that deals with the level of implementation of that plan, and I propose to go to just a few brief extracts from that. That includes a report performed by Deloittes who in effect did an audit of the extent of compliance with that plan, a year and a half into the plan. Again I'll refer to some of that material. I'll mention the following plan, and then I'll conclude, your Worship, with a reference to the process by which the 2002/2004 plan was developed. I want to spend some time taking your Worship to passages in the report by Mr Cheney in 2002 which commented on the draft report for the period that followed, and his involvement appears to be precipitated by the December 2001 fires because the report was done in January. And then I

just want to touch briefly on the circumstances in which that report was launched. Regrettably, of course, the report wasn't launched until November 2002, and of course although I think anyone would concede it was a significant improvement on earlier plans, there was clearly no time between that date and the fires for its implementation to in any way be assessed or tested. I'm hoping that that process will take no longer than an hour in the morning, your Honour.

THE CORONER: Thank you, Mr Woodward. That's a convenient time to adjourn.

MR LASRY: Your Worship, can I just add that after that process, the next witness will be Mr Cheney. I'd be surprised if his evidence finished before the end of the week, bearing in mind tomorrow is Friday. I expect his evidence-in-chief and his presentation will take some time. Presumably there will be questions for him. I'd be surprised if we got beyond his evidence before the weekend.

THE CORONER: We'll see how we go. Thank you, we'll adjourn until 10 o'clock.

[4.03pm]

MATTER ADJOURNED AT 4.03PM UNTIL THURSDAY, 9 OCTOBER.

TRANSCRIPT OF PROCEEDINGS

CORONER'S COURT OF THE AUSTRALIAN CAPITAL TERRITORY

MRS M. DOOGAN, CORONER

CF No 154 of 2003

INQUEST AND INQUIRY

INTO

THE DEATHS OF DOROTHY MCGRATH,
ALLISON MARY TENNER,
PETER BROOKE, AND DOUGLAS JOHN FRASER,
AND THE FIRES OF JANUARY 2003

CANBERRA

DAY 3

10.04AM, WEDNESDAY, 9 OCTOBER 2003

[10.04am]

THE CORONER: I should make an announcement. I note it's very unpleasant in this room at times because of the airconditioning. Complaints have been made, indeed complaints were made last week and the week before about the airconditioning in this room. I'm now told and have been assured that technicians are coming at about 10.30 to investigate. I would simply invite them to come into this room. They don't really need to investigate too much. So I hope that the situation will be repaired.

MR WOODWARD: Your Worship, at the end of yesterday, I had completed taking your Worship to extracts of the 1998 Bushfire Fuel Management Plan and was at the point where I wanted to cover in brief some issues relating to the implementation of that plan. There are two, if you like, sets of documents to which I want to refer in that regard. The first is what is in essence folder 5 of the brief, and I won't suggest that either your Worship or the parties endeavour to follow the documents to which I'm going to take your Worship because, unfortunately, the material in that brief we weren't able to get into a chronological order before the brief was compiled and in those circumstances it will be very difficult to find each of the documents I'm referring to, but I do only want to refer to a couple of paragraphs in four or five of the documents and I'll give the relevant numbers of that. I should say, your Worship, that it's clear that what is folder 5 of the brief does not constitute a complete set of the what's called the output reporting in respect of the Bushfire Fuel Management Plans over the relevant period. Apart from anything else, they only go up to I think it's the fourth quarter of 2002 and it would appear from just a perusal of those documents that there's not a full set in that section in any event. So it will be necessary for us in the lead-up to the second phase to

liaise with the Department of Urban Services or with the Victorian Government Solicitor in order to ensure that we do end up with a full set of that material. It is instructive, in my submission, your Worship, just to refer to a couple of passages from some of the summaries of that material.

THE CORONER: In folder 5?

MR WOODWARD: In folder 5, because it does give some indication of the areas where those responsible for fuel management were finding the process of implementation problematic.

The first document I'll take your Worship to is [ESB.AFP.0055.0396]. This is a minute on environment ACT letterhead which commences:

> This report describes the implementation of the Bushfire Fuel Management Plan during the first quarter of 1998/99 including activities from previous financial years.

If you move to the second half of the page, just under the chart there showing levels of implementation, your Worship will see this passage:

> Six of the nine activities outstanding from 1997/98 were prescribed burns. These burns were not completed during 1997/98 because the weather was too dry for prescribed burning. The weather conditions during the first quarter of 1998/99 were not suitable (too wet) to undertake these burns. These burns will be undertaken as soon as weather conditions allow.

In the next report for the following quarter, which is at document [ESB.AFP.005.0332], the following appears, again, in the second part of

the document where it summarises what was achieved or, more importantly, what was not achieved for that quarter, and again just below the chart there, your Worship will see:

> Few of the burns prescribed for 1998/99 and outstanding from 1997/98 have been completed during this quarter due to a very narrow window of opportunity of suitable weather conditions. There are a large number of burns outstanding from 1997/98 because conditions were too hot and dry for burning that year. Unfavourable weather conditions for prescribed burning in autumn 1999 will result in a serious backlog of prescribed burns.

Just quickly to the equivalent minute for the following quarter, which is the third quarter in the 1998/99 financial year, that is to 30 March 1999, at [AUS.AFP.062.0427]. Just to take one item, in respect of the Namadgi, in the chart, it's in relation to burning where slashing was 100% completed in the four areas in the Namadgi. Just down in the first half of the chart, you will see in respect of burning, zero of the three burns, 0% prescribed for 1998/89 and outstanding from 1997/98 have been completed.

Then over the page:

> Because conditions were too hot and dries for burning during 1997/98, none of the burns prescribed for that year were completed. In addition, few of these burns or the burns prescribed for 1998/99 were completed in spring 1998 because of unfavourable weather conditions. This resulted in a significant backlog of uncompleted prescribed burns.

> It was hoped that this backlog could be removed or at least reduced during autumn 1999 and considerable effort was put into undertaking all the planning and preparatory works to allow these burns to be undertaken. Unfortunately, there has not been a single day this autumn with weather conditions suitable for prescribed burning (it changed from being too dry to too wet). It is now unlikely that suitable weather for prescribed burning will occur until spring 1999 by which time there will be burns outstanding from 1997/98 and 1998/99 as well as the burns prescribed for 1999/00. This amounts to a total of 29 burns.

Now, moving into the first quarter for 1999/2000, at document [AUS.AFP.062.0114], the relevant minute says this:

> Just 18% of 173 actions prescribed in the Bushfire Fuel Management Plan for 1999/2000 or outstanding from previous years had been completed by the end of the first quarter of the 1999/2000 financial year. This is because 94 of the 173 actions are slashing which is not carried out during the first quarter.

Jumping to the next paragraph:

> There are a further 18 actions that are no longer required. These include areas in which slashing or burning is not required due to fuel loads being kept low by native animal grazing and areas in which fuel accumulation has been less than expected. None of the 22 burns prescribed for 1999/2000 or outstanding from previous years were completed during the first quarter

> because there were no days on which the temperature, relative humidity, wind speed, wind direction, drought factor and atmospheric stability were within the range required to conduct a safe and effective prescribed burn.

Similar message appears in the minute for the second quarter of that year. That document is at [AUS.AFP.0039.0280]:

> Of the 73 outstanding actions ....

I should note, your Worship, that quarter 3 is the autumn quarter, I think. No, that would be the spring - no, it is the autumn quarter:

> Of the 73 outstanding actions, 39 were not completed because they were not needed. This particularly applies to slashing which was not required in most of the Tidbinbilla and Namadgi districts because the fuel load was kept low by native animal grazing or low grass curing meant that the grass did not pose a fire hazard. 16 actions were not completed because of unsuitable weather conditions. These actions were all prescribed burns and were not completed because there were no days ....

Et cetera. It's a very similar form to the last minute I took your Worship to. Moving to the fourth quarter of that year, 1999/2000, document [AUS.AFP.0064.0491], again the minute provides or states that:

> 13 of the 26 necessary fire management actions that were not completed were hazard reduction burns. 7 were research or monitoring, two were grazing and one was hand removal. The hazard reduction burns were not completed but there were no days in

> which the temperature, relative humidity, wind speed, drought factor and atmospheric stability were within the range required to conduct a safe and effective prescribed burning.

Your Worship, for the periods following up to the fourth quarter of the financial year 2001/2002, that is to 30 June 2002, we've been unable in the material so far provided to us to locate equivalent minutes and we would simply be seeking to ascertain whether those summaries have been prepared. However, reviewing the documents that actually sit behind the minutes, which are the various reports for each of the fire management units, there appears, in my submission, to be a similar problem presenting itself to the fire management agencies, particularly as regards fuel reduction burns.

Another indication of difficulties associated with implementation, your Worship, is found in an audit that was conducted in respect of the implementation of the 1998 plan by Deloitte Touche Tomatsu. That audit appears in folder 3 of the brief. I think it is the first document in that folder. Does your Worship have that?

THE CORONER: I do.

MR WOODWARD: The document number is [AUS.AFP.0039.0215]. A reading of the document is assisted by the executive summary that appears on page 1 of the document, which is 0217, where the authors set out:

> That the objectives of the review were to assess the extent of progress made by the department relating to the actions section and the work program section of the Bushfire Fuel Management Plan and to make recommendations where the monitoring and implementation of the action and work program sections of the Bushfire

> Fuel Management Plan 1998 could be improved.

It then refers to the requirement under the Bushfire Act that continues by saying:

> This was not an easy task [that is the audit] for a number of reasons. Firstly the format and description of actions and work programs in the plan does not easily allow the agencies to report progress made against these actions of work programs. Secondly, the agencies responsible for implementing the requirements of the plan were never informed that their implementation of the plan would be subject to external review.

Over the page, your Worship, the authors summarise the outcome of their audit work:

> Urban Parks and ACT Environment, Conservation and Land Management, are meeting most of the requirements of the plan. In respect of the small number of actions and work programs where the requirements of the plan are not being met, acceptable reasons exist for this. ACT Parks and Conservation are not meeting a material number of their requirements under the plan. Grassland burning activities is the main area where the requirements are not being met. The main reasons given by ACT Parks and Conservation for not meeting their required grassland burnings included unsuitable weather conditions, legislative requirements and resource limitations. Audit have identified a number of general issues that require management's attention regarding the monitoring and reporting of implementation of actions and work

> programs under the plan. The issues are listed below.

I won't go to each of these, your Worship, because many of them are issues relating to reporting and so on. But it's clear from those comments that there's a concern that there wasn't a rigorous process in place to actually monitor adequately the level of implementation and a lot of what the report relies on is anecdotal information provided by officers as to the extent to which the program was implemented.

Just drawing attention to one particular recommendation, your Worship, that appears in that document at page 9 of the document, 0225, under the heading "4.2", which is the more detailed description of the observation earlier in the executive summary of the failure by ACT Environment, ACT Parks and Conservation to meet a material number of their requirements.

The recommendation for dealing with that by this report, your Worship, is that:

> The requirements of grassland burning within future plans take into account the restrictions of weather conditions, legislative requirements and resource limitations. A more achievable set of actions in regards to grassland burning should be included in future Bushfire Fuel Management Plans.

In other words, the auditors seem to be recommending not that there be an attempt to more rigorously pursue the burning program, but rather that the program be wound back to match what was achievable. I'm not suggesting, your Worship, that there's any evidence that that was the response to that recommendation, but it does indicate obviously some limitation in an audit of this kind, given that the auditors are

really monitoring only achievement and are not themselves experienced in the issues surrounding the need for fuel management of the kind dealt with in the plan.

It does go on to say, however:

> If insufficient resources are available to complete all required grassland burning, the tasks need to be prioritised to ensure that the most important tasks are completed in the available time frame. The basis used to prioritise the tasks needs to be documented and retained for future reference.

There's then the last two-thirds of the document, which is a more detailed fire management unit by fire management unit summary of the achievements under the plan, which I won't go to at this stage, your Worship.

I should note, too, significant limitations in the conclusions that can be drawn from this material. Firstly, it clearly only goes to the 1998 plan, and there are no equivalent documents - at least none that we've so far been able to find - dealing with subsequent plans. It's not clear whether that audit process continued.

The other limitation, your Worship, is that this is limited to the work undertaken by ACT Parks and so far we've been unable to find any documents that provide a similar information concerning the activities of ACT Forests in relation to the pine plantations, and that's something that we'll be pursuing.

I should just perhaps pause there to mention, your Worship, because it will come up in the context of other documents, there's been reference in some of the materials to which I've referred your Worship to the issue of

maintenance of fire management trails as part of the overall fuel management planning process.

For reasons which I'll come to, it's important, in my submission, to not lose sight of the fact that the maintenance of fire management trails within these areas is a particularly important element of the overall fuel management task and again, we're not in a position at this early stage to indicate what the level of maintenance was. There are some documents that suggest that it was adequate, but more recent inquiries would suggest that there were difficulties or issues about the level of maintenance of fire management trails, and that's another matter that will require further very careful research in my submission. It's almost as important as the broader issue of the accumulation of fuel for reasons which I'll come to shortly.

THE CORONER: Are you saying that this information is not available or you just don't have access to it at this stage?

MR WOODWARD: I'm not sure which of those it is, your Worship. In the time we've had to review the extensive material that has so far been gathered, we've been not able to find documents equivalent to these general reports, which I've taken your Worship to, that deal with the fire management trail issue. It may be a matter of sifting through a large amount of material and drawing conclusions from discrete documents rather than finding a report to deal with it. We've so far been unable to find any general reports that discuss the level of maintenance of fire management trails in the relevant areas, including the national parks and in the pine plantations. I'm not saying that they don't exist at this stage, and certainly we'll be pursuing inquiries with the other parties in relation to that in due course.

The plan for the following period, namely 2000

to 2002, document [AUS.AFP.0032.001], again a very large document and I won't go to that at all, your Worship, because as I indicated yesterday, there are very few changes between that report and the report that precedes it, namely, the 1998 plan. I am sorry, I should have said the plan that precedes it.

I was unable to detect significant changes to either the introductory sections or to the actions and work programs in respect of that plan. However, it should be acknowledged - and I will take your Worship to a document that appears in folder 3, unfortunately I can't tell your Worship where it is in that folder, it may be the next document after that Deloitte's report, which is an Emergency Services Bureau minute provided to the Minister for Justice and Community Safety at the time, who I believe was Mr Humphreys, in relation to the approval of that plan. It's at document [AUS.AFP.0037.0117].

THE CORONER: That's in volume 3?

MR WOODWARD: Yes, it is volume 3. It's only a two-page document and unfortunately I can't tell your Worship precisely where it appears in that folder.

THE CORONER: I have that. It's in volume 3, just before the Bushfire Fuel Management Plan.

MR WOODWARD: Thank you, your Worship. Your Worship will see that that's the minute by which approval for the plan is sought and it should be acknowledged that that minute contemplates a much more significant revamp of the fuel management plan for that following the one for which approval is being sought. At the bottom of that first page, in the last paragraph:

> It should be noted the government land managers have agreed that for the next

> review of the plan the format of the plan should be significantly restructured to make it more user friendly and the specific yearly works plans more evident. To this end the government land managers would work with the bushfire fuel management committee over the next two years to restructure the plan into components, such as strategic directions, technical matters and tactical treatment works. Some of the comments from the public submissions for the current plan are relevant to this order restructure and will be incorporated into the work of the committee.

It's perhaps worth also noting the approval that's shown on that document, it appears at least, your Worship, that the Minister has circled the agreed section but has added this annotation:

> However, as discussed with P Lucas-Smith yesterday, there seems to be a number of inadequacies underlying this plan. The plan is good on paper but does not seem to address the reality that little seems to be happening in some areas to address bushfire fuel build-up. There is some point to the matters Val Jeffrey has raised.

I understand Mr Jeffrey may have provided a submission in response to the development of the plan as required:

> I'm prepared to accept the advice I have here given that the present plan should be gazetted but the next version of the plan must make a serious attempt to overcome these deficiencies.

I think the initials are GH, 19 July 2000.

Your Worship, that process of revamp of the next plan was given, really, impetus by the fires of December 2001 and, as part of that process of revamp, the Department of Urban Services sought from Mr Cheney a report commenting on an early draft of the proposed plan for the 2002/2004 period. That report is the first document in folder 4. [AUS.AFP.0037.0137].

As I indicated yesterday, your Worship, in discussing the 1998 plan, it's apparent from Mr Cheney's comments in this report that many of the features of that earlier plan were carried through into the draft that he was reviewing. And I should say also, your Worship, for the benefit of my learned friends, as I've indicated, this issue is obviously an issue that would require significant further evidence before your Worship in the second phase of the hearings and we anticipate that that will include evidence from Mr Cheney discussing the adequacy of the early plans going back to the 1998 plan. Of course, when Mr Cheney is in the witness box in relation to the matters which are referred to in the opening, the parties should feel free to ask him any questions they feel appropriate about this particular document. However, I did want to mention that it's likely he will be returning to the witness box in the second phase on the issue of fuel management in particular, which may be a more appropriate time to address these issues. But that's a matter for the other parties.

The executive summary appears at 0138 and is as follows:

> This fuel management plan ....

I should mention this is a plan that was a draft of the 2002/2004 plan:

Documents the activities of the ACT land managers to reduce fuels on areas under their responsibility. There is a clear need for the Department of Urban Services to consider the problem of a major fire spreading across the ACT and impacts of fuel on lands under other management, and to consider the impact of fuel reduction strategies across tenure boundaries. The fuel management plan confuses the accepted terminology of fire hazard and fire threat. This confusion means that the plan does not fulfil the requirements of the Act. It does not identify areas of high fuel hazard for prescribed fuel reduction activities to reduce these hazards. It does not provide a program of works to be carried out during the plan period. Fire management zones are mapped as fuel reduction activities. This is misleading because a fuel reduction activity may or may not be carried out during 2002/2004. There are no strategic fuel reduction activities in forest and woodland areas planned for 2002/2004. The maps accompanying each fuel management unit give the impression that some fuel reduction activity is planned in the strategic fuel management zone. The maps of past wildfires and prescribed burns are cluttered and confusing. Fires that have occurred in forests more than ten years previously are largely irrelevant to fuel management planning. Grazing should not be considered as a strategic fuel reduction activity. The areas identified as having grazing are not strategically located, nor is the grazing specifically prescribed to reduce fuels to a low level prior to

> the fire season. Major areas of significant hazard omitted from the plan include defence property (e.g. field firing range) and land managed by the land and property section of Urban Services. Major assets on Mount Stromlo should be taken into consideration and fuel reduction on adjacent land considered. Issues to be considered in the next plan include: Statements of policy relating to standard fuel management procedures for routine activities, e.g. separation of houses from bushland, grassland or other fuels; roadside mowing, et cetera; a sensible policy for prescribed burning specifying acceptable maximum fuel loads; likely rotation and objectives in terms of fuel structure and composition; a full wildfire threat analysis that includes public consultation on relative values; fuel mapping to determine priorities for fuel management and suppression.

That does incidentally, your Worship, conveniently summarise the bulk of the report, but I think it is useful to go to some specific comments made by Mr Cheney in the course of the report. On the following page, he sets out the objectives of the report, which were:

> To assess whether or not the fuel management strategies identified in the plan adequately address the key fire risks. To ensure that the fuel management strategies and policies have been identified are consistent with the overall objective of the plan which is to protect life and property as well as protecting environmental diversity.

Some of the specific matters that I referred

you to yesterday, your Worship, the first of those is at page 6 of the report, or 0142, in the middle of the page. The second sentence of the third paragraph reads:

> The suggestion that a fuel at equilibrium load may have a lower flammability than that of a fuel accumulating after a wildfire in the first five years may be a special case where grasses invade a forest area as explained below. The suggestion that follows that planned burning to reduce fuel loads may only be of real benefit in reducing rate of spread for the first 6 to 12 months is certainly not the general observation that has been reported widely.

I drew your Worship's attention to that passage in the 1998 fuel management plan yesterday, and mentioned that that was one that Mr Cheney disagreed with.

Probably the most important section of this report, particularly given the events of earlier this year, your Worship, begins on page 7, or 0143, under the heading "Planning for Extreme Fire Danger Conditions":

> The general principle for fuel management planning and wildfire threat analysis is to plan for the most dangerous conditions. This may be quantified by calculating the top percentile of the past fire weather conditions or by simply examining the conditions under which severe bushfire events occurred in the past. There is enough knowledge and evidence to show that the most severe events in the ACT will occur under a particular pattern of extreme fire weather. This means that the event will have been preceded by a period of below-average rainfall

> as quantified by a high drought index. Under these conditions grasslands are fully cured and forest fuels are uniformly dry. The influence of recent rain will have disappeared and fuels on all aspect also have the same moisture content because they are in equilibrium with the atmospheric moisture. There will be a strong dry wind. In the ACT this wind will come from the north-west or west. Under some synoptic weather patterns this wind will precede a cool change when the wind direction suddenly changes to the south-west. The air mass after the wind change is generally moist but a large fire may burn severely in forest fuels for up to two hours before sufficient fuel moisture is absorbed to modify fire behaviour. Fire behaviour in grasslands will become less severe more rapidly. Using this principle, it is then possible to develop sensible strategies for fuel management and fire suppression and to prioritise assets that are most likely to be severely affected if a fire should break out under extreme conditions. It also makes it possible to identify areas that would support only mild fire behaviour for most of the year but which pose a considerable threat under extreme conditions. For example, the plan states (page 38, paragraph 2) that "the majority of the south Cotter area of Namadgi National Park poses little hazard to neighbouring lands due to the combination of low visitation, moist vegetation types and local weather conditions".

Again that was a passage in the 1998 plan which I took your Worship to yesterday:

> Under extreme weather conditions, wind speeds at higher elevations will be greater than measured in Canberra and fuel will be uniformly dry. Forests carry heavy fuel loads and any fire starting in, or to the west, of the park will burn severely and carry considerable threat to adjoining lands on the eastern perimeter.

The plan goes on, or the report, your Worship, goes on in the following pages to deal with some of the specific concerns Mr Cheney has about the plan, and in particular in page 10 of the report, which is 0146, in the second paragraph. Mr Cheney observed:

> The inclusion of amenity mowing and general grazing are activities that are not specifically targeted for fuel reduction.

The reference to amenity mowing is a reference to mowing which has been conducted for aesthetic reason in any event, and although it has a fuel management advantage, that's not the purpose for which the mowing is being done:

> This obfuscation gives the impression that much more fuel reduction is being conducted than is actually the case. If the plan illustrated only those fuel reduction activities that are specifically carried out for fire protection within the period of the plan, it would be a very slim document indeed.

Over the page, your Worship, some examples of that. In the middle of the page, mowing:

> The areas marked slashing/mowing asset on the maps of the fuel management units appear to be mostly the mowing

> plan for Canberra Urban Parks and places. The maps do not differentiate those areas that are irrigated or those areas that are mown year-round for public amenity, from those areas that are mown only from October to March specifically for fuel management purposes to protect significant assets. The plan, therefore, has areas mapped with no fire hazard (e.g. the lawns in the parliamentary triangle), areas with no prior protection significance, (e.g. Springbank Island, cycle paths beside the lake and golf courses and walking paths in nature reserves), and areas that present a minor local threat but are maintained for public amenity, (e.g. suburban dry parkland, walkways, et cetera).

Your Worship, a few pages further on, page 13 of the report, or 0149, some of the strategies are elaborated upon. The bottom of the page under the heading "Strategies Needed in the Plan" says:

> A fire management plan needs to have a clearly defined strategy that sets out how large fires that have the potential to burn across the ACT will be handled. At the moment the plan focuses on a microscale with individual fuel units. There is no broad scale consideration of the impacts of a very large fire or the simultaneous threat to a range of values including conservation areas, pine plantations and the urban interface. This strategy would set out the fire management activities needed to facilitate rapid suppression of a major fire. Issues to consider would be access, east-west control lines (particularly across the Cotter

> Valley) and fuel reduced areas primarily designed to assist suppression and reduce the impact on neighbours. There is no overall consideration of the impacts that broad-scale fuel reduction could have on the spread of fire other than the impact on the immediate boundary between the asset and the fuel.

That's one of the references to access and the importance of access, to which I referred earlier, your Worship.

Specifically on the issue of burning in forest areas, at page 17 of the report, 0153, under the heading "burning", Mr Cheney observes:

> There is no burning planned in the areas marked on the maps for burning FRA 2, strategic fire, and it appears from the overlay that no burning has been carried out since 1990 (excluding the areas burnt by wildfire this season).

Being the December 2001 fires. It continues:

> As discussed above, the lack of fuel load specifications in the prescriptions means that managers can leave these areas without ever carrying out fuel reduction burning in them. The inclusion of these areas in the map of planned activities obfuscates the main issue of identifying areas of hazardous fuels and illustrating the planned activities to reduce them over the next two years.

Again, over the page, your Worship, it's worth observing specifically, given what occurred earlier this year to the paragraph, the last paragraph on the page, where Mr Cheney's

referring to specific or major areas omitted from the plan. He makes specific reference to the Stromlo Observatory and says:

> There is no consideration of the impact on wildfire on the Stromlo Observatory, the ACTEW AGL water treatment facility and associated buildings. Consideration should be given to the fuel management both within the grounds of these facilities and in the pine forests and other vegetation on the western slopes of Mount Stromlo.

Your Worship, that report was completed or provided in February 2002 and then throughout that year, the process of completing the fuel management plan for 2002 to 2004 continued. It's perhaps worth observing that again, as with the Curtin fire in 1994, it was the fires in 2001 that seem to have provided the wake-up call for that major revamp of the plans that had been in operation since the 1998 plan.

Just to continue the chronology: because of the legislative requirement that there be a plan completed every two years and the priority being given at that stage to a new plan, a significant revamp, in February 2002, the Department of Urban Services sought approval of an interim fire management plan which was essentially an extension of the then current plan, namely the 2000 to 2002 plan, to enable that review to continue with a view to producing the more comprehensive and revised plan later that year.

That temporary plan, is at [AUS.AFP.0037.0164]. Sorry, that document is a minute seeking the approval of that plan and the plan itself, or at least what may be a draft of it, is at [AUS.AFP.0037.0168]. I don't propose to go right over those documents, your Worship, because, as I say, the plan really was largely an extension of the existing plan to provide

the time necessary to conduct a major revision. Those documents are located in folder 4.

In due course, your Worship, following a process of public consultation, the new plan was completed and launched in November 2002. There are a number of documents generated as part of the launch of that plan. Again these documents appear in folder 4. They include a communications plan. These are documents that have been provided to those assisting by the Department of Urban Services - a Communications Plan for the Release of the Draft Bushfire Fuel Management Plan 2002. This document sets out the process by which the new plan was to be developed and made available for public comment. At page [AUS.AFP.0037.0179], the communication plan makes these observations about the process then under way:

> An ACT Government wide planning approach has been implemented. Planning has been undertaken. Where previous plans described the fuel reduction activities to be undertaken on an agency-by-agency basis, this plan consolidated all of the proposed fuel management actions into a single set of easy to interpret maps. Consolidating this information has reduced the size and complexity of the ACT Bushfire Fuel Management Plan. The draft 2002 plan has incorporated a number of lessons learned from the severe bushfire events experienced in Christmas 2001. Modelling of bushfire risk to the urban interface and other key assets undertaken by ACT Emergency Services Bureau has helped to identify priority areas for bushfire fuel management on the urban interface. Increased attention has been placed on identifying the risks of fire in ACT forest and national park areas. For the first time, the 2002 plan has

> identified a number of strategic bushfire fuel management actions to be implemented within plantation pine forests and Namadgi National Park. It is expected that these actions will provide for greater protection of both human and biodiversity values in the ACT.

So it would appear at least from the process that followed that much of the matters raised by Mr Cheney were acknowledged, accepted and the process of improving the plans for future years was under way.

There are other documents included in the brief associated with the launch, your Worship, which I won't take you to, and they follow that document in folder 4. But there is one document which I think it is instructive to read, and I do so without further comment. It appears at [AUS.AFP.0037.0021]. It's a document headed "Questions and Answers: Bushfire Fuel Management Plan".

I should indicate that the document as it appears in the brief appears to have a rogue second page. It's actually only a two-page document and comprising 0021 and 0023. Your Worship is no doubt familiar with this type of document, which is one that's prepared in this case for the launch of the 2002 plan in November and it's a set of question and answers which appear to have been prepared to assist the Minister on the making or on the launch of the plan with some difficult questions that might have been put to him at that time. I'm not in a position, of course, your Worship, to say whether those condition questions were put and, if so, whether the answers included in this plan were given but it does provide a sense, at least, of those in the department responsible for drafting this document as to what they considered to be an appropriate way to respond to the questions that were proposed.

The first question that was suggested might be asked was:

> Why hasn't the ACT Government done more to reduce fire fuels?

The proposed response is:

> The ACT has undertaken a significant amount of bushfire fuel management in the past year. This has included the relatively large amount of prescribed burning undertaken by ACT Forests in areas adjacent to pine plantations and a very significant amount of vegetation management in the most at-risk areas of the urban interface. Almost $200,000 of additional funding was provided for this work. Land managers have also recently completed an extensive program of fire trail maintenance in reserve areas and a number of trails have also been realigned in pine forest areas. The aim of this work is to provide safe access to firefighters and assist in preventing fires from spreading outside of containment lines. It is important to note that rather than focussing on the amount of fuel reduction that's been undertaken, what we need to do is ensure that all of the most important areas are managed responsibly. That is where this plan is a significant improvement over its predecessors.

The next question:

> So you've compared two areas at Gossan Hill - one to show before hazard reduction and one after - but why haven't you done both areas as they're close to houses and property? The

> hazard reduction work undertaken on Gossan Hill and similar areas of urban interface was targeted at the most at-risk portions of the reserve. The work completed has enabled mowing of a reduced fuel zone behind the houses most exposed to the prevailing high fire danger conditions. The hazard reduction work you've done across Canberra is not enough; will you accept liability when there's loss of property and even life this bushfire season?

The response proposed is:

> The ACT Government is well prepared for the current fire season and the hazard reduction undertaken more extensive and better targeted than ever. Fire is an integral component of the Australian landscape and no amount of fuel management can ever provide an absolute guarantee that fires started under extreme conditions will be controlled. However, targeting fuel reduction in the areas considered to be of greatest threat will at least give firefighters a better chance of success.

Jumping over two pages, the answer continues:

> It is also worth remembering that fuel management is only one element of bushfire management and preparedness. It is used in combination with other strategies such as early detection of fires, fast response by firefighters, sensible urban planning and responsible behaviour from residents.

Clearly, your Worship, each of those are elements said to be part of the overall control process that would require careful examination.

The next question:

> The ACT is way behind in hazard reduction work so you have created a dangerous situation for this bushfire season. What are you going to do about it now? As mentioned, the ACT Government land managers are well prepared for the current bushfire season. Can you please give specific examples of where you believe fuel management has not been undertaken appropriately and I will ask the relevant land manager to investigate?

Finally:

> Because of the high levels of fuel on government managed land you have put properties and homes at risk. Do you accept responsibility?.

The response is:

> Drought conditions have meant that the amount of grass available to be consumed in a bushfire is significantly less than can be expected to be present in most other years. This means that there is not the same amount of fire fuel available close to houses and other property as there is in most years. Once again if you can identify any specific areas of concern, ACT Land Managers will evaluate their bushfire potential.

Your Worship --

THE CORONER: Is there a date that that response was prepared?

MR WOODWARD: It itself doesn't have a date, your Worship, but it's associated with the media - there was a media alert that appears at

[AUS.AFP.0037.0006], dated Thursday, 28 November 2002 for the launch of the Bushfire Fuel Management Plan, which states that:

> ACT Urban Services Bill Wood will today publicly launch the 2002 ACT Bushfire Fuel Management Plan. "We learnt a number of valuable lessons from last year's bushfires; the 2002 ACT Bushfire Fuel Management Plan contains the priorities for bushfire fuel management for the next two years", Mr Wood said.

It appears the launch took place on Thursday, 28 November 2002 at Gossan Hill. One can assume it was prepared slightly prior to that date.

THE CORONER: Thank you.

MR WOODWARD: The plan was completed and launched in November, as I've indicated, your Worship, and it appears at [AUS.AFP.0031.0030]. As would be expected, your Worship, having regard to a gestation period of almost 12 months, there is no doubt that the plan for that period launched in November is a significant improvement on its predecessors and in our submission it will provide your Worship with a useful starting point for any recommendations your Worship would make in due course in the area of fuel management.

As to the plan itself, your Worship, I don't propose to go to it because the catastrophe of the January fires has obviously had a significant impact on the relevance of that plan and no doubt particularly having regard to the recommendations of Mr McLeod in his report. Work is being done to revise the plan and we would hope to be able to provide, with the assistance of our learned friends, an indication to your Worship as to what revision has occurred during the second phase of the

hearings to acknowledge the fact that a large area of land that would otherwise have posed a threat is no longer.

It's perhaps worth just briefly referring, your Worship, pending the further examination that will inevitably occur in the second phase, what Mr McLeod said about the issue of fuel management. He deals with it in chapter 4, "Operational Readiness and Assessment", effectively from pages 83, including issues of fire access, through to about page 100, including the ministerial foreword for the Bushfire Fuel Management Plan for 2002/2004.

What he says on page 89 is under the heading "The Reality". Having referred to the plan and saying "that plans are of little value if they do not give rise to practical management outcomes against a clear policy framework and unambiguous set of measurable outcomes", he says:

> The large quantities of fuel have accumulated in ACT Parks and Forests. Appendix E shows the area of the ACT that have been burnt in recent years. Of note, however, are the extensive areas that have not been burnt for many years. In the 2002/03 season, fuel loads in some areas were estimated at between 35 and 40 tonnes per hectare, described by some as the maximum available fuel load. That is, the balance between the level of fuel that naturally degenerates through composting and the fuel accumulates through leaf litter. After January 2003, the ACT now has an opportunity to take advantage of the substantial reduction in fuel loads that resulted from the January fires. Planning should be reviewed, access tracks further developed and future strategies determined. This is easier

> to do when there is less fuel in forests and parks. The likelihood of fires of the same ferocity occurring in the next few years is considerably diminished although grass fires are a threat and some areas still carry a heavy fuel accumulation both in Canberra and in rural areas remain a high fire risk. The Bushfire Fuel Management Plan should be revised to take account of the changed circumstances as a result of the January fires. Greater emphasis should be given to controlled burning in combination with other measures such as mowing and slashing in and around Canberra.

So I will indicate to your Worship, as the government has indicated, those recommendations will be implemented. It will be part of the second phase to examine what has been done and whether further work needs to be done in that area for the future.

As to the past, your Worship, in our submission the issues that these documents to which I've taken your Worship throw up in the area of fuel management for examination in phase 2 of the inquest are these:

> Were the fuel management plans developed following the report by Mr McBeth and the Glenn task force sufficiently aggressive and comprehensive to have an impact on the conflagration events about which the government had been repeatedly warned for a decade or more before the 2003 fires and, if not, why not?

In considering that first question, your Worship, it will be important not to overlook the interplay between fuel management regimes on the one hand and future trail maintenance

and community education on the other. By that I mean this first question raises two subsidiary questions. There may be circumstances in which it is both necessary and appropriate to limit fuel management in order to preserve conservation values, and that's acknowledged in all of the documents to which I've taken your Worship, but the question then is this: Has the network of fire trails been maintained to a level that will allow early aggressive attack, which is generally seen as the alternative to a high degree of fuel management, following an ignition in areas where there has been little or no fuel management? Secondly, if the decision is made not to pursue aggressive fuel management, are the fire suppression agencies adequately prepared and resourced to mount an early and aggressive attack in those areas where no fuel management has occurred? And most importantly, and this picks up comments made both by Mr McBeth and Mr Cheney in the reports to which I've taken your Worship, are the communities that may be affected by a fire starting in areas of high fuel loads where an early attack has failed, adequately prepared for the possible consequences of that decision to limit fuel management? Obviously that is a particular focus for the urban interface.

The second question, moving from the theoretical perhaps to the practical, for your Worship will be: was enough done to implement the plans that were in place from mid-1998, particularly having regard to the recognised inadequacies of the ad hoc approach to fuel management in the earlier years? Again, if not, why not?

Thirdly, your Worship, it will be necessary to consider and obtain largely expert evidence on this question: in either case, would it have made any difference; that is, would a more aggressive and more comprehensive fuel management regime, or alternatively more

detailed or more comprehensive implementation, have made any difference in either the capacity of the fire suppression agencies to control the firestorm that raged into Canberra on 18 January or the devastating effect of that fire on the ACT and, in particular, on the urban interface? As I've indicated to your Worship, there's quite a bit of work to be done in order to provide your Worship with sufficient material on which to consider those issues and it's anticipated that there will be further expert evidence provided during the second phase of the hearing.

Your Worship, that concludes the material to which I wish to take you in the area of fuel management. There are, as I've indicated, a number of documents which I haven't directly taken your Worship to but form part of the brief and will potentially need to be revisited in the second phase. If your Worship pleases.

THE CORONER: Thank you, Mr Woodward.

MR LASRY: We call Mr Cheney, please.

<MR NOEL PHILLIP CHENEY, SWORN

<EXAMINATION-IN-CHIEF BY MR LASRY

MR LASRY: Mr Cheney, would you tell her Worship your full name and professional address and occupation, please.
A. Noel Phillip Cheney, CSIRO Forestry and Forest Products, which is in Wilf Crane Crescent, Yarralumla, and I'm a research scientist.

Q. And, indeed, are you the senior principal research scientist and project leader in relation to bushfire behaviour and management for CSIRO?
A. I gave up the position of project leader a couple of years ago and I'm now a senior principal research scientist.

Q. Yes. By way of qualifications, as I think you may have heard me open, you have a Diploma of Forestry from the Australian Forestry School in Canberra?
A. Yes.

Q. Way back in 1963?
A. Yes.

Q. And you hold the degree of Bachelor of Science in Forestry in 1973 from the University of Melbourne?
A. Yes.

Q. Is that all the qualifications - not that that's not enough - but have I missed anything?
A. No, they are my academic qualifications.

MR LASRY: Your Worship, Mr Cheney's curriculum vitae is quite substantial and I think by now has been distributed, but I just want to ask him a few questions about it. If it hasn't been, then my learned friends will get some benefit from what follows. There is a document which is 20-odd pages and I apologise to my learned friend because I thought I had made arrangements for it to be distributed. It will be soon.

Q. Just dealing with the various positions, Mr Cheney, that you've held. If you go back to 1963/1964, you held the position of forestry officer grade 1, I think, with the Forest Research Institute?
A. Yes.

Q. In the watershed research subsection?
A. That's correct.

Q. And basically what was the nature of the work that was involved in that position that you held?
A. I was asked to investigate turbidity in the lower Cotter Dam and my first job was to

identify sources of sediment in the Cotter catchment and later to set up a watershed research program which was to prepare a number of experimental catchments which would be given different forestry treatments to assess the effect of forestry on water yield into the Cotter catchment.

Q. Between 1965 and 1972, still with the Forest Research Institute, you held the position of forestry officer grade 1, and broadly that work involved research carried out by you into fire behaviour and fire control; is that right?
A. That's correct.

Q. And I'll just go into a bit more detail about that. It included the development of prescribed burning guides and the application of aerial prescribed burning for fuel reduction in mountains and forests, modification of fire danger rating systems and investigations of fire behaviour and damage caused by large wildfire. You also examined issues of equipment development which included reference to aircraft and developing of fire retardant chemicals and things of that nature; is that right?
A. Yes.

Q. Between 1972 and 1974 you were a forestry officer grade 3 with the Forest Research Institute and during that period supervised researching the fire behaviour of various fuel types, and I take it that meant particularly various kinds of trees or various species of trees in forests and things of that kind; is that right?
A. Well, probably a bit more broadly, that we were looking at a whole range of vegetation types and again over the longer period, ranged from sugar cane burning in North Queensland, tropical grasslands in the Northern Territory, wet and dry forests in the southern states.

Q. Also during that time, indeed commencing the year before that period, from 1971 to 1974, you lectured students in the degree of Bachelor of Science and Forestry at the Australian National University and the lecture courses included aspects of combustion physics and chemistry, fire weather, factors affecting fire behaviour, detection of fire suppression, the effects of fire ecology and the use of fire in forest management. Is that correct?
A. That's correct.

Q. Between 1975 and 1980, now with the CSIRO division of forest research, you held the position of senior research scientist and your research involved research into fire behaviour and spread mechanisms in grassland and forest fuels, and you were a consultant to other scientists within the CSIRO undertaking research concerning fire effects on various eco types ranging from alpine woodlands to arid zone woodlands; is that right?
A. That's correct.

Q. 1981 to 1985 you were the senior research scientist and project leader for Project Aquarius, which was a specially funded project to investigate the effectiveness of large air tankers in Australia, and your research included investigation into the behaviour of high intensity fires, suppression effectiveness of various chemical fire retardants, physiological performance of firefighters, effectiveness of large air tankers and other conventional fire suppression techniques and the economics of fire control. And there were cooperators in Project Aquarius which included forestry sections from the United States?
A. Yes.

Q. From the Chisholm Institute of Technology, from the Forestry Department of Western Australia, the Commonwealth Institute of Health, Bureau of Meteorology, Country Fire Services South Australia, Forest Commission of

Victoria, as it was then, and the Country Fire Authority of Victoria?
A. Yes, that was a very large project.

Q. Yes. Between 1989 and 1995, again you occupied a position of principal research scientist and the work that you were doing during that period - I'm sorry, between 1985 and 1989, the work that you were doing as described in the document I'm referring to concerned the national bushfire research unit which was a mission-orientated research program within the Division of Forest Research and received support from the CSIRO and outside agencies.

Areas of work included research into fire behaviour to understand the spread of bushfires in the natural environment and to develop models to predict the behaviour of fires and important fuel types, research on suppression technology to evaluate different suppression systems, to find the limits of effectiveness, research on fire meteorology to better understand weather affecting bushfires, using numerical simulation and field validation, and research on management systems using fire behaviour knowledge to develop better and safer bushfire management; is that right?
A. Yes.

Q. And then --
A. We were combined within CSIRO with the division of atmospheric research and I had staff situated in Melbourne, so the meteorological work was done by my staff rather than by myself.

Q. And since 1995, as you say I think you no longer were the project leader, but in your position as senior principal research scientist and then project leader into bushfire behaviour and management, you have undertaken research into fire behaviour to understand how bushfires spread in the natural environment, to develop

models to predict the behaviour of fire and important fuel types, undertake or supervise research on fire meteorology to better understand weather phenomena and also research management systems using fire behaviour knowledge to develop better and safer bushfire management; is that correct?
A. Yes.

Q. And the work that you have done over that extensive period has continued up to the present; is that right?
A. Yes.

Q. And since the fires of January of this year, have you spent a considerable amount of time accumulating information either from other people or from known data or from your own investigations and observations for the purpose of compiling a report for the Coroner in relation to those fires?
A. Almost wholly since the fires I've been doing that.

Q. Now, in addition, and indeed in the earlier days, Mr Cheney, had you been involved with the work done by Mr McArthur in his research into fire behaviour and the development of what's become known as the McArthur Index?
A. Yes, Mr Allan McArthur was my supervisor when I started in hydrology work and I was virtually shanghaied into fire. We got on well together and we worked together - I was providing experimental data for the fire danger rating systems that he was putting together.

Q. Yes. And how did you go about accumulating that experimental data? What was the process by which you obtained the data?
A. Pretty much all of it was by burning experimental fires in different fuel types and McArthur adopted the philosophy that there was no valid theory on fire and there still is no valid theory that fully explains how a fire

burns and spreads, and so we used a technique of burning fires under a range of weather conditions and then correlating the obvious variables of fuel moisture, weather variables and fire spread.

Q. Was some of that work done here in Canberra?
A. Most of the work that I did was done in Canberra on Bruce Ridge primarily between what's now Calvary Hospital and the Bruce Stadium, and on the dry forests out on the Cowen Ridge, west of the Cohen pine plantation. This was often done - we carried out the experiments throughout summer and usually combined it with our instruction to forestry students who were the firefighters that we employed as part of their training to control the fires.

Q. Yes. And with that went the necessary equipment, tankers and things of that kind, to enable you to control the fire?
A. We mostly had a Land Rover with 100 gallon tanker trailer behind it. Most of the work was dry firefighting and the tanker was just used to mop up the areas after we finished.

Q. Apart from that, in connection with various work that you've done, have you made - I think some nine overseas visits since something like 1978, either to attend various fire management courses or, for example, as in 1983, did you attend in Canada in the United States as a guest key note speaker at the Intermountain Fire Council, 1983, fire management workshop on suppression options and alternatives in Alberta in Canada?
A. Yes.

Q. And have you made several other trips like that, including to such places apart from the United States as China, Portugal, New Zealand, and I think more recently - what was the most recent trip that you undertook?

A. It was to Portugal.

Q. And on top of that, have you been involved in something of the order of 54 different consultancies as a fire behaviour expert?
A. I think that's something like the number.

Q. It's a long list, isn't it? It commenced in 1986. Those consultancies have been for a variety of purposes, either as consultant to particular government departments or the offering of expert fire opinions to a variety of solicitors, fire services or government instrumentalities?
A. Yes.

Q. On top of that - I think in every case, you co-authored, but are you the co-author of some seven books on various aspects of fire behaviour and fire management between 1983 and 1999?
A. Yes.

Q. And on top of that, have you prepared for some 13 publications - more than that actually. On top of the books - I'm sorry there are a large number of publications. I meant to total those, but a large number of referred publications where you've either written articles or co-written articles in an extraordinarily long list of publications over the years on these topics?
A. The list falls into two parts. There are those that have undergone peer review, which are the referee publications --

Q. Yes, referee. I said "referred", I beg your pardon.
A. And a fairly extensive list of unreferred publications, which I've just highlighted some of them. There are quite a few, and I sometimes get caught out because I haven't listed them all.

Q. I think the total is 91. A combination of

referred and unreferred. And finally, I think the number of conference papers that you've written and presumably presented at various points between 1994 and 2001 is something of the order of 13 different conference papers, again on issues of firefighting, fire management and various aspects of your studies over the years on fire behaviour; would that be correct?
A. That list is quite incomplete. It's only recent conference papers and only those of major significance.

MR LASRY: Would that be a convenient time to take the morning adjournment.

THE CORONER: Yes.

ADJOURNED [11.22am]

RESUMED [11.45am]

MR LASRY: Your Worship, Mr Cheney's CV has now I think been distributed to the parties.
Mr Cheney, I just want to touch briefly on an area that has already been dealt with to some extent by my learned friend Mr Woodward in some of the material that he has read to the court and also in the evidence of Mr McBeth. In 1991, you prepared what was described as your comments on the Hannon Group Pty Limited report, which, as I understand, was essentially a report on the way in which the fire Emergency Services should be structured from then on. Is that a fair description of it.
A. That's correct. I was then a member of the Bushfire Council of the ACT.

Q. And that was one of the things that I left out of your CV in summarising it. You had been a member of the ACT Bushfire Council from 1979 to 1995, I think; is that right?
A. That's correct.

Q. And is it too much of a simplification to

say that it was the report of the Hannon Group, which led to the structure of the Emergency Services Bureau as it now is, in broad terms; is that effectively so?
A. I would say so, yes.

Q. And so you were asked or offered comments on that report and the structure which was proposed by that report - we'll come to this in more detail in phase 2 - but the structure was not favoured by you, was it?
A. Yes, I argued in my comments that I believed that the responsibility for fire management, including suppression, should be held by the land management agencies, be they forests or parks, or the rural people in the rural sector.

Q. In that document, which is at - I think you've got it in front of you, [AUS.AFP.0079.0197], and in particular page 0203, you set out your views on what you described as the future model for rural fires organisation in the ACT. Do you see that there, on page 7 of the report?
A. Of my report?

Q. Yes.
A. Perhaps I have the wrong report here. Oh, sorry.

Q. Just briefly I'll read from it, Mr Cheney. You say under the heading of "Future Model for Rural Fires Organisation in the ACT":

> As the major rule, land managers in the ACT, the Parks and Conservation Service, should undertake the bulk of the bushfire fighting. This department should be totally responsible for all aspects of fire management, including finance, fuels management and providing a fire suppression organisation capable of suppressing most fires in their own

areas. The firefighting resources of ACT Forests should be reduced to meet under the requirements of ACT Forests who will be responsible for suppression of fires occurring within their area. Volunteer Bushfire Brigades should be maintained primarily to suppress fires on leasehold property but also to assist the ACT Parks and Conservation Service in the ACT forests, suppress fires on their land, and to protect homes on the urban fringe. Interagency agreements should be drawn up between ACT Parks and Conservation Service, ACT Forests, this will be particularly important if ACT Forests is made a government-owned corporation and is expected to return a profit from forestry operations, and the volunteer Bushfire Brigades and relevant authorities in New South Wales to provide a clear understanding of the operational expectations of each group.

The position of the Chief Fire Control Officer needs to be clarified. This person should have the power to coordinate fire suppression activities over all lands within the ACT in the event of an emergency, should be experienced in fire control and should be a member of the ACT Parks and Conservation Service.

You go on to talk about the Bushfire Council and some other matters, but that was essentially the thesis of what you were arguing for in those comments; is that right?
A. The comments that I had - I didn't say, I don't think, unless, again, this is another copy, that he should be within the Parks and Conservation Service, but rather someone that had the power of coordination in the event of

an emergency or a fire situation that was large enough that it required coordination and couldn't be carried out within the structure of ACT Parks and Conservation.

Q. Am I right that the primary thought behind all this is that the large land managers in the ACT, large government land managers, needed to be the people who would control fire suppression as well as land management; is that essentially what you were contending for?
A. My view is that I see that a land manager has to be responsible for the fires that break out on the land and take all reasonable steps to keep them under control, and that responsibility has to rest at the highest level of that agency so that the problem of fire management is understood fully by the agency at all levels and that they argue for appropriate finance from government to carry out fire suppression and the fire management activities that are necessary within the area and also that their other responsibilities, be it conservation management and in the case of parks or timber production in the case of forests, are also met with the pre-suppression measures that need to be undertaken.

Q. Now, Mr Woodward I think referred Mr McBeth to other portions of the report, which I won't go back to and repeat, but in other sections of your comments. You made certain predictions in the way in which a conflagration event might occur and the circumstances in which it might arise and obviously you adhere to forecasts or predictions you made then?
A. Yes, basically our philosophy of research for fire danger is to provide a scale which includes what we put in, in inverted commas, "worst possible", which is basically worst recorded or the top one percentile of fire conditions, so that the full range of possible fire behaviour is appreciated by the managers and that the planning that they need to do is something which doesn't cover the median event

or the average fire season but rather is planning what has to be put in place so that they can address what will happen under extreme fire conditions.

Q. Such as those which occurred in January of this year?
A. Yes.

Q. All right, thank you. I won't need to take you to that document any further. I just want to briefly ask you a few questions about the CSIRO during these fires. In the period that we've been, and we'll examine between 8 and 18 January, the CSIRO, and your section particularly, were interested obviously in the fire and its proportions, and, I take it among other things, in any data that you might be able to obtain from observing the event?
A. Yes, we try to put people on the ground during these events so that we can collect reliable spread data under extreme conditions as data that is used to check what our extrapolations in experimental conditions are from experiments under milder conditions. So it becomes a valuable top-end data point.

Q. So to do that several people from the CSIRO and from your section were involved in, in fact, going out to the fires from time to time?
A. Yes, they were.

Q. And making observations and also, as we'll see later, taking some film of what they saw at various places as the fires developed?
A. Yes, I believe that we would have to do a reconstruction for our own purposes, if nothing else, to establish rates of spread and intensities of these fires.

Q. All right. Now, as I asked you earlier, and indeed as you said earlier, a lot of the data that you accumulated was accumulated for preparing the document which is now part of the

brief. The document entitled "Origin and Development of Bushfire that Spread into the ACT, 8 to 18 January 2003". It's a document you prepared in effect in report form; is that right?
A. That's correct.

Q. We'll come to the detail of it as we go through the course of your evidence. But in so far as it contains information which forms part of your evidence, to your knowledge and belief are the contents of it true and correct?
A. Yes, they are, as far as I have data that supports that. I know there is more data out there that I know of, but didn't have time to incorporate into the construction of the fire spread maps, and you will see that there are some areas of those maps which I've just put as "Under Construction", and I will go through how we collected that, but suffice at this point to say that a lot of it was hearsay evidence which will probably be tested within phase 2 perhaps and I expect through the proceedings to fill the gaps where I've had to make certain assumptions about what happened at different places.

Q. Do you have a copy of the document in front of you?
A. Yes.

Q. I just want to refer you to it in a couple of respects as we go. I'm not sure, your Worship, whether this has a number. I'm confident that it will have, or perhaps it hasn't.

Can I just take you to page 3 to start with, which under the broad heading "Background Information" and under that heading you deal with a number of matters, including the fire danger rating system, based on the McArthur scale, and then you go on to talk about the drought index, the drought factor, and the diurnal change of fine fuel moisture. I think

you probably have already dealt with the McArthur forest fire danger rating system in the evidence you gave before the break, but in relation to the other topics, the drought index, drought factor and diurnal change of fine fuel moisture, can you perhaps just summarise or overview the detail of what you've indicated in that section of your report?
A. I think to do that clearly I would need to use some diagrams because I think that it's important to understand the relationships between fuel and fire and the reaction with moistures and the different indices we use to help us characterise what they moisture level is --

Q. Well, there's no problem. Do you want to use the magic screen that we have here as a white board or do you want to refer to aspects of the two Powerpoint presentations that we have?
A. No, I think I can use this as a white board. I had a little practice yesterday and I think it would help to do some diagrams and particularly of the different fuels that are present in a forest fuel complex and how the indices are used to characterise the response of those fuels, particularly to changes in moisture.

MR LASRY: May the witness leave the witness box, your Worship.

THE CORONER: Yes.

MR LASRY: If we can go into white board mode, please. There's also attached the magic pen, Mr Cheney, so perhaps I'll simply leave it to you to make the explanation as you wish. If I might be seated, your Worship, in the hope that my learned friends can see what's going on.

THE CORONER: Yes. I should indicate that courtroom 9 is also available. I note that if people are having difficulty seeing the screen,

and I know that there is to be some further presentation, then there is a large screen in courtroom 9. I just bring that to your notice. Yes, thank you, Mr Cheney.

A. What we refer to as fuel is a mixture of both living and dead material on the ground. And it comes in various sizes. I'll deal primarily with forest fuels. In Australia we use two rating systems - one for grasslands and one for forests. We do that because grasslands as a discrete fuel type are relatively uniform and can be applied across wide areas. They are relatively simple as it's basically standing grass and materials accumulated underneath it.

In forests, it's more complex. I'll just try to draw you a small diagram of the important components. If that's the soil level, we have leaf litter or fuels consisting of leaf litter, falling leaving, bark and twigs which builds up on the forest floor and it's largely sort of horizontally layered and is compact on the bottom, as it's decaying, where it's in contact with soil, and where new leaf litter is added on the top it becomes more aerated and more flammable as a result.

Within that we have growing material, which might be bits of grass put through it. This material is fine, often less than a millimetre in diameter. The leaf litter generally is two to three millimetres in thickness, although it may be much wider, and we then have larger rocks and branches of various dimensions which has accumulated over time in the litter bed, and we then on top of that have low shrubs and the shrub material also accumulates within it fallen leaf litter. So you have a mixture of suspended litter often around the base of these shrubs and depending on the density of the shrub will depend on the extent and the continuity of that layer.

In our eucalypt forests, we have the trees and they also constitute part of the fuel. Where

the bark is thick and fibrous, we have a layer of flammable material on the trunks of trees, on the smooth part of eucalypts which shed their bark each year. Then we can also have trees which are clean and non-flammable.

In general terms, for the fuels in the crown of the tree to be ignited, it requires a substantial fire within the surface litters and the surface fuels on the ground, which probably make up around about 80% of the total fuel load, to provide enough heat to dry out the green crowns and then cause them to burn.

In a pine plantation, there is just pine where the top of the plantation is green, but unlike the eucalypts, which have a habit of shedding their branches as they grow, the pines hold on to them and so it provides a step for fuels going from the surface - fuels up into the crowns of the trees.

The importance of this is really in what we use as the drought index and the drought factor. Now, as Mr Webb pointed out, the drought index, the Keetch-Byram Drought Index, was originally developed on the theoretical concept of the amount of moisture that the layers of the soil could hold, and so in a saturated condition, it was assumed that the top 10 or 15 centimetres or so of the soil could hold 200 millimetres of water within it or the equivalent of that.

So where it becomes important is in terms of transfer of moisture into the fuel, we have moisture coming from several directions. When the soil is saturated, we have moisture coming from the soil up into the lower parts of the fuel bed, and under those saturated conditions, these large materials also accumulate a fair bit of moisture as well.

The other moisture that comes in is we can have rain, which comes and wets up the fuel moisture, and as the effects of rainfall and

the soil moisture decrease in terms of when we have an increase in drought, we get to a point where the transfer of moisture is primarily from the air and there is a two-way exchange between the moisture level in the litter fuels and the amount of moisture that is held in the air mass above.

I don't know whether you want to save this, your Worship.

THE CORONER: I think that would be useful.

MR LASRY: Yes.

THE CORONER: If we could do that.
A. Okay. I'll simply label this fuel. If you could save that.

MR LASRY: Your Worship, the operator gave that a number [PC 0001], I think. It might be convenient if your Worship would simply for the transcript note that that's the exhibit number that goes with that. It's in effect a document for our purposes. There probably should be some record of it.

THE CORONER: That's noted that document will become an exhibit [PC 0001].

<EXHIBIT [PC 0001] - DOCUMENT ADMITTED WITHOUT OBJECTION

THE WITNESS: Can I have a new screen. I'll now deal with the influence of the Keetch-Byram Drought Index and how it is important in our calculations of fire danger because it is a way of estimating certain of the fuel conditions.

With our little diagram on the side - I'll just do it as a block of soil with the leaf litter and logs. The Keetch-Byram Drought Index is an index which takes into account the evaporation of moisture from the soil and from the heavy log material, and evaporation is dependent on

many factors, but the simplification of it for fire control use was to take the maximum temperature of each day and work out how much moisture would be extracted at a certain level of drought.

For example, if I'm looking at a graph of KBDI against time, when the conditions are saturated, a certain daily maximum temperature will evaporate a particular amount of moisture, and so the index rises from saturation to a certain level, depending on that loss. Now, as the soils and logs get drier, it becomes progressively harder to remove the moisture from it, so the calculation of this index is that as the drought increases, the amount of moisture removed is progressively less, and so if we had a constant temperature going for a large number of days, we would get - on the next period, it would be slightly less, and in the end we get a curve which tapers away and approaches the maximum value of 200 millimetres, and it never quite reaches that because when it's extremely dry only tiny amounts, increasingly small amounts, can be removed.

Although it was originally based on the soil moisture capacity, the reality of the real world is that out in the forest we have all sorts of different soils and so if you were looking at soil moisture capacity, this might rise in this way for a heavy clay soil, but if we were in a sandy soil which had a lower capacity to hold water, it may rise quicker on this scale and end up in relative terms becoming drier sooner. What we were really interested in was the moisture content of the logs and the litter bed. So although the units are ostensibly in millimetres equivalent of rainfall, it has to be considered purely as an index that gives a relative number which is a proportion, a number, which indicates relative dryness between saturated condition at zero and at 200 completely bone dry situation.

The relationship between the drought index and fires is something that has to be built up by association by observations over a number of years as to what sort of fire burns at what index for your particular area. Now, the original associations that McArthur made in 1965/66, when he brought this system from America to Australia, were done in south-eastern New South Wales, and so are really probably more applicable to the ACT than perhaps in some other areas.

Although it's not a highly precise index, it is very useful and it's most useful where fire controllers have made the associations as to what happens in the field at particular indices.

Now, in general, at around about 100, in this part of the world we've found that conditions are sufficiently dry that the full amount of the fuel bed has dried out on all aspects in mountains and generally across the terrain. So at this point McArthur's claim was all of the material within the fuel bed became available for combustion, and --

THE CORONER: That's at 100?
A. At around about an index of 100, yes. In his fire danger rating system, he set his drought factor of 10 to match a Keetch-Byram Drought Index of 100. Below 100, certain things happen, and again depending on the particular site and the soil moisture holding capacity of the soil - for example, grasslands in some areas may become cured at an index of between 25 to 30, and so you have curing happening at that point. At other levels above 100, the drought index doesn't affect the fuel bed per se, but it affects other things such as large moist swamps become progressively smaller as they dry out, creeks start to dry up and the shrub vegetation starts to lose moisture, becomes under drought stress and starts to

welt.

All of these things that happen above 100 don't necessarily have much effect on the fire behaviour, but do have an important effect on the difficulty of suppression because natural barriers like shallow lakes or swamps have now dried out and don't provide a barrier for fire controllers to use.

Once you go above 150 or so, any progressive increase will eventually end in tree deaths because there's just not enough moisture to sustain tree vegetation. Dams will dry up, et cetera.

So the important thing for fire controllers in their area is to recognise in their own areas the particular levels of fuel that became available as this index rose. Now, in some cases if you are dealing with moist peat swamps, it may be that in your local area this happened at an index which was higher or lower than the generalised figure of 100. It's really for the fire controllers an aide-memoire because it's a bookkeeping method of keeping track of the amount of dryness of the soil. I think we can save that one, if it's wanted.

MR LASRY: I'd ask your Worship to note that as an exhibit as well as we go. I think it's been marked as [PC 0002].

THE CORONER: The diagram will be [PC 0002].

<EXHIBIT [PC 0002] - DOCUMENT ADMITTED WITHOUT OBJECTION

THE WITNESS: There are a couple of other - there are a number of other systems for keeping track of the effect of droughts and another one is the mount soil dryness index, which is also contained within the ACT. That is a little more complex because it takes into account the moisture content of different air masses. The

problem with all of these indexes is what we observe in one location as effects can't necessarily be transferred to another area and so the same effect would happen there.

The mount index works better in some locations because it uses a different set of evapotransferation formulae for locations which have a different average air mass, and so in simple terms I guess the coastal climate is more humid in general than is the tableland climate and so there is a separate way of compiling the graph for the coast than there is for the tablelands

But all of the systems need to be calibrated at a local level. It doesn't matter which ones you're using. Most of them work well when they start from a saturated soil and in the spring and summer follow this initial drying curve as the soils and the fuels are drying out.

If we get a rainfall event, then the index is reduced by the amount of rainfall that falls. It's a direct deduction, less a little bit for interception by the tree canopy and the litter bed itself. Then it starts to rise up again.

When we have summer rainfalls, the rain that falls can be heavy and need not all be transferred directly into the soil. All of the indexes tend to break down when we've had a series of heavy summer rainfalls because if it's a heavy rainfall event, much of it may run off because when the soils get dry, they tend to become hydrophobic and resist wetting up and they also may go - it literally channels within the soil which drain the water away from the surface and don't uniformly wet up the surface soil layer.

What we have noted is if this is January and June and has just reached sort of what is the theoretical saturation level before things start to dry out again in the following spring,

as things warm up and things get drier, then in fact the soil has not been saturated as the index indicates, and so when we have a particularly dry winter like we had last year - and we will sort of look at that briefly in the bureau's chart of the drought index for Canberra - we actually start off with the soils and the fuels being actually drier than the drought index indicates. So the conditions are worse than what you would expect if there had been a winter period when, say, this had been down at zero for two or three months.

MR LASRY: Mr Cheney, can I just interrupt for the purpose of asking you about that because you referred to one of the weather bureau slides and their presentation. I'm not sure whether it can be obtained quickly but that's also, I think, in your presentation. Your Worship, in volume 10, folder 10, in the weather bureau submission to the court, at page 18, I think that's the diagram that Mr Cheney has just been referring to. It may assist your explanation if you look at the actual diagram. I wonder whether I can show the operator the document.
A. Can I use that one out of my presentation and the one following because the one following is one of the original calibration graphs.

MR LASRY: Yes. Your Worship, having confused the court operator totally, can we go to the longer Powerpoint presentation, please.

THE CORONER: This is the bureau's submission to the inquiry; is that the diagrams attached to that?

MR LASRY: The same diagram appears in Mr Cheney's --
A. Slides 7 and 8 out of my presentation.

MR LASRY: It's the same one so your Worship can either look at the weather bureau submission at page 18, but you'll see the diagram in colour

shortly on the screen. It's slide 7. That's one of the ones I had in mind. Thank you.
A. This was the conditions of the drought index. There was heavy rain in February which brought it to zero, but again because that was a summer rainfall it was not as effective in wetting up the soils and the fuels as would be the same rainfall occurring in winter. Then we went through a pretty dry winter where intermittent short periods of rain kept the drought index in the 40 or 20 to 40 mark and it only zeroed briefly at the end of August and so the conditions that we set off from September/October/November we in fact drier in terms of both the soil and the fuel than you would expect on a normal year.

Perhaps if we could have the next one. This was a drought index that was part of the calibration that McArthur did when he was looking for associations in south-east Australia with severe fires and different burning activities, and he went back and traced or reproduced the drought index from about 1938 onwards to 1965, and in various locations around southern New South Wales looked at the position where severe fires occurred and the index in those areas. Now, this was a graph taken from a coastal area down at Nowra in New South Wales where early in - it would have been 1965, and the drought that led into this, there had been severe fires both on the Tablelands and on the coast when the drought index exceeded 100 millimetres. At Nowra, they found that here in July, a bit like as occurred last year, the drought index almost came back to zero but then started to rise again in the spring and they were finding they were getting conditions where prescribed burns at this time, which would normally be mild, were burning considerably hotter and in the coastal forests, they were starting to get extensive forest fires at an index of 40 to 50.

Q. Thank you. Do you need to go back to your

earlier drawing?
A. I'd like to talk about the drought factor.

Q. Do we need a new screen to do that?
A. Yes, could I have a screen, please.

THE CORONER: Do you wish to save that previous slide? Is that to be saved, Mr Lasry?

MR LASRY: I think the --
A. It looks a bit like the Opera House!

MR LASRY: I think the subsequent factual graph would overtake the need for that one, so there's no need to save that one.
A. On the McArthur fire danger rating system, which I think has been distributed to parties - I'm not sure - he includes a numerical factor between 2 and 10, which he calls the drought factor. If I go back to my little fuel diagram, for the purpose of fire behaviour, his drought factor of 10 meant that all of the fine fuel on the forest floor became available for burning.

I'll go back one step. His association between the drought index and his drought factor was an indication of how much of that fuel bed was available and in the front of his fire danger rating system he assumed that when the drought index was less than 25 millimetres that there would still be some 40% of the fuel which would contain moisture and wouldn't burn under fire conditions, under normal fire conditions, at that drought index. So as the drought index rose from 24 to 100, you see in the windows on this fire danger metre a different number which indicates the fraction of that fuel bed which is available for burning. That range is from - this is a KBDI of 25. We have a drought factor of 6. At 25 to 62 - and I'll just put the last figure - it goes up to 7, and then eventually at 100 plus it becomes 10. Now, at all levels of drought index, you can get a secondary input of moisture which comes from recent rain. This

is good, it hides my spelling mistakes!

The rainfall tends to wet up tops of the fuel bed and so when we are calculating Fire Danger Index, we have not only the moisture that is coming up from the soil but we also have to account for the moisture inputs from recent rainfall. We can get conditions which are difficult to predict for, particularly when we get up to a drought index of 10, and I'll take out this moisture here, and we have a condition where the top surface litter may be wet from the recent rain, but the lower levels of the fuel bed and moisture may be dry.

Under these conditions, there are generalised curves which relate to the number of days during average summer drying conditions that it takes to remove that additional moisture that is added from rain.

The next moisture input is one that comes from the air. When we have a drought index of 100 and a drought factor of 10, then the moisture exchange within the fuel bed is primarily dependent by the amount of moisture that is in the air above it and that's where we get this two-way exchange between the air and the fuel moisture. And the rate that exchange takes place depends on the daily relative humidity and the daily temperature. So as each day progresses, we can have all our soil bone dry, we can have our large logs very dry, but we have the fine fuel taking up moisture when the humidity is high and then losing it again when the humidity is low. So despite these indices which are setting up the fire danger, what happens on an hour-by-hour basis in terms of the moisture content of the fuel and then the subsequent fire behaviour, depends on the daily change in temperature and humidity. Now in most eucalypt fuels, what we call moisture content of extinction is around about 20%. We call that FMCX. So at let's say a relative humidity which may reach 90 or 95 overnight, then the fuel can

take up enough moisture from the air that in fact it wont burst because it gets enough moisture in it to stop the fire from spreading. So even under extreme drought conditions, you can have on a daily basis conditions under which the fire will slow right down and that occurred during these series of fires. What often happens though is if you have the lost log material imbedded in that, that will catch alight and it doesn't respond to the change in daily moisture. So you have a condition where the litter fuels will burn very slowly, or even stop burning, but the large log material will remain alight and as soon as the litter fuels dry out the next day, they will reignited around the perimeter by the large material that is imbedded in it.

MR LASRY: Thank you, Mr Cheney. We'll save that one as well if you could, please. You can go back into the witness box, please, at least for the time being. Not for long, though.

THE CORONER: That chart, relationship between the KBDI and the drought factor will be [PC 0003].

<EXHIBIT [PC 0003] - DOCUMENT ADMITTED WITHOUT OBJECTION

MR LASRY: In the course of your report, in particular page 4, dealing with the drought index, you referred to the drought index for the Canberra Airport. We've just seen the graph and two of the features of that I think were that it dropped to zero I think around September, as you've pointed out, but only almost momentarily, and the other thing that you noted in your report that was important was that in October, November and December it rose steeply, and I think by something of the order of mid-December of 2002, that Keetch-Byram Drought Index had exceeded 100. Am I right about that.

A. Yes.

Q. For that time of the year, is that unusual?
A. It is a little early for Southern Tablelands and mountain forests, or Southern Tablelands. The index in the mountains may have been a little bit lower, but in general the conditions were drier earlier than would be normal. Plus, in addition, not only because it was at 100 earlier, but in fact the effects that were normally attributed to an index of 100 would have been happening at about an index of 80 or some index lower.

Q. Now, changing topics slightly, at page 5 of your report, you discuss a number of fire suppression tactics. I might just ask you to summarise those as we go. The first of them that you referred to was direct suppression and I think direct suppression is self-explanatory, as you say in your report it is a method by which work is applied to the fire edge and that might be by the application of water or by pushing a burning edge of a fire backwards and so on. It's fairly clear. Obviously in relation to direct suppression, the circumstances in which that can be carried out will depend on the circumstances of the fire?
A. Yes.

Q. Easier in some circumstances and in some terrain than in others; is that a fair statement?
A. Yes, and it is pretty difficult if you're doing it by hand to sustain it for any length of time or under anything but the very mildest of fires, as you rapidly become exposed to heat and heat exhaustion.

Q. You then refer to parallel attack, and in describing that in your report, you say:

> In this method, the fire line is constructed parallel to and just far enough from the edge of the fire to

allow work to be carried out effectively away from heat and smoke. A fire line can be shortened by cutting across fingers - indentations in the fire perimeter and is usually accompanied by burning out these pockets of unburned fuel.

What are the usual kinds of circumstances in which that method of attack would be appropriate or able to be executed?
A. Well, it's done either by hand tools or by bulldozers constructing a bare earth trail and really under drought conditions any fire suppression tactic that's adopted has to ensure that all the fuel down to the mineral soil has been scraped away and depending on the intensity of the fire, it depends on the width of trail that you need to create, and with low intensities you can have a trail between half a metre and a metre wide, which would be sufficient to stop the fire and it will go out. As the intensity gets slightly higher, then you need a wider trail.

When you have in difficult fuels large log material that has to be moved or cut through, eventually the task of cutting through that material becomes so labour intensive that you have to resort to a bulldozer which is big enough to shift the material and the distance that a bulldozer would work away from the trail really depends on the distance required not to drag burning material as he's working out of the fire and on to the other side of his action.

Q. You also refer to both indirect attack and remote indirect attack and am I right to say that perhaps both of those were tactics that were employed with some frequency in these fires, in January of this year?
A. Yes, all forms of attack were attempted to a greater or a lesser degree, but certainly indirect attack and remote indirect attack were

important tactics that were used.

Q. Perhaps I can just refer to your report. In relation to indirect attack, you described that as "a control line being established at some distance from the fire edge and the fuel between the fire line and the fire edges are burnt out". Remote indirect attack, I take it, is where existing, as you describe, existing fire trail networks become in effect the containment line, so is one of the differences between the two the area that's in which the fire is to be contained?
A. Yes.

Q. It tends to be larger in the second area?
A. It's purely a matter of scale and very often you get to the stage where it is impractical to construct new fire lines with bulldozers and you are forced to go back to the existing road network and that that road network or the cell size within that road network determines the area that you're going to control the fire at in its final stage.

Q. Yes. Is it almost obvious that in the case of remote indirect attack the maintenance of fire trails and fire breaks is crucial to the success of that tactic?
A. It certainly speeds up the implementation of the tactic - if you have to open up trails and clear them during the fire, you can waste a number of days doing that. The critical issue in applying a remote indirect attack is not only getting a fire to secure the perimeter, but also to burn out all the fuels within that area that you have designated as your control lines.

Q. We'll see more about that when we come to a discussion of these fires, in particular in the way in which remote indirect attack was employed and what the consequences were of such an approach?
A. Yes, we'll follow that through in some

detail because it took some days to complete the operation.

Q. Yes. You also at page 7 refer to the various firefighting techniques. There's a lot more to fighting fires than hosing them with water obviously and a great deal of the problems I gather arise from the topography in which fires are occurring. It's not always possible, of course, to have large vehicles with large amounts of water in tanks being taken into some areas and some other methods have to be employed; is that a fair summary?
A. Yes.

Q. And the first of those, as you've set out on page 7, is in effect with hand tools and primarily with rake hoes. Is that the technique that you are describing in that first item on page 7?
A. That's the most common or series of implements or technique that is used when fires are small and in remote areas or to construct sections of fire line in difficult country which may be inaccessible to bulldozers.

Q. And, as I understand it, one of the most unpopular jobs in any fire brigade is spending hours out in the bush with a rake hoe. Would that be --
A. Well, it's a tough job because we spent a fair bit of time measuring the physiology of firefighters undergoing fire line construction with hand tools and firefighters that are doing this for any length of time have their heart rates sitting up around 160 beats a minute for anything upwards of six to eight hours, which sort of drops the brakes. So that's really equivalent to long distance running, except that they're using mostly their forearms and upper body strength, and it's something that - to maintain it over any length of time, you really have to be fit and somewhat trained for it to do it.

Q. Obviously particularly in country where you're even getting to the fire may require some walking distance over difficult terrain, up steep hills and things of that kind?
A. Yes.

Q. You talk about direct attack with water, which doesn't require any further explanation, and you also refer to bulldozers and you note at page 8 in your report that as there's a decline of production forestry in native hardwood forests, there's now a difficulty in getting operators to work bulldozers in tall forests and in rough terrain. There are a number of different sizes in bulldozers, obviously from small to large, and that in turn affects the work they can do, but is it right to say that having people who are able to work large machinery in difficult conditions, such as these national parks, it's becoming more difficult?
A. Yes, well, it does require a specific skill and experience to operate a bulldozer in areas where you have to shift quite large logs. It may involve pushing down with the blade of a bulldozer, pushing down trees, and negotiating, particularly if it's granite country, large boulders which can take the tracks off the bulldozer. They can slip off a boulder and lose their tracks and be stranded on the fire edge and become immobilised. So it does require a specific skill and operator experience which with the reduction of forest operations around Australia and particularly logs in the hardwood forests, these operators are becoming more difficult to find.

Q. Yes. Are you able to say whether or not in certainly these days issues of conservation and damage that might be done to forests by bulldozers can arise as an issue when fire controllers are making a decision as to which method to use to suppress a fire?
A. Certainly there are a raft of different issues that come up. If you're disturbing the

topsoil, then the cut from the bulldozer, particularly in steep terrain, then makes that area vulnerable to erosion from water and rain and the cut really has to be specifically rehabilitated after the operation, so that's something which has to be built into the sort of afterfire operation and the expense of fire control. There are also other issues which become important as to damage to cultural sites and sites of Aboriginal heritage and the list can be quite extensive.

Q. These are judgments that are having to be made under some degree of pressure obviously as a fire is expanding and having to be dealt with?
A. Yes, I think there are issues where there has to be very concise guidelines which are available before the fire season and there has to be an understanding by the land management agencies as to the importance of the issue of controlling the fire and the urgency of controlling the fire, which comes back to another reason why I believe the agency has to take that responsibility because they are the best people to be able to identify areas of significance which may be affected by the fire control operations and weigh up the judgment of the importance of getting the fire under control or understanding the pressure that the fire boss is under when he has maybe two days before he's faced with extreme weather to bring the fire under control while conditions still make it possible.

Q. In the section in your report on aerial attack, you deal broadly with two issues - one the effectiveness of aircraft and the dropping of either water or fire retardant chemicals and you also refer to the importance of having crews on the ground who can, I take it, maximise the benefit of having an aerial attack on the fire. Perhaps I can ask you first of all to just briefly refer to the difference between the use of water and the use of

chemicals and also then go on to give us an indication as to how ground crews can maximise the efficiency of aerial attack?
A. Water can be, particularly with helicopter operations, picked up directly and quickly and there can be a very short or relatively short return time between individual drops, which makes the helicopters a very efficient delivery system.

Under general summer conditions, the effect of a water drop probably only lasts about an hour, a little longer, - a bit like a light shower - a light sprinkle of rain on a very dry fuel bed. That drop of water will wet the top surface of the fuel but may not necessarily penetrate down below, and will extinguish the fire over a short length for a short period, but then has no long-term holding capacity unless - to hold the fire it must be backed up by an action on the ground because in the end, even if the helicopter drop is effective in suppressing the whole fire, it won't put out those large log materials which are burning because of the high drought level.

The other problem - and this applies - we might come to that.

Q. I'd ask you to just summarise the effectiveness of the fire retardant chemicals, their use, as you've said in the report, from time to time, just as to their effectiveness and the best circumstances in which they can be used?
A. Yes, fire retardant chemicals in use nowadays are mostly diammonium phosphate. The chemical interferes with the combustion reaction, and if the top surface of the fuels are well coated, it in fact will still work effectively when it's dry and so it will hold the fire for a longer period until perhaps it burns underneath the coating or follows a large log through across the level - the width that has been applied by the aircraft or however,

and so you can hold fires for periods of several hours or maybe 12 hours or more by an application of retardant before you bring firefighters to do the final job of ensuring that all the fuels are separated from the fire edge. So even using retardant chemicals you still need to back up with a bare earth trail of some sort.

Q. Finally, perhaps before we break, can I just ask you to refer briefly to what you describe as the safe work practices. I think we'll come to this as we go into the detail of the fire. You've set out a section here describing the safe work practice for firefighting and also for burning-out operations. These are fairly crucial issues for firefighter safety obviously.
A. This will take a few minutes.

MR LASRY: Perhaps we'll deal with that at 2 o'clock, if your Worship pleases.

THE CORONER: Just your comment on using water or chemical retardants. You say, Mr Cheney, that with the chemicals you can hold the fire for longer than you can with the water attack?
A. Yes, that's correct, your Worship.

Q. But in either event you need firefighters, you need people on the ground to maximise the effect of both of those attacks?
A. Yes. One of the problems with applying it from the air is that it doesn't build a continuous line, and so it tends to be applied in staccato fashion at individual points around the fire and it requires an operation either on a small fire where you can get around it with a number of drops, but once your fire gets a little larger the individual drops are easily burnt around and so it is most effective when they are actually supporting the ground crew who is building a line in a continuous fashion around the fire - and this is what I would like to go into after lunch if I can.

THE CORONER: Certainly. We'll take the luncheon adjournment then.

ADJOURNED [1.00pm]

RESUMED [2.00pm]

MR LASRY: Mr Cheney, before lunch we were about to embark on a brief discussion in relation to safe work practice and I think I'd taken you to that portion of your report which dealt with both the safe work practice and also the different methods of back-burning and burning out. I wonder if you might just summarise that for us and also perhaps do so in the context of fire temperature and various temperatures at which fires burn - fire balls, that kind of thing - and the way in which safe work practices cope with those risks. Do you need the --
A. May I?

Q. Yes, we need the whiteboard again.
A. The primary issue in safe work practice if you're working in the forest - very often the only safe area that is available to you in a remote area is the burnt ground of the fire, the fire that has already been burnt. This is the fire perimeter, being driven by the wind in that direction. The speed of the fire depends on its orientation to the wind that's driving it, and so the fastest point - the head fire will be down wind and there's usually a larger flame depth and the slowest portion of the fire is the back of the fire, back here, where the rate of spread is very slow and often constant because it's not affected by the wind speed. It's backing back into the wind speed.

Normally the point of attack on any fire would be to go to what we call an anchor point, and by definition, that's a point where you will always hold that portion of the fire. Now, if the fire is very mild and you can safely attack

and hold the head of the fire, then an anchor point might be established somewhere up here, but you have to be sure that in selecting the point near the front, you are always going to hold that point. The danger is if conditions pick up and you're starting here, although it might be safe initially, there's a chance that you'll get a slight wind shift and this part of the fire, if you start constructing your control line around the front of the fire, the wind direction will shift and blow this point and cause problems there.

So in general terms, we say the anchor point is usually at the back of the fire. We would start here at the back - I've outsmarted myself here.

MR LASRY: Just while we restart the system, I wonder if perhaps the most efficient way of doing this might be if your Worship doesn't mind if from now on I remain seated and ask questions while I'm sitting down so that - because if I'm standing --

THE CORONER: Yes, everybody will have a good view of the board.

MR LASRY: I'm sure my learned friends love looking at my back, but they'd probably rather look at the witness.

THE CORONER: It's probably not as interesting as the board, Mr Lasry!

THE WITNESS: So the anchor point is established as the back of the fire, the wind direction is in that direction, and then firefighters will progressively move and construct their fire line, if they're using parallel attack as illustrated there, and as soon as possible they will establish - they might do direct attack here and move away, but as soon as possible they have to control this section of the fire line so that people who are

working up here, if there is a change of wind direction, can immediately come back and get inside the burnt area. The burnt area itself has some hazards but those hazards are usually considered less, particularly if there's an escalation in the weather and an escalation in the fire behaviour, so any portion of the fire moving away from it may place you in jeopardy.

Now, things look straightforward on a white board, but in the bush your visibility is often very low, you often can't see more than 20 or 30 metres away, and when you're constructing line over a considerable distance, it's hard to maintain your orientation in the field unless you are continually referencing yourself to the fire edge and know that in an emergency your action is straight back along the line, back on to the burnt ground.

The general practices when they're doing this is as soon as they've constructed their line, to burn out this area so that only a few minutes need elapse before this area is safe to go back to.

If you are constructing line with bulldozers and it's easy to move away from the line you can get yourself in a situation where you are too far away, so if there is a wind change and there is - this flank will take off - because it's a long line of fire, it will take off at its maximum rate of spread, which may well be many times the actual spread of the fire while it was spreading in this direction, so you can find a situation that this would rapidly carry out and in that spread it would be faster than the retreat time to get back on to the burnt area.

In recent times we've started calling this area here a dead man zone, and just by definition we allow five minutes to, a), recognise the situation has changed, stop the work, get the crew together and get back on to the area. If

that's going to take you any more than five minutes, then you're probably working in a very dangerous situation for fire changes.

A close attack like this - some people would call it a direct attack, but I'd prefer to call it a close indirect attack because it is indirect. I know of only one instance where firefighters have been killed in forest fires in the last 30, 40 years, which was actually an incident down in Dalesford where they got a long way from the fire and the fire actually had broken away behind them and had swept up and, although they had just managed to get on to the burnt area, they were overcome by hot gases and were killed. But in general terms, this close direct attack is the safest form of firefighting and we always say that direct attack is the safest form of firefighting for inexperienced people because they have a safe area to retreat to and if they're working close to the fire, they will be forced to withdraw if conditions get too hot because they will know and they will feel that the conditions are too hot for them to work. The temptation is to fall back, but we keep insisting to people: Work close to the fire and do close burning out of this line.

Again, if you get too far away and - we might go around the other side. You light your burning out fire along here at a distance which is probably around 25 metres or so. You will lose the convective draw of the original fire, which down here would draw this fire in towards there. Once you get a certain distance away, this will then form as another fire and will keep pushing you further away from the main fire edge, and as this fire gets wider and wider, it then has the potential to form a much faster rate of spread.

I'll just put here - I'll just put "anchor point". The hazards of course are not only from the fire but from the falling timber and

this is a situation that has to be recognised by firefighters in firefighting training and if you are forced to go back on to the burnt area, then you have to look up as well as around and see what's burning around and above you and select a safe location to sit it out if you have to sit it out in that area, which may be the case. You might have to sit it out for the rest of the day and wait for conditions to subside before you go. That can be frustrating but sometimes that's all you can do in this situation where it becomes too hot. Is there anything else?

MR LASRY: I was going to ask whether this is the appropriate time to ask you about fire intensity and temperature. You might have been in court yesterday when my learned friend Mr Stitt asked Mr McBeth some questions about fire intensity. That's obviously related to an extent to the safe working practices that you've been speaking about. Is there anything that you would want to add in relation to questions of fire intensity.
A. I think I'll talk about temperature first, if that's okay.

Q. Yes.
A. And could I have a new screen. Could I have permission to light a small fire?

THE CORONER: I can't give you that permission!
A. Was that yes or no, your Worship?

MR LASRY: Your Worship, we should first of all save that screen.

THE CORONER: We'll call that the safe working screen. Will that be 0004? It will become exhibit [PC 0004].

<EXHIBIT [PC 0004] DOCUMENT ADMITTED WITHOUT OBJECTION

THE WITNESS: It was a difficult and important

question that was asked by counsel yesterday of Mr McBeth. I need to explain that. A simple explanation is by looking at a flame, which my lighter has run out, but you can see, if you can see, that the bottom of that is almost clear and there is an incandescent portion on the top. If I draw that diagrammatically, we have the lighter - a thin combusting section which is a little bit broader on the top, like so. Now, the temperature is a way, a measure, of the site of excitation of molecules. We sit at a temperature of about 37 degrees Celsius, which is what the molecules in our body are reacting at. When we have a reaction that causes an exothermic reaction that causes heat to be released, we have a high state of excitation of the molecules in the combustion zone. In this case, with my lighter, we have sort of cold gas, which is propane, coming in at the base and filling up that envelope and being at a body temperature that's probably around 35 degrees Celsius. It then on this narrow reacting boundary that you can see has the visible flames is the carbon that's produced within the reaction at a very high state of excitation, and the temperature, if you could measure it - and this is part of the problem of talking temperatures, being able to measure it - the temperature in this section here, right on the red part, is around about 1,000 degrees Celsius. The air outside - in this courtroom it's probably close to 35, but elsewhere it's probably around, let's say, 25 degrees Celsius around it.

Now, this is called a diffusion flame because the combustion is taking place on the envelope between the gas that has come out of the lighter and the oxygen in the air surrounding it.

Our bushfire flames are almost exactly the same as the flame out of the lighter, except that they are mixed up and a turbulent mixture of gases. So by comparison - I'll try to keep

talking into the microphone - we have our fuels on the ground, which effectively is releasing a lot of - there's a whole lot of these points from the fuel bed which is emitting hydrocarbon gas, which is a mixture of propane and methane and almost any hydrocarbon you like to name because the reaction is a chaotic one where the fuels are literally torn apart and then reform in a number of different hydrocarbon combinations and when people ask what sort of chemicals can you get out of a bushfire smoke or in a flame, you can get almost any chemical that you care to name if your analysis equipment is sensitive enough.

So we have a situation where the gas is coming out and it's mixing in a turbulent way with the air around it. We'll go to red now I think. In fact what our flames are are a mass of these combusting zones where we have a mixture of the gases coming out on one side and the cold air on the other side and the combusting area in between it. This is repeated right through the flame complex - gas on one side, the air - and eventually what is coming out the top is your combustion products, which is what's carried up there. So as well as the gas, the air that's entwined, we then have combustion products mixed in with this as well.

I know that's not a very good diagram, but it is a turbulent mixture of hydrocarbon gas being emitted from the fuel, the air that's been drawn in to burn on a boundary between the gas and the air, and that combustion product coming out at all stages in that flame.

We might save that one so I can go to a new screen. I'll just put "flame temperature". While you're saving that, John, I'll just do another demonstration and my lighter is running out of gas, but I can - although that's 1,000 degrees, I can pass my finger through the flame quite comfortably because there's the difference between temperature and heat, and

the heat is the rate of energy output.

Now, although it's 1,000 degrees Celsius, the rate of energy output is very low. So when we're asked about flame temperature, we often say we measure flame temperature to the nearest half brick, because what's important is not so much the temperature of the flame, but how it transfers that heat to the object that you're interested in, being my finger or the side of a house or another piece of wood.

Q. Just on that, questions were asked of Mr McBeth yesterday. My learned friend Mr Stitt was asking about particular measurements in kilowatts per metre. Is that a recognised measure of either heat or energy output in situations where a fire is burning?
A. It is a measure of energy output and I'll go on to that. If I just expand the sort of measurements that we have been able to make on flame temperature.

Q. Yes.
A. If we were to take a cross-section through a flame with all the turbulence going on, in general terms it would look something like this. You'd have a series of this and then we'd have a tall section at the front of it. The height of the flames really depends on the amount of aeration or the distribution of the material that's being burnt. We get our tallest flames of course when what we're burning are sort of trees in this area, so we're getting flames not only from the fuels at ground level and the intermediate shrubs that might be there, but also flames from the canopy itself.

Now, if we look at the temperatures there, the very tip of the flame, which unlike the sort of hot part of the pre-mixed flame, which is what you get out of a gas stove when you're mixing air in with the fuel and burning it - the temperature at this tip is about 300 degrees

Celsius, and that's low because it is mixed with the combustion gases and the air that's entrained all along the flame. Air is being entrained into it both for the combustion reaction and because of the buoyant rise of the flames themselves being lifted upwards, the temperature increases from the tip downwards into the flame and when we come down about six metres, say at this level - and say that's a distance of six metres - we now have a temperature in here which is approaching 1,000 degrees Celsius. Within the structure of that flame, from six metres below the tip down to ground level, it's between 1,000 and 1,200 degrees Celsius.

The persistence of these flames, these very tall flames at any one point, is very short and about 10 to 15 to 20 seconds, between 10 and 20 seconds. It never looks like that when you're looking at film or video of it because it is always moving on into new fuel, but if you were to look at one particular - say, we were to look at that tree canopy, we'd find that if that tree canopy was engulfed in fire, it would be burnt out within about 10 seconds and then it's moving on to the next tree canopy. So there's that illusion that you get that the flames are persisting for a long time.

There's also this persistence of continuous flame zone here, which generally lasts between one to two minutes. These low flames are because the fire is burning downwards into the litter bed, and so that's compacted fuel and it's burning from the surface down. These flames are burning because the fire is moving into the new fuel bed and it's aerated, very combustible and produce the high flames.

On extreme conditions, these flames generally peak out at about three times the height of the vegetation. So if the vegetation is 40 metres high, we can expect flames going up to maybe 120 metres maximum.

For the flames to go any higher, then it requires some constriction of the gases so that they're not mixed with the air around it. Occasionally you get a vortice which will concentrate the gases and carry the column of unburned gas up to a much greater height and probably the highest flame flashes of continuous flame flash that we've been able to observe is something like 300 metres above the forest. It was also at a very sharp angle because it was obviously constricted either by a large amount of fuel lighting up at one time and producing a large amount of gas that was constricted and carried upwards but still burnt in the same way as my gas lighter - it burnt on the outside of that column of gas. I'll just call this "Forest Fire Temperature". Can I save that please, John.

THE CORONER: That diagram will be [PC 0006] And the previous one, the "Flame Temperature Diagram" [PC 0005].

<EXHIBIT #[PC 0005] - DOCUMENT ADMITTED WITHOUT OBJECTION

<EXHIBIT #[PC 0006] - DOCUMENT ADMITTED WITHOUT OBJECTION

THE WITNESS: The statement about fire walls is one that is commonly referred to and it's a term that's widely used with I guess many different interpretations. My interpretation of a fire wall would be a flame that is separated and is moving ahead of the fire, a bit like the situation when you have one of those boiling expanding gas explosions where a big pool of gas is produced and it's dense and then it sort of moves off and does actually travel close to the ground. It's something which is almost impossible to get in a forest fire for two reasons. One is that 1,000 degrees temperature and the gas is heated and is mixed up and it is buoyant and it wants to

go upwards and it wants to fight against the prevailing wind, so just can I have another screen.

In common vernacular amongst firefighters, and I've looked at what different people have called fire balls and often the only interpretation I can give is that they are describing the flames, nothing with particular distance about it. In some situations when people are looking at a forest fire which is crowning and the fires are coming out of the top of the crowns and looked at a distance, it appears as those the flames are rolling along the top of the crown, but in fact that's a situation where successive crowns are burning. People have said just talking about crown fires, that the fire has now started fireballing, which is really just saying it's crowning.

What does happen, though, is that if we have a fire which is burning up to the edge of a forest and being driven by the wind, it gets to a point where it comes out of the forest and this part is burnt out or just burning with low flames and the fire has lost the bulk of its buoyant energy and so the wind then starts to dominate and these flames that are produced from the crowns here are being forced downwards or straight out from the tree crowns.

So this is something that happens on the edge of the forest. Seconds before they were high, and then as the fire loses its energy from down here, then the wind dominates and pushes the fire over and sometimes pushes it down towards the ground.

Bits of this may break off and appear momentarily as independent bubbles of burning gas and the same as going upwards, and I guess it's this phenomena that should be understood, but again there is limited capacity for that to travel down wind because there's only so much

gas produced by the crowns of the trees which is mixed and being mixed very rapidly and burning as it's blown down. For the years that I've been looking at fires of all intensity, that is the best technical description that I can give of fireballing. Again, we would expect that the maximum carry of those flames coming out of the forest would be probably because it's losing energy one to two times tree height.

THE CORONER: If I could just ask one, Mr Cheney. We've heard a lot about the fire crowning. Could you just explain crowning. I think you probably have already touched on it there. Does it simply mean from tree top to tree top and just moving in that fashion?
A. No, in the strictest sense, it just means that the crowns of the tree are burning. In something like a pine forest, the whole of the fuel complex from the ground to the tree crown burns at virtually the same time. Because the flames are being flanked by the wind, the leading edge of the fire will probably ignite the tree crown before it ignites the fuel on the ground, but in that leaning situation, the transfer of radiant heat downwards to the ground and the embers that are falling means that the ground will be alight only seconds after the tree crown is alight.

In our eucalypt forests, the crowns are sufficiently widely spaced that it is impossible to get the fire moving any distance from crown to crown before it's diluted too much by the air around it, and a crown fire in a eucalypt forest requires a substantial fuel underneath it to sustain it.

MR STITT: Is that diagram to be kept?

MR LASRY: Yes.

THE CORONER: So that will be [PC 0007], that fire out of the forest diagram.

<EXHIBIT #PC 0007 - DOCUMENT ADMITTED WITHOUT OBJECTION

MR LASRY: While we're talking about fires coming out of the forest and so on, and we'll come to this in more detail when we come to your evidence dealing with the specific fires but in your report at page 22, in your narrative of what occurred on 18 January, you describe the fire which was the McIntyre's fire, I think. You say:

> The head of the fire burnt through the Mount Stromlo forestry settlement soon after 3 o'clock and first crossed into Duffy just east of the intersection of Warragamba Avenue and Eucumbene Drive at 3.05. By 3.45 the fire had entered the suburb of Duffy between Dixon Drive and Hindmarsh Drive.

In that paragraph, what are you describing as entering the suburb? What is it that's in the suburb, or is it the point at which the fire runs out of some degree of energy because it's no longer being fuelled by combustible forest or whatever?
A. I probably just need to go a bit more into the structure of what's happening around the flame front.

Q. All right, okay. Could I have a new screen. Because of the buoyant convection of the fire, most of the air that is driving that fire is coming in from behind the fire. So, again, if I have my fire such as that being driven by the wind, the strongest convection is coming from the strongest burning part of the fire, and so it will be somewhere here depending on the wind strength. Now, it may be located behind the fire edge or on very high intensity fires it may be located just in front. That's probably the situation where we had a vortice formed in this zone right in

front.

This drawing is accelerating the end draught of the wind driving and falling. So if the length of wind is indicated by the length of arrows, we have a stronger wind coming into this part in a fashion such as this.

This acts as an obstruction to the wind downstream, and so around the fire we have it affecting the wind around it in this sort of manner. It's drawing it around the front and along the side and pulling it in towards the combusting zone. Downwind you get - because of the strong convective centre which is almost like putting a building in the way of the wind, you get a zone which is an Eddy zone where the winds can be light and variable for a certain distance downwind.

If I was to look at that in sections, and I have my tall flames here, we have this enhanced wind that is coming down into the fire, and because it's accelerated, it actually dives down, so behind the fire is a pretty strong down-draught which is coming down into the base of the fire. Before it gets carried up, it's accelerated by buoyant effect and accelerated upwards.

The angle at which this sets is a balance between the buoyant convection of the fire and the strength of the prevailing wind. If it's burning, for example, through grass, the buoyant convection in terms of the amount of energy per square metre is relatively low so that this prevailing wind can dominate and flatten those flames so that they're almost lying directly along the grass surface.

In a forest where there is a high fuel load, the flames want to stand up straight. The buoyant convection pushes them up and provides a resistant to the prevailing wind. Down-wind we have this zone where the winds can be light

and variable and it can be one of those features which takes people quite by surprise because although it's dark and there's something approaching, it seems that the wind has dropped and often you hear, "We're okay, the wind has dropped," and the next thing you hear a yell of surprise as the fire comes through.

This enhanced wind at the back of the fire can be very strong and particularly in grasslands but also in forests, this can pick up a mass of ash and burning material which is behind the fire, so someone who the flame front has passed and is now in this zone behind may well find themselves in an area which is for a few metres high is actually filled with flying silt and dust and burning ash and all mixed together and so when the fire hits an interface, and in many cases the fire came out of the forest, across a main area and then sort of ignited the houses, people sort of saw the flames at first and then were engulfed in this mass of wind blown partially burnt, still burning and some unburnt material which was being blown along by this wind which was following up what had been the convective front of the fire.

I'll do a mini-diagram down the bottom. When you have run out of fuel such as on the sort of interface with houses or on the road there, although there are no flames, the energy that was released at this part of the fire when it was back here is still going upwards in this area and this strong down-draught wind is still blowing across for some time.

So even though the prevailing wind is very strong, you have this phenomena where the wind near the ground is coming down, it's a down-draught which is forced to pick up a lot of burning material, and there are many descriptions of people standing and just giving descriptions like it was mass of red locusts flying across the ground, and what they were

looking at in the very dark conditions was all this blown, burning material which had come from behind the actual leading edge of the fire.

MR LASRY: We'll save that.
A. We'll call it "Fire Wind".

THE CORONER: That fire wind diagram will be [PC 0008].

<EXHIBIT [PC 0008] - DOCUMENT ADMITTED WITHOUT OBJECTION

MR LASRY: Have we covered that?
A. I think now I have to talk about fire intensity.

Q. Yes, I'm sorry, which is where we started a little while ago. I think that's what the question was about initially.
A. I think so. Yes. As Mr McBeth said yesterday, the fire intensity is a calculated number which helps us represent in numerical terms the heat being released from a fire. It's the product of the heated combustion of the fuel, that's 'H', the weight of fuel consumed, which is 'W', and the rate of spreading of the fire, 'R'. It has units of kilowatts per metre. Sometimes there's a confusion between radiant heat flux, which is the transfer of radiant heat, which has the units of kilowatts per square metre, but that's quite different.

In diagrammatic terms, we'll have two perimeters of the fire - one at time one and a second one at time two. The fire intensity is calculated for each metre around this perimeter of the fire. The figures involved in this case are for this metre of fire. In this strip it has travelled a certain distance and has consumed the available fuels within that area. It identifies the amount of heat release that the fire has given off when it travelled from

this point to this point.

It varies all the way around the perimeter, as you can see. If we come to the minimum one, a metre here will be calculated consuming the fuel over just that distance. Now, normally we characterise fires by this figure, which is calculated for the head of the fire. But it does vary all around the perimeter, and if we were to plot the intensity release where this is, let's say, the head and this is the back part and we're coming backwards either side of this line, the intensity figure would be something like that. So all it's simply saying is that the lowest intensity part of the fire is at the slowest spreading part and the highest is at the fastest spreading part of the fire.

It's useful to compare the effects of fire in the same fuel type but because, for example, between forests and grasslands the burning characteristics of the fuel are very different, one can't compare a fire which has an intensity of, say, 10,000 kilowatts per metre in a grassland with a 10,000 kilowatt per metre fire in the forest. A 10,000 kilowatt per metre fire in grass will have flames of about six metres high and is probably travelling, at a guess - and someone will work it out, I'm sure - at three to four kilometres an hour. At a 10,000 kilowatt fire in the forest, it will be a crown fire, with flames extending through the crowns, and it will be travelling at around 1 kilometre an hour, just depending on the fuels consumed.

MR STITT: Sorry to interrupt. Could you just tell me please in the equation what the 'H' stands for?
A. The 'H' is what we call the heat yield. Now, it's similar to the heat of combustion of the fuel, but the heat of combustion by definition is the heat released from a kilogram of fuel when it is completely consumed and is

reduced to a standard pressure. In an open situation, not all the fuel is consumed, so it becomes an average figure of what's likely to be consumed.

Now, not all of the fuel is consumed because some of the combustion products that are sent off above the fire might include carbon and various carbon hydrons which are still flammable but not consumed in the process. Generally this heat yield figure is between 5% and 10% lower than the heat of combustion, and in general terms, for most hydrocarbon natural fuels, this value is between - we'll spell it out - it's between 16,000 and 18,000 kilojoules per kilogram of fuel.

We generally treat it as a constant because 16,000 might be common for grass and 18,000 might be common for eucalypt fuels and although there is variation, it is not much, and compared to the variation that we have with both 'W', the fuel consumed, and the rate of the spread, and if you were working out the units, a watt is a joule per second, so it's a rate in terms of the heat release in joules per second or watts per metre of fire front.

MR STITT: Sorry to interrupt you again, but is the 'W' measured in tonnes?
A. It depends on the units that we're using. In this formula, 'W' would be in kilograms per square metre and the rate of spread would be in metres per second. If I add a constant in the front of it we could use tonnes per hectare or kilometres per hour or whatever. But as it stands, kilojoules - I might as well write this. 'W' is available fuel, which is fuel consumed, and I'll just write "fuel burnt" because I'll probably misspell "consumed". That's in kilograms per metre squared. And 'R' is rate of spread in metres per second.

MR LASRY: Thank you. We'll save that and give it a number if you wish.

THE CORONER: The diagram of the fire intensity will be [PC 0009].

<EXHIBIT [PC 0009] - DOCUMENT, ADMITTED WITHOUT OBJECTION.

MR LASRY: Mr Cheney, you might as well stay where you are and I'll stay seated because we're going to go now to the Powerpoint definition.
A. Do you want briefly the definition of back-burning and burning --

Q. Indeed. You have referred to those in your report but by all means, a further explanation of those would be useful.
A. I added them there because they're two terms which are commonly confused and they have quite specific meanings to fire people, and so the difference between what fire people might say and what's published in the press can sometimes appear confusing.

Back-burning is a specific firefighting operation where if the fire is approaching with the wind behind it, and someone has set up a row or a barrier in front of the fire and they light a fire to try and enlarge the size of this break to stop the fire going across it, it's a dangerous fire suppression tactic because generally the rule of thumb that I advise students is that if you cannot control the head of the fire directly, you are not going to control the back-burn because what usually happens is you get some spotovers from back-burn and very often what you end up with is a much wider fire than you started off before you started the operation.

Q. Is the loss of control of a back-burn a relatively common experience for firefighters?
A. It's a difficult operation. It requires a very skilled person who knows exactly what his capabilities on the fire are and very often

it's applied as a last resort in the hope that they might be able to stop the fire and in this situation, if there's any substantial wind, it's a very low chance of success.

Q. Does the technique involve starting the burn at the barrier, in this case a road, or some distance to the west of it --
A. It's usually started here and if someone is game or perhaps foolhardy they might also walk in between the fires and light some additional spots again to increase the width. But the problem of it being a dangerous technique is very often there is no anchor point and so if there's an escalation of the fire and you have your trucks and people set up here and down here, there is no safe place for them to go.

Because of the blocking effect that I spoke of earlier, you really don't get much drawback of this fire back into the fire front because this fire has blocked the wind and, in any case, what wind there is is generally that this is burning back against it. So the effect that it primarily has, because you're adding more energy from in front of the fire, is really to accelerate this fire towards you, and so that's one of the reasons why it is more dangerous, that it can have a countereffect.

Burning out, on the other hand, is when you have your fire and it's a process with remote indirect or indirect firefighting and is very commonly used and you have your roads around it. This is the process where you are simply lighting fires around the perimeter in the event that you'll eventually burn out the whole of that area.

Firefighters often time the operation so they're taking advantage of wind which is blowing from the road towards the fire, so the wind over a period of days goes through an anticlockwise process. They will light up this

area first and then this area and later this area. So sometimes it's a process that can be timed with the change of wind. At other times you just have to get in and do it, even when the wind is blowing counterwise, but in which case you have to ensure that before the fire builds up and gets close to the bits you've burnt, you have to burn out these areas in between, and these days that's often done by placing aerial incendiaries in to burn out the fuels between the fire and the fire that you'd like to burn out from the controlled area.

Q. To apply that to the fires we're examining, was the burning out process in effect the tactic that was initially adopted in relation to McIntyre's fire?
A. That was the tactic that they tried. They established control lines around the fire and then progressively burnt out, and we'll see that as we go through the slides of the individual fires.

Q. Yes.
A. I mean, it applies at all levels. That section on safe fire attack, the aim is to get the area between the bit of fire line that you construct and the burnt area burnt out as soon as possible so that it can be secured and declared safe, and you won't get an acceleration of the fire in the intermediate fuels between the fire and the control line.

Something which does happen unfortunately is at high fire intensities and there may be a road here and someone might decide that, it's okay to burn out from this road and light a series of fires along here under extreme or very high fire danger conditions, with the inevitable result that this will take off and disappear down wind at the same speed but somewhat further away than the main fire, and we'll look at a couple of examples where that seems to have occurred.

Q. Should we save that?
A. Yes, please.

Q. We'll give that a number.

THE CORONER: Back-burning and burning out diagram will be [PC 0010].

<EXHIBIT [PC 0010] - DOCUMENT ADMITTED WITHOUT OBJECTION.

MR LASRY: Mr Cheney, the next step in the process I think is to proceed to the Powerpoint presentations. I should indicate to your Worship that there are two of these. My learned friends at this stage, I suspect, only have one, which is the longer one. Mr Cheney has recently compiled a shorter presentation which concentrates to some extent on the fire history in the ACT and in one particular case an example of a fire and its containment in an area close to where the Bendora fire in January of this year commenced. So I'll simply work my way through the historical presentation first and then we'll move to the presentation that our learned friends have.

I think the copies have either been made or are - no, they are being made so what we'll start with will be provided and Mr Cheney's evidence will take us into next week anyway, so my learned friends will have some time to consider it.

Before we actually go to the presentations, though, I want to ask you a couple of general questions about some of the information in those presentations. Apart from the photographs and things of that nature in those Powerpoint presentations, a lot of the slides involve in effect tracking the perimeter of the fire and the expansion of the fire perimeter over a period of days. As I understand that, that information comes principally from I think mainly New South Wales Rural Fire Service line

scans?
A. Yes.

Q. And line scans again, as I follow it, is something that is done by surveillance from an aircraft and recording in the form of thermal images in effect what the edge of the fire is at a given time; am I basically right about that?
A. That's correct.

Q. Could you just explain that in a bit more detail, with a new screen if you like, so that we can understand how the process actually works. If your voice gives out, Mr Cheney, and you could use a break, I'm sure her Worship --?
A. A couple of smokes, that would be great.

THE CORONER: Your lighter is out of gas!
A. The Rural Fire Service very kindly gave us access to all their line scan imagery, which made my task of reconstructing the fires a lot simpler. I used three types of material for interpretation. There was the line scan imagery, there was thermal imagery, thermal photoimagery, which was a compilation of a whole lot of thermal photographs of the fire, and an interpretation of the scorch pattern from aerial photographs which had been taken over the area.

The interpretation from aerial photographs was largely used when they had days when there was no line scan data and I needed to interpolate between the line scans and it made it easier for me to find those areas where around midnight the fire intensity was lowest and it showed up on the aerial photos as a relatively narrow band of unscorched canopy. It wasn't present in every case, but there was sufficient there for me to make an interpolation between other images.

We have an aircraft flying up here and it has an instrument with a rotating detector which

sends down a narrow beam that covers a small section of topography, but this is a rotating beam which makes a thermal image of a narrow strip of country, something like this. This might be five kilometres wide by perhaps 50 kilometres in width here.

As the aircraft flies along - and in this case it's flying down this way - these images are built up in what we call a rastar. So there are a whole series of strips which are put together like that, and so between the start - and the fire is burning in this area down here and of course in some places the flames are high, in other places this is just hot ground. We get an image of the fire reproduced in these rastars where the edge is hottest and inside we have the ground which is burnt which is somewhat hotter than the surrounding - not very hot, but somewhat hotter or enough to be detected than the surrounding area. So we have a heat pattern as well.

The imagery picks up the temperature differences between different aspects of the topography, so as well as the fire picture, we also get an image which reflects north and south aspects. Creek lines are usually colder so they'll show up in the rastar as a cooler area and western aspects are generally warmer and so if this is north up there and this is a westerly aspect, then that will show up a little bit warmer than the southern aspect. So we get a representation from that of the topography.

This data is taken and is called georeferenced because in building up this image, what happens is if this aircraft as it's flying along tilts backwards and forwards, then the beam coming down from it also may tilt that way at one stage or tilt the other way, which means that these rastars can be put out of place just by the tilting or if the aircraft wobbles side ways, we find that as we get a wobble, we might

have some rastars which are stuck out like that to one side.

Now, the georeferencing is done if there's instruments in the aircraft which relates its position in space or does some correction which is done on board. Another correction is taken back. So it has tried to be brought as close to a map scale as is possible.

In the interpretation we found that while the material was excellent for operational purposes for producing a precise positioning of the fire, we had to look at the imagery and look at known reference points on the data. The digital elevation model that we were using to reproduce the fire boundaries and in some cases the correction that had been made was not adequate enough to place it correctly on terms of the topography, and even where there is distortion like this, we find with this distortion, this creek here would then reproduce itself over here. You could see in fact that that was a distortion within the photograph. And so the fire, which is there, would continue on down here.

By looking at those, they were really minor corrections, but just to get a properly unambiguous map of the fire. I think from the rastar data, we're probably as accurate to what would be the width of a pencil, which is probably plus or minus 20 metres or so.

The aerial photography, the accuracy is less because I was interpreting what was a green band which probably was formed somewhere between 10 o'clock at night and 6 o'clock in the morning while the fire intensity was very low, and I generally put the edge of the perimeter of the fire in the middle of that green band and said that that was 2400 hours or midnight.

MR LASRY: Thank you. I wonder if I could just

get you to write "Line Scan" on there and then we'll save that as well.

THE CORONER: That line scan diagram will be [PC 0011].

<EXHIBIT [PC 0011] - DOCUMENT ADMITTED WITHOUT OBJECTION

MR LASRY: I wonder if we could, your Worship, go to the first of the Powerpoint presentations and just by way of introduction, Mr Cheney, this is a presentation that you've put together quite recently, in the last few days, I think; is that right?
A. Yes, the maps in here I've taken from maps that were in evidence and the description of the Pago file, which is the last part of this presentation I reconstructed from notes that I had back in the office.

Q. All right. You don't get to sit down for very long. Would you like to go back to the screen and take us through the slides, please.
A. This is a map of some of the historic fires that we've seen in Canberra and I'll just point out these by the colours. The black, the very early fires in around about 1920, which were largely, I believe, drawn from newspaper reports at the time. The descriptions were very general. In fact, the fire was probably not mapped as we know it now, but was given a verbal description of the areas that were burnt. So it's difficult to know what the accuracy of the perimeter is. I suspect the next one underneath that, and working up from the bottom, is the cross-hatched area that was burnt in 1926.

Q. Just pausing there, if you could just point that out. That's under the purple. What area is --
A. Yes, can I touch this. The 1926 areas are here and it's this area sort of underneath here which is cross-hatched and it's sitting on the

same area as burnt in 1920 and in part some areas that were burnt in 1939.

I think that that was largely compiled by looking at areas of alpine ash that were generated in the area in 1926 and again I suspect there is very little mapped information of those areas and my general feeling is that in 1926 the fires were probably more extensive than is indicated on that map.

The pink area is coloured in, and it may not show up very clearly, your Worship, but there is a pink area underneath this darker area --

THE CORONER: That's visible.
A. Which was the area burnt by the 1939 fires. The upper boundary of this fire I'm pretty sure hasn't been mapped out to its full extent to the north-west because the accounts that I've read is that the fire came from north of Wee Jasper and burnt into this area, which is called Mountain Creek, and finally burnt out and stopped through the pine plantations in Uriarra and stopped when it came out to the grassland and the Murrumbidgee River, which is probably down following this perimeter down here.

That was a similar drought situation, except that the fire control people had the benefit of rabbits and those pastures were really completely eaten out and almost bare, and so there was very little burning in grassland areas of the ACT, although spot fires reported to have originated from somewhere back here landed in Civic centre, which I guess is somewhere here, and also on Capital Hill, which is somewhere there, plus other spots which were in the grassland in the vicinity of Mount Stromlo. So I think we have materials that were collected in Canberra somewhere deep in my basement of bark and leaf material that was brought in in 1979 with that long-distance spotting.

I'll talk about this one on the next line, but I wont go to it yet, John. The other major fires - the Gudgenby fire was in 1985. I wasn't present because I was trying to light fires in Western Australia at the time and it rained on me - and was serious with Ash Wednesday. This of course occurred earlier than Ash Wednesday, as did most of the fires in East Gippsland and the South Coast of NSW, mostly in January 1983. Still pretty severe fire conditions at that time. Ash Wednesday was 16 February 1983.

Up here we have the Hall fire. Sorry, I'll go back to these fires in 1952, which are coloured in yellow. They started on two different dates. These two fires here started in January and the photos and notes that I have suggest that they were started from power line failure and in one case a birds nest that had been built on a transmission line and the bird arced between the lines and dropped to the ground burning and started the fire.

The extent of the fire has been truncated at the ACT border and again the reports suggest that it continued to burn past Queanbeyan into the Tindery Ranges, which could extend that fire somewhere down into this area quite possibly, but we have no mapped information about that fire - just a description that it burnt into the Tindery Ranges.

The Stromlo fire occurred from lightning in February, a separate fire, but which was smaller and burnt through the grassland up over Mount Stromlo and didn't go much further than Narrabundah Hill and the present location of Duffy, which at that stage was open farmland. Again, it was controlled once it came out of the forest and into the grassland.

I don't know the condition of the grass but I think it was pretty good because these fires

that were a week or two earlier, one started in the vicinity of the Mint, the Mint's present position, and burnt over Red Hill and skirted around the northern sides of Red Hill and then took over across the grasslands into the forest. This other one started a little further west along the Cotter Road, in about the vicinity of Curtin.

The Hall fire up here burnt this cross-hatched area. It started from a power line shorting and an expulsion drop-out fuse exploding. These are safety fuses within the power line set-up. When it went off, it produced a great shower of burning metal as part of the fuse and the effects of the drop-out fuse started the fire.

Mount Majura fire, I think - or maybe this fire at Hindmarsh Drive, one or the other - also was started from an expulsion drop-out fuse, and I'm not quite clear on which one it was at the moment. Electrical power line failures have always been a source of fires particularly in Victoria and New South Wales in the mid to late '70s and they became a cause at about the time 15 years or so after they had been put through rural areas and time for trees in areas that weren't patrolled to grow up and grow into the power line and under extreme conditions of high temperature, the power line would sag down into the tree and then cause a short-out and spark down at ground level.

Some of these fires were also caused by arson. I think this one started off Mugga Lane was arson and certainly these fires down the Tharwa Road, which was a series of five fires which were deliberately lit on the eastern side of the Tharwa Road and between what's now Gordon and Banks and those suburbs before they had been built, and started deliberately on a day of extreme fire danger, which was worrying because a lot of our arson fires are not started under extreme weather, but more by

disturbed people, often late at night, because they just want to watch a fire.

These were a series that any one of them would have beaten initial attack, and so that's a real problem that the authorities have to meet with.

The black area in the centre is a fire at Coppins Crossing, which I've done a little better diagram, also started from two fires which started from arson, deliberately lit roadside fires.

Could I have the next one? I'll keep my pen active, if I may. I want you to look at this one because it illustrates the difficulty that we have in making an interpretation about historical fires. This fire started somewhere down in the Brindabella Valley, made a run up to the Mount Franklin Range and then burnt with the westerly wind in a very similar way across the ACT in what was described in the notes by the late Professor Lindsay Pryor as a series of hops from one point, and eventually out at Royalla, which wasn't marked on that map.

The interesting part about this fire is the shape of it. This shape can only be created because the area in here and here and probably here have been burnt one or two years before. I'm sure Lindsay Pryor had an extremely accurate map of this because that was the nature of the man, and there are notes that I think it was a Mr McCann went through and did some excellent spring burning in the Cotter Valley and the Tidbinbilla Range. Had that burning not been done, the shape of that fire would have been more like that. As you will see, it's more or less the shape of the fires which were burnt under extreme weather.

So just because this was a small or a relatively small fire, the shape of that fire and many fires in the high country up to 1939

and before were constrained by the degree of burning by graziers and other people in the intervening period.

These were a series of fires, and I've included them because they relate to McArthur's calibration of the drought index, but also to indicate that one of the problems about fire awareness is that if a fire doesn't burn through your area simply by chance, there becomes perhaps a complacency in people and a thought that it doesn't happen.

Some of these fires started a little earlier than 3 to 13 March. Certainly these two down in Gippsland had started at a couple of locations, probably here and here.

MR LASRY: This is 1965 I think.
A. Yes, this is 3 to 13 March 1965.

THE CORONER: And what is the area, Mr Cheney?
A. The area extends from Melbourne in the bottom left-hand corner up to close to Jervis Bay up in the top right-hand side. It covers the mountain country from Jervis Bay through down to about probably Bairnsdale and Sale here in Victoria. I was present on a couple of these fires. I had been working on this one in February and it made its run on 3 March and I plotted that. I then returned back to Canberra and immediately was sent out to this fire, which was the Tumut River fire, which burnt from the Tumut River Valley across to lake Eucumbene, between Luke Eucumbene and Tantatgara dam.

The next series of fires which started on 3 March up here and burnt a small area on the first night and another one here, they made their major runs on 6 March and went from Taralga, which is north of Goulburn, almost out to the coastline I think somewhere near Tomerong. They have basically one day spread distances of between 30 and 40 kilometres.

MR LASRY: Before you leave that slide, the prevailing weather conditions and drought conditions, or lack of it at that stage, or what was the antecedent weather leading to those fires.

A. By 3 March, when most of these fires were occurring, the drought index was in excess of 100 and the weather conditions were probably extreme and a Fire Danger Index of 70 to 80. This is just a representation of the reconstruction of the Tumut River fire. It had similarities to the fire problems that authorities were faced with this season. It started in the Tumutrivine, a point somewhere there, under very high fire danger conditions, made a brief run-down to the south and then a run up there towards the east. They had three days in which to try and contain it before there was an extreme weather forecast and they had set out to establish control lines along here and along these roads back up on to the highway, which is probably back up here, and they were unable to complete that within the three days that they had. They managed to hold some of this area along here from breaking away, but the initial breakaway occurred down in the rivine and it broke away here and then made a run up an area called rivine, which is to the north of Cabrumurra and Yarangobilly Caves I think is somewhere in here.

Kiandra is here, and under those conditions it made a very strong run across the Kiandra Plains from Tumut River to Eucumbene Dam, which is here, and Tangtangera Dam which is there.

That is the Tumut River fire on the first day and simply to illustrate that three hours after ignition under high fire danger simply because of its location it rapidly developed into a big fire - no hope of direct attack or no hope of really initial attack on that fire and they immediately had to go back to an indirect form of attack.

Q. Can you see the original ignition area on that photograph?
A. I suspect it's somewhere up in a creek that came off the Tumut River somewhere in that area there, alleged to be a fisherman's fire, but I don't know whether that was ever proven.

With the switch to the west, northerly wind, a switch to the west, it has already started to throw spot fires outside the general condition. Interestingly, the wind in the valley is from the north and yet the wind up in the ridge is reflecting the prevailing westerly wind, which is blowing this spot fire towards the east. At the same time this one obscured by the smoke - there are more spot fires spreading towards the east.

This is really to illustrate the area burnt in 2001 through the Stromlo pine plantation, mostly north of Uriarra Road and the Cotter Road. Importantly, though, it was started by arson at this point and another fire by arson at Huntley and without foreseeing the Coroners report on this, I believe this started from a spot fire from the Huntley fire there.

Two days spread and the fact that this area of pine plantation had been burnt prior to this year's fires had a pretty big impact on the carriage of the fire northwards through Black Mountain and certainly impacts that might have been around Government House and Yarralumla.

Q. In the absence of that fire in 2001, is it able to be estimated what the prospects were of this year's fires burning into Black Mountain? I presume that would have been even more disastrous --
A. My guess is almost certainly on to Black Mountain but probably not much further than Aranda to the north, but if it had burnt on to Black Mountain when the winds shifted from north-west to westerly, that would have had a

similar impact on O'Connor, as it did on Duffy. It may have been a bit less because it would have been an hour or so later in the day, but I suspect not much.

Certainly there's enough fuel in the surrounds of the golf course and Government House and the sort of park areas that would have caused a bit of a stir in that area as well.

Q. This is a separate part of the presentation in relation to a particular fire in 1972.
A. Yes, I wanted to include this fire because in some respects it reflects some operational and cultural changes that have happened in the last 30 years. This was a fire that in my term with the CSIRO - actually before we were formally within CSIRO, but still doing fire research, attended as part of the ACT's firefighting force. The fire started in a similar location to the Bendora fire. It started off Walks Road at this point. It was on a south-easterly aspect and it started in a forest with 1926 alpine ash and it burnt under I think somewhat more severe conditions, but at that stage the ACT Forests were responsible, the fire was under the direction of Tony Fernside who was the Chief Fire Control Officer at that time.

Q. Just to make it clear for anyone who hasn't seen this before, what we're looking at is one of the slides from your mapping of the perimeter of the Bendora fire, which is shown in red. Is that right? And then you've superimposed on that the ignition point for this Pago fire back in 1972?
A. That's correct. That's the line scan image of the Bendora fire at a bit after half past 6 in the afternoon. The arrows indicate the point of origin of the Bendora fire and the point of origin of the Pago fire. The pink gives the ACT/New South Wales border. This location is Bulls Head and the Brindabella

Valley, Bendora Dam, the Cotter River flowing down there.

Q. Thank you.
A. The weather conditions at Canberra Airport - and I use Canberra Airport because of a comparison with the weather that we had in 2003, the 15,000 hours, very similar weather conditions to 8 January. 35 degrees Celsius, 15% humidity, with a wind speed of 32 kilometres an hour, which gave us a forest Fire Danger Index just going into the extreme range, with a drought index of 103. I think it was 104 on 8 January. This was one of those seasons when there was a very steep rise in the drought index, and this is happening on 21 January, just as I was getting ready to get stuck into the grog at the divisional Christmas party.

At about 1500 hours, the ignition went. We think it was a deliberate or accidental roadside ignition.

The next two days were followed by two days of very high to extreme fire danger. On the 22nd and, for most of the day, or the afternoon, we had a forest Fire Danger Index of 30, but a small frontal system went through with mean wind speeds of 64 kilometres an hour, which for about a period of an hour lifted the forest fire danger to 65 extreme and on the 23rd we had not so low humidities but really quite strong winds and a forest Fire Danger Index of 49, which is just on the point of very high to extreme.

Those later days were important because the potential for this fire was there to burn into Canberra if it wasn't brought under control.

Q. Just going back to those - if we could just go back a step. You'd already mentioned this to an extent, but although it's the third week of December 1972, conditions compared with

the conditions prevailing on, say, 8, 9 and 10 January of this year, particularly as they apply to the Bendora fire, what would you say about that comparison?
A. It was a steep sharp rise, sort of a hot spring and a short intense drying period. I don't think the real levels of drought were as bad as on this fire as they were in this year, although the index is about the same in Canberra, and in the mountains I think the index that we calculated for Bulls Head, when we had instruments there, was probably around 75, so it was down a little bit in terms. We still had quite active overnight fire behaviour associated with this, which meant that our calculated figure at Bulls Head was 75, but it was reflecting the sort of conditions that McArthur had recorded of 103.

Detected at 1507, probably started a little before 1500 hours, probably accidental. A roadside fire, so either accidental or deliberate. Initial attack was a light unit came in at 1500 hours, tried direct attack with water and failed pretty much immediately. Perhaps that was because it was run by a research group! It was then brought in by bulldozers and support tankers at 1800 hours. They used a containment - a sort of variety of suppression actions. Direct attack with bulldozers on the western and eastern flanks, some burning out from roads and firelines, mostly after midnight when the actual positions of the fire was known and some lines had been constructed. I think importantly it was contained by 0900 hours and then patrolled for the following three weeks, and we'll see some of the problems on the map that I have later.

The next one, please, John. This was the intensity of the fire somewhere around 1700 to 1800 hours. I've said approximately 1800 hours and I think on reflection, even though I took the photo, I think it was probably more like 1700 hours. The fire was coming up the ridge

and when it got up to the top of the ridge where I am here on the Pago break, it would be exposed to the full force of the wind and developing into the crown fire. I think the next one is a similar photo with the flames temporarily going and we always take these photos when the flames are highest and burning out the crown.

General flame height, though, was in the intermediate trees and it was pretty severe, and certainly beyond any capacity for direct attack.

The photograph you've just seen - those photographs were taken off what we call the Pago break at somewhere around this point here. What had happened was the fire which had started here burnt under prevailing west south westerly wind, which was the general line, but the curved nature of the topography meant that there was an Eddy wind that drove the fire from the road up slope towards the ridge. When the fire came out into the full strength of the wind at the top of this break, then it started throwing spot fires down wind and these extended the fire in a north-easterly direction, with each spot fire repeating this run upslope and then respotting again.

The bulldozers, when they arrived, probably somewhere around between 1800 and 2000 hours, set about to confine the edge of the fire by almost pretty close attack there, which then stretched out at night and they brought the trail down to here - the Bulls Head/Bendora Dam Road and a little cut off by bulldozer trail through there to the direct edge of the fire, in that position. The bulldozer trail was pushed down to about this point here, where it became too steep for bulldozer operation, and that generally occurs when the slope is greater than 25 to 30 degrees, and this area along the bottom, although it was in lighter, very steep fuels, was contained by hand tool lines along

that area, and the mopping up effort over the next couple of days in particular focused on controlling that part of the fire with men being there with hand tools and picking up spot fires as they occurred.

We attempted rudimentary efforts at water bombing from fixed-wing aircraft which were cobbled together on the spot the next day, and trying to fill the agricultural hopper with flowers and stones to seal it was not a particularly successful venture, but they officially did so some water bombing on this fire.

Q. Before you leave that slide, to the north of the northern edge of that fire, the map records prescribed burn, I think, in February 1962. That's some 10 years earlier. Does that have any influence on the ability to control or contain that fire?
A. I believe it did, primarily by removing some of the large stags that had formed after the previous fires through the area, which - most of this down here is 1926 regenerations, and so I suspect that area was last burnt in 1926, and certainly it had fire-killed trees in it, of which the prescribed burn in 1962 would have reduced the numbers of those. And 10 years after the burn - and our recent research is saying there is still some effect that that would possibly reduce the intensity by 15 to 20% compared to a 25-year-old fuel. Certainly I believe it made suppression easier in this area where the burn had been carried out.

Just to illustrate that, 23 December, two days later, was a serious day. There was a fire at Burrinjuck, to the north of Burrinjuck Dam, which put up a convection column which was similar to what we saw on 18 January over Canberra, a very severe forest fire through that hill reserve just to the north of Burrinjuck Dam between the dam and Yass.

So in summary, this was a fire that started in alpine ash forests. The fuels were up to 40 tonnes per hectare and I didn't really make it clear, usually we are referring when we talk about 40 tonnes per hectare, this is fire fuel less than six millimetres in diameter. In that area, the total fuel load which we measured at another time was in the order of about 100 tonnes per hectare, of which generally the fine fuels compose about a quarter or 25 tonnes. The rest is in larger fuels which either don't burn completely or they burn well after the fire front has past. So we don't take them into consideration in calculations of fire spread, but they must come into considerations of suppression difficulty.

Controlled overnight by combined attack with bulldozers, tankers, hand tool attack and burning out and held for periods of very high to extreme fire danger.

I'd just like to add that the direction of the fire attack was held by two very competent forestry foremen. One was Morris Franklin and the other was Billy Bates, who is probably listening next door, and really their knowledge of the country and knowledge of tracts and access and what could be done with bulldozers was fairly critical in the crews being able to bring that under control. And they had a very experienced bulldozer operator, who was on the job and really didn't need instruction about how to build line around fires.

MR LASRY: Thank you, Mr Cheney. Is that a convenient time to rest Mr Cheney's voice.

THE CORONER: Yes. We'll adjourn until tomorrow morning. The court is adjourned until tomorrow.

MR LASRY: I think there has been some unofficial discussion, but I think it's your Worship's intention to adjourn at 1 o'clock

tomorrow for the day. Am I right about that?

THE CORONER: To adjourn about --

MR LASRY: At 1 o'clock tomorrow for the day.

THE CORONER: Yes, if that's convenient to the parties, we'll adjourn tomorrow at 1pm.

MATTER ADJOURNED AT 4.00PM UNTIL FRIDAY, 10 OCTOBER, 2003.

TRANSCRIPT OF PROCEEDINGS

CORONER'S COURT OF THE
AUSTRALIAN CAPITAL TERRITORY

MRS M. DOOGAN, CORONER

CF No 154 of 2003

INQUEST AND INQUIRY

INTO

THE DEATHS OF DOROTHY MCGRATH,
ALLISON MARY TENNER,
PETER BROOKE, AND DOUGLAS JOHN FRASER,
AND THE FIRES OF JANUARY 2003

CANBERRA

DAY 4

10.03AM, FRIDAY, 10 OCTOBER 2003

[10.00am]

MR LASRY: Before we start, a couple of matters. Apparently I've thrown the system into chaos by revising the numbering system which your Worship has followed in relation to Mr Cheney's drawings. At the moment those exhibits stand as exhibits [PC 0001] through to [PC 0011]. In order for the system to function effectively, it's desired that those exhibits be renumbered from 2 through to 12 so that the first document that was tendered, your Worship will recall, was the weather bureau prognosis from October 2002 I think. It was exhibit 1. So exhibit [PC 0001] Should now become exhibit 2 and subsequently through to exhibit 12.

THE CORONER: I think that has been done, so thank you for that.

MR LASRY: Yes. Your Worship, the other thing is that in relation to the part of the hearings that will deal with the four deaths, it's been the concern of everybody connected with those to ensure that there's some certainty as to when that evidence will be called, particularly for the benefit of the families of each of the four people. What we propose at the moment is to more or less come what may present that evidence at 10 o'clock on Thursday morning. If we finish other evidence before then, then it may be that I would be asking your Worship to stand the matter down until Thursday and if we haven't, we would be asking your Worship to stop whatever we're doing on Wednesday afternoon and deal with those matters in one process as it were on Thursday. That evidence, as your Worship realises, is essentially the evidence of each of the investigating police officers and the evidence of the pathologist, so it might take all of Thursday and a bit of Friday. It might not take that long, but we're anxious to give some certainty as to the time, if that's convenient to you.

THE CORONER: Yes, that's suitable, thank you.

MR LASRY: I'll recall Mr Cheney, if your Worship pleases.

<MR NOEL PHILLIP CHENEY, RESWORN

<EXAMINATION-IN-CHIEF BY MR LASRY CONTINUING

MR LASRY: Mr Cheney, perhaps don't get too comfortable. I'll just ask you some preliminary questions about the process we're about to embark on and then we'll embark on it. What we're about to deal with is the Powerpoint presentation which has been distributed to the parties in relation to basically the development and spread of the fires along with comments by you more or less on a step-by-step basis. Perhaps what I'll ask you to do, if the Powerpoint presentation is ready, is to go to the screen and start.

I think in the earlier part of it, there are some slides which we've already seen in relation to antecedent weather and some of the information that you already referred to and the Bureau of Meteorology have referred to, so we can probably skip over those. If you could just take us through those slides and I'll ask you some questions based on what's in the written report as we go through. If the witness may leave the witness box and from here on I'll remain seated so that everybody can see the screen.

A. Just a summary of what I wanted to go to - the antecedent weather has been covered, although I will be running through the sequence of the days using satellite photos to show how the weather conditions after the 8th affected the fires in a more general sense.

The fire ignitions, I wish to just illustrate the ignitions that were around on 8 January. I won't be going into any detail on the determination of these conditions.

Then the fire danger from the 8 to 18 January and an illustration of how - I just want to go over a couple of points on that, although it has been covered, if that's all right. And then the fire histories of McIntyre, Bendora and the Stockyard fire.

So I think if we could go through to probably slide 9. I think one point that should be made is that one of the effects of such a severe drought is that the grasslands in early January were largely eaten out around much of the ACT and New South Wales, and that did have a considerable impact on slowing down the fire spread when it came out of the forest. Some people were caught in the run-through towards Duffy and may not have appreciated that.

But elsewhere in New South Wales, the fires largely came out of the forest and stopped on the eaten-out grasslands and it is a fairly common event that when we have a bad forest fire season, we usually have an easier grass fire season because the grasslands have been eaten out.

The fact that our forests are largely burnt don't give the Rural Fire Service and ESB any relief this coming season because there could well be abundant grasslands and severe grass fires that they have to deal with.

The next slide is the diurnal trace of temperature, and I am allowed to touch that, John? We talked about how the fire danger relates very closely to the combination of temperature and relative humidity, which you can see in this graph are opposing cyclic patterns reflecting the diurnal cycle. But in just very rough terms, if we look at the minimum and maximum relative humidities, we can get some impression of those days and nights that were giving some difficulty to firefighters, and certainly the first day, on

the 8th, and the first night, the relative humidity here was in the relatively high ridge, which indicated that the fires would probably be burning relatively brightly overnight.

The humidities rose. The minimum humidities rose during the week and then started to fall again. A couple of nights on the 12th and 13th we had some low overnight humidities, with again a little more active fire behaviour during the night, and then finally, which we'll deal with in a little more detail, 48, a very high overnight humidity compared to what preceded it before.

Now to the next one. The overnight humidities are reflected in the fire danger at night. You can see here, the evening of the 8th and the 9th, the fire danger didn't drop close to zero as it did in some of the other nights. 12th and 13th a little bit higher and on the 18th quite a high overnight humidity.

Typical of the fire dangers, we had - 50 is the extreme range, approaching 50 on the first day, and then generally in the moderate to high range for the next five or six days.

The next slide, please. I think it will be established that the ignitions were largely due to lightning and severe thunderstorms passing through the region on 8 January. There were multiple ignitions which extended from Mt Buffalo in Victoria to Captains Flat in New South Wales. I might just add that these were not the only fires that the authorities in New South Wales and ACT had to deal with. Also, during the period where I'm discussing the fires, there were other fire outbreaks that Emergency Services Bureau and Rural Fire Service had to deal with along with the fires that we are discussing here.

MR LASRY: So in some of the other material I think and in the material provided by Kattron,

it indicates, doesn't it, that there were a large number of lightning strikes right through south-east Australia, a very large number.
A. Yes, that's right.

Q. Many of which started fires to a greater or lesser extent?
A. Yes, I'll illustrate that shortly. But what we haven't discussed, which may come up in phase 2, is the fires that broke out while attending these fires, which is something that they have to be aware of and we have to be aware of.

The next slide - this is the weather pattern for 7 January. It may or may not have been in the bureau's presentation. I put it in because it reflects close to what we understand as what's going to be a bad fire situation in south-eastern Australia. We have a blocking high sitting out in the Tasman and if that sits there and these cold front pressure systems move up to it, then that tightens the isobars and increases the strength of the wind, which is - I've got the pen here - sort of coming around these isobars like so, and so we have a northerly wind generated from these pressure patterns.

Whether or not we get a bad season in south-east Australia depends on the latitude that these high pressure systems are running for the summer. If the general pattern of the centres of these high pressure systems is further south, at a latitude further south, then New South Wales comes under the influence of the top of the high pressure system, which is largely easterly weather being blown in from the coast, and that gives us a mild season and usually means that Tasmania gets a nasty season down there.

Before the advent of satellites and when we were just using the bureau's skill from pressure observations, which by and large they

still do, the firefighters had a rule of thumb that these sort of frontal systems passed roughly every seven days. So if we had an outbreak of fires, then we were likely to have a period of somewhere between four and eight days where we might expect some mild weather as the southerlies and easterly winds passed over before we had the next extreme weather. Any indirect firefighting technique had to always bear that in mind, that again rule of thumb you'd say in seven days we're going to be in strife again and we will have bad weather.

That pattern fairly well reproduced itself during these fires, with a small exception that we'll discuss.

The next slide, please. This is a squall line crossing the ACT about 1.50 on 8 January. A nasty little bit of weather from a firefighting point of view associated with strong gusty winds in the squall line. The photo was taken somewhere in the south of the ACT, looking towards the north-west.

MR LASRY: Is that a photograph you took or someone else.
A. No, that was a photograph taken by Geoffrey Cutting, who was a photographer taking photographs around at that time. This is a satellite image on which the lightning strike data has been superimposed over the passage of the frontal system travelling across Victoria and into New South Wales. The yellow dots are detected lightning discharges. Now, not all of those would have reached the ground, but a lot of them certainly did. It's an extraordinary ignition potential that passed over the mountain country and New South Wales.

There was a little bit of rain associated with the passage of this frontal system and that may have extinguished some of the lightning strikes or it may have just quelled them and presented the firefighters with what we call sleepers,

which are fires that are ignited but don't show up and don't give smoke until conditions dry out. It's this one condition where often the surface fuels are moist from light showers of rain, but because of the drought, those fuels underneath are still dry and the fire can smoulder under there without giving detectable smoke.

THE CORONER: Mr Cheney, this happened on 8 January?
A. This is a compilation of 8 January, your Worship.

This is Mount Buffalo in about this area here, the Hume Weir, Lake Eucumbene, Lake Jindabyne, Kosciuszko area here and the ACT of course. The red circles are showing fires which were detected by the Modus satellite system, and Modus is one of the satellites used by NASA in one of its Worldwatch programs where they have a number of climatological features detected, and fires are one of them. Earthquakes, floods, wind storms are others that come up on the satellite. So when the Modus satellite went over and took this photograph, a number of fires were showing up as red circles.

In the ACT we have the McIntyre's fire, which is illustrated by the dash with the lightning strike, the yellow dot, plus the fire that had already been detected.

We have essentially the Bendora, Stockyard and Gingera fires represented by these lightning dots here, but they were certainly alight at the time the satellite went across, but they were not giving out enough heat for the satellite to detect that they were actually burning. The lightning activity extended a little ways to the east of Captains Flat and a bit towards between Captains Flat and Braidwood and then that was about the extent of the storm passage.

By 10 January, these were the active fires across the mountain country and again - is that vibration on the screen worrying everybody or can we stop it? No, okay. These are now fires which are active and that you can see. The fire agencies both in Victoria, New South Wales and ACT had a significant problem with them. Another fire out there just to the south of Captains Flat, which is of considerable interest to me personally. A lot of these were picked up on the Modus system and the Sentinel system at CSIRO which provides these on a 1:250,000 map. That has helped people like myself, farmers and rural people, to know where fires are much earlier than perhaps we would otherwise. On the other hand it has a disadvantage. It still doesn't replace the conventional detection systems that we used with fire towers and aerial patrols because you can see from the other one, the satellite takes some time to recognise enough fire to register on the satellite detectors. When the front has passed through, the wind is now generally from the south.

I think if we take the next screen, by 12 January, the wind has moved now around from the south to the south-east and east/south-east up in Canberra. Again, a little different scale. We have Melbourne here, Omeo, Lake Eucumbene and Canberra is up under the cloud up here. So the fires that we're concerned with are shown up as these fires here, McIntyre's Bendora and the Stockyard, Gingera fires in that area there. The fire out to the west which we only deal briefly with is the Broken Cart fire, which is just there.

This is the next slide, and down here we have three new fires that have popped up in Victoria, which we believe were sleepers which weren't detected in the morning satellite. So again this is another problem that firefighters have when these lightning strikes pass across, that not all the potential fires will show up

immediately, either by conventional detection systems or by this satellite imagery.

The winds on the 12th at 1500 hours have strengthened somewhat, particularly south of the ACT and Kosciuszko region, but they also strengthen here and we'll see it causes problems on the Bendora fire and the actions that they were taking at that time to try to keep it under control.

The next one, please. By 13th January, the winds have now switched around to the north-east in the ACT, and as you can imagine, the pressure system is swinging around in the line of the smoke a little more northerly down in Victoria. In this period is when firefighters are using indirect attack. As I mentioned yesterday, they may take advantage of this regular change in wind direction from the south around through the east to the north to assist them with burning out in indirect attack.

The next one, please. Now, seven days later, virtually on schedule, the next frontal system was charging up a high pressure out in the Tasman and another front pushing up underneath it. But this frontal system was running lower, at a lower latitude here, than the one before. So we have quite broad isobars across our area which meant that we didn't get the normal strong winds. The winds were relatively light. They had gone around to the north and the north-west, but because there was a weak pressure gradient across our area, we weren't getting strong winds penetrating over the fire areas.

If this system had stayed at the latitude that the previous systems were running at, then we could have got on cue another very bad on 14 January, which fortunately didn't happen.

MR LASRY: That lack of pressure, I take it, has

an effect on wind and temperature as well, so the winds are gradual and the temperatures remain lower; is that right.
A. I'll say the winds remain lighter. The further temperature questions I'll save for my colleague to deal with.

By 16 January we have the next pressure system which has moved around. The winds are now sort of around moving into the north-west and still haven't picked up a great deal. Just looking at the situation on the ground, it is reflected by the smoke. Under these conditions, the Modus satellite is again only picking up those areas of fire which are intense enough to record on the satellite detectors. So we have spots of fire, but that is not necessarily the entire burning area that the firefighters are dealing with.

On 17th January, another cold front embedded in

the high pressure system that separated things. We got the frontal system moving in and the temperature rose and the humidity fell and as is a common feature when we are starting to get a weather system that is going to give us a bad day the next day, it's very often preceded by this low of overnight relative humidity. The winds often also don't die away at night, at low levels, and we can get low fuel moistures through the night and some active fire spread, quite active fire spread, during the night.

This is the pattern of temperature here and the pink one is relative humidity. On the 17th we had humidities less than 10%, which is a severely dry condition, and ignition of extremely small particles and fire brands are capable of lighting new spot fires under those conditions, and during the night the humidity rose and at 3 o'clock in the morning at Canberra Airport we had a sudden rise in temperature, an immediate reflected drop in relative humidity, and out in the field that was associated with some strong gusts of

north-westerly winds, which created problems for firefighters who were undergoing homestead protection, particularly in the south of the ACT. Then we have as the winds pick up after 6 o'clock and this dry air mass is reflected, the temperature rises rapidly and the humidity is falling away, again to - sorry, less than 10%. I was looking at the wrong scale. This was less than 20%. But what I said about the humidity, that's still apparent. The critical point for low humidity is about 25% - once it drops below 25%. The fuel moisture which follows the same graph as the humidity graph is at a point where these small ignitions of capable of lighting fires.

Certainly when it drops to around 5%, tiny particles are capable of setting ignitions in new fuels and so while in places the fire spread went across grasslands that were almost bare, the wind blown sparks associated with the high winds ignited almost any fuels that were capable of burning and this is an unusual feature that very few people see in their lifetime.

The next one, thanks. 17 January 11.15, we have our fires here, which are still showing the north-westerly wind, but they really haven't developed strongly. There was some cloud, and overnight on the 17th there was a little bit of sprinkle of rain in some of the fire areas, I believe, around the Stockyard area and Bendora, which hampered the burning out operations during the night, but certainly not enough to quell the fire.

I think the next one is a little later in the day. At 1525 hours, 3.25, in the afternoon, we are starting to get some activity in all these fires and about this time, you can see it's almost due westerly, blowing across there. I believe at about this time the Stockyard fire had spotted across the Corin Dam and was starting to make a major run towards Mount

Tennent under quite strong westerly winds.

So we're coming up to 18 January, again the bureau has described what I would call as a classic bad weather synoptic weather pattern, with the blocking high pressure system in the Tasman and the approaching cold front in the great Australian Bight.

The next one, thanks. Again, an illustration of that, very similar to the system that was passed on 7 January. Again, high pressure in almost exactly the same position, with the north-westerly winds forming and this was complicated by a small low pressure cell that embedded itself in the frontal passage here, which presents a problem to bureau forecasters because very often these low pressure cells develop inside their observing network and they don't always get advanced notice of this cell forming, although they did an excellent job on this occasion, I believe, and this can cause much stronger local winds, or winds in a general area, than would be generally considered by the general spacing of the isobars in that synoptic situation.

The wind velocity trace - and to people like myself who want to be accurate about all things, velocity is something that requires speed and direction to be sighted. Mostly we just talk about wind speed and not necessarily direction it comes from.

Interesting feature at Canberra Airport: throughout most of the day, the wind was almost fairly steady at 3:15, north-west right throughout the day, with some variation, as is always the case either side. Wind directions elsewhere in the ACT were different to that. Some were affected by the fire. It's difficult to tell whether or not this wind record was affected by the fire itself at Canberra Airport.

Certainly between 1500 and 1600, we had a spike in the wind speeds, which may well have been associated with the outflows that Clem and Rob mentioned in their presentation, but pretty characteristic wind speed pattern of an extreme day, with quite large extremes in the gusts and lulls, with gusts here approaching 70 kilometres per hour and not long after it, you have a lull which is less than 20 kilometres per hour there.

So a feature of this weather is that it is very difficult for firefighters in the field when they're exposed to this variation both of wind speed and wind direction to tell just where the wind is coming from and they are very reliant on the forecasts from the bureau who can give them advice about what the general pattern of wind will be, ignoring the local wind observations and the overall direction and spread that the fire would travel.

Because of the low overnight humidity, we had the fire danger running into the very high a little after 8 o'clock. That actually meant that by 8.30 in the morning of 18 January, they were getting similar conditions to the day at around about 3 o'clock in the afternoon on the 8th when the fires broke out. So immediately they were faced with difficult conditions and it was virtually impossible to do much useful control action when the fire goes into the very high range. By 1300, with the increase in wind speed and the drop in the humidity, it has gone into the extreme range. At these conditions, with large fires, there is really nothing that can be done in terms of controlling fires within forests and about all that can be done is go and withdraw as the firefighters did to property protection.

Fires in grasslands can be controlled if there is a very concerted flank attack on the flanks of a grass fire, but in a situation like we were faced here, with fires coming out of the

forest and spotting into grassland, it was virtually impossible for them to do any suppression action even on the grass fires, which may have been able to be controlled in places.

Even in extreme weather where fires are in almost continuous grass, if it runs into a patch of woodland and forest, the fact that the capacity of the fire to throw spot fires out of the forest much further than they are thrown out of grassland means that even a flank attack will be stymied at about that point where it runs into forest fuels.

The next slide, please. This is one also that has been shown before, but what I want to use it for here is that in fact there was quite a strong pressure differential between the north of the ACT where the fires were running and through here - the winds were stronger in this area than in fact they were further south. And at the south of the ACT where I have made some observations, the actual general wind strength was much less than it was in the north. Going down into Victoria, this was not a really bad extreme day down there, so there was quite a large gradient in the wind speed between the ACT and down as far as Cooma.

Just a couple of other little features - the smoke from the previous day's fire has been carried up and is sitting up there and now is producing a lot of smoke which is being blown out into the Tasman. Again, that's New South Wales. There are other significant fires running elsewhere in the state.

A close-up of that pattern - this in fact is a very strong convective activity. We think it's around about 1430. I'm not absolutely sure on those times, but that tends to match off the ground, and again lesser wind speeds. The height of this convection column here is illustrated by the shadow thrown on to the

lower level smoke, and a couple of my blokes estimated that from the size of the shadow and the sun angle, that it was about 45,000 feet, which I think was a bit in excess of the radar calculation, which is more accurate.

Just finally, a shot of the column from another view, which is taken from Shannons Flat, which is just to the east of Cooma and south of the ACT, where it was reported by the observer down here that the wind conditions weren't as bad and they were looking at this massive development of huge convective activity.

Finally, in this series of slides, just an overall view of the total area burnt through January right through to the end of March in the ACT. It was a very significant fire event for south-east Australia, of which the fires that we're primarily concerned with - that may be 20% of the total area burnt during that period.

The pattern of these fires, apart from - there is really an area in Canberra where they ran from grasslands - from the forest into the city here, and in Omeo down here, where the fires ran through grasslands and did extensive damage to the township of Omeo, burnt out the little township of Wulgulmerang, which is about here somewhere.

Elsewhere when the fire ran out into the grasslands they did not spread very far, and again I'm just repeating that feature - there was a characteristic of these seasons when we get really severe droughts and the grazing pressure has removed most of the grass.

I just note that there were in that area four firefighters killed in New South Wales and there were several firefighters killed in Victoria. So those fires were at a considerable cost as well as what happened here in Canberra.

I'm dealing with the individual fire histories of four fires and primarily the fire that started near McIntyre's Hut, which I'll call the McIntyre fire, fire that is started just to the east of the Bendora Arboretum, which is the Bendora fire, two fires, one at Stockyard Spur and one at Mount Gingera which I've combined together and are treating them as one fire for illustration, although they were two fires up until about 12 January. Then I want to look at the interaction of the combined fire spread, both between the Bendora fire and the McIntyre's fire on 18 January and the Bendora, Stockyard and Broken Cart fire, only briefly at around 1500 hours on 18 January.

In terms of looking at access roads into these fires, here we have the location of the McIntyre fire, Bendora fire, Stockyard and Gingera fire. The primary access from the ACT into McIntyre's fire would have been either along Two Sticks Road, which is a torturous road that comes in through here, and then there is another trail, that sort of comes through there somewhere, more or less. It wanders around a bit more than that. And there is access from the Brindabella Valley and from the west over here for New South Wales people.

For our fires in the ACT, in the Namadgi National Park, which is most of the area down here, the access is circuitous - from sites in Queanbeyan, they had to come up along the Brindabella Road, down through the Bendora fire. To get into Stockyard fire they had to come down virtually along the Mount Franklin Road or they had to come from south of Canberra through Tharwa and in through the Orroral Valley Road.

One of the issues when I was on Bushfire Council was making an action through the trail on Stockyard Spur through to the Corin Dam Road, which you can see would have provided

very rapid and immediate access into that fire.

I believe in managing natural areas, you have to look at the access, the time that it takes to get in there and perhaps examine ways where that can be reduced to facilitate rapid and early initial attack.

MR LASRY: On those roads you've referred to as being the access roads to each of those fires as at 8 January, what sort of condition were those roads in? What are the limits on vehicles being able to travel those roads; in other words, size of vehicle.
A. Just these roads that I've marked, they were accessible, I believe, although I haven't travelled them personally, myself. Certainly Two Sticks Road was accessible for crews or my staff that went in there to inspect that fire. It's a question that needs to be raised because we can look at these roads but we do have to understand the capacity of them to get large tankers in. I would believe for most of this trail it was accessible through most of the areas to get large tankers through, but I've only identified the main routes in there. There are many other roads in different states of maintenance.

Q. For the use of machinery, of course, bulldozers and things of that kind, they also have to be trailered in to the sites of particular fires. Are the roads as at 8 January - were they suitable for floating bulldozers of various sizes?
A. For large machinery, it was probably the curves on this road - they were probably too sharp to float something of the size of a D7 or D8 bulldozer into those areas, so I can stand corrected, but I suspect it probably couldn't get much further than Bulls Head. I really don't know how far they could float a large machine in through the southern roads. But that would involve then a considerable walking distance for this machinery.

Q. The crews responding to the McIntyre's hut fire, indeed those that did so, where were they coming from? Was that NSW Parks and Wildlife initially? Where would they have been coming from?

A. The NSW Parkes and Wildlife offices are in Queanbeyan. There were volunteers, brigades, both in Brindabella Valley here and north in New South Wales towards Wee Jasper. There were a number of rural brigades there. There are a number of other trails not marked in here coming from New South Wales which would provide access from brigades if they were called from both Brindabella and from the sort of northern part. The Brindabella Road, this road, tracks through as a major road that goes through to Tumut and, if necessary, resources would have been brought in from Tumut and taken - there are roads that sort of connect through into this area, something like that, up towards the fire. That's very rough, my sketch. It's not necessarily an accurate positioning of the road.

Again, I've tried to reproduce this to represent some of the topography that we are dealing with in addressing these fires. This also illustrates to some degree the available road network which around the Bendora fire it was quite a dense road network compared to what was the problems in both Stockyard fire, which is here, and the Gingera fire, where if the fires were straight from initial attack, there is no close and accessible fallback line to go to and that either means that you need to do major operations to construct cut-off lines or fire trails that cut off the area, or you fall back to very large burning out blocks, which will be difficult to get around, and ensure that the whole area is burnt out by indirect attack within the time that you have available to you.

At the time of the fire, the Stockyard Spur was

not trafficable. It had been allowed to revegetate and, although now after the fire, it has been extended down the Spur, about to there. As was part of their strategy of saying, "What are we going to do with this fire?" - a major problem in the ACT is the Cotter Valley, the Tidbinbilla Range here, with no east/west roads going across it, and again I believe that connecting through the Stockyard Spur to Corin Dam is an essential part of making this road work and area in Namadgi National Park more accessible for firefighting.

Any fire starting up in the ranges in the ACT, you urgently need to get it out before it gets into this very steep rugged country on the western side of the Tidbinbilla Range. It's very difficult to do any firefighting operations in there. And anything else?

Q. No.
A. I think that's it.

Q. I'll take the next one, thanks. Just another one quickly. I'm trying to put the proximity of Canberra out here. Nice brown leafy suburbs! The Cotter Valley, which is pretty steep and rugged terrain, and the location of the four fires we are dealing with in respect of this major valley.

I'd like to now go on to the daily development of the McIntyre's fire and I'd like to acknowledge the assistance I've been given from the Rural Fire Service of New South Wales, who provided the line scan information and thermal information for which I've done this mapping; The Defence Imagery Geospatial Organisation, who provided the infra-red imagery from spot satellites that were mostly taken on 7 February, which give that pattern of the burnt area which you've already seen - they got that image from Raytheon, an organisation - and MapInfo, who provided the digital terrain model that we have used to illustrate the terrain; my

own staff, who put the whole picture together; and the police task force and many people that I've interviewed in the field. That assisted me as to where the fire spread.

Is it possible to give me a red pen, John? The McIntyre's lightning strike occurred here, just to the west of Lowells Fire Trail, at around 1541. It made a run briefly up this ridge, which is fire trail its sitting on, between these two creeks. It ran in that direction up the ridge and then got into this creek here. Under these conditions, a fire getting into a creek catchment like that will expand very rapidly, very quickly, and by 2000 hours - and this is a reconstruction from aerial photos supported by observations of people who have driven in on this trail to this point, and I suspect the accuracy is reasonable because this is the start - the fire collapsed at about 2000 hours and this illustrates the start of the green band that separated severely scorched or defoliated area here from a band of green just outside there.

The fire rapidly filled out that valley and through a number of spot fires, short-distance spot fires, just to the west of Webs Ridge into Mountain Creek up here and out on Baldy Range up there.

Q. Now, in your report at page 12, you suggest that by the time of this particular slide, the fire behaviour, as you say, had subsided, weather conditions had become milder with lower wind speeds and increased relative humidity. I think some of your staff were in the vicinity of this fire on this night and I think we'll see some video of that, won't we, subsequently?
A. That's correct.

Q. Just point out on there where they were?
A. They came along the Two Sticks Road and then came on to Dingi Dingi Fire Trail and

drove up and were in the vicinity of these spot fires here and then walked around several of those spot fires and then approached the edge of the main fire and they later drove back out to the Baldy Range fire, the spot fire there.

This had crested the ridge pretty much by 6.30 and the convection column had collapsed at that point, so the intense period of spread, certainly as it came up that creek, and the defoliaton shows up on all the imagery as a fire that has been a full-crown fire where the flames have extended past the canopy of the trees and a very damaging run up there. I've got a couple of photographs which illustrate the development of that fire, again taken by Mr Cutting, who took these photographs and actually recorded the time as he took them so they were very valuable image.

Q. Just before you do that, I wonder if we could go back to the previous one for a minute. The Baldy Range fire over on the right-hand side looks, according to that scale, to be about five or more kilometres east of the eastern edge of the main fire. Am I reading that correctly?
A. I sort of would say it probably originated in this slope - it's run up the slope and so it was probably a carry-off around about 6 kilometres ahead.

Q. Does that tell you anything about the original intensity of the fire, that it spotted that far ahead, or does that not give you any information particularly?
A. I can say that from the look of the convection column as well as that spotting distance, I would say that was a pretty intense fire coming up this steep part within the catchment, but even back at this point, I suspect that the early development of that fire, even though it was still a surface fire, under those conditions, even if someone had been on that road at the time that the fire

started, with the fire unit, they would not have been able to contain it on that road. It developed very rapidly. This area here is a

dry box stringy bark country, and the stringy barks are particularly prone to produced fire brands and throwing spot fires ahead and so really when you are in a very high fire danger, you have little hope of stopping a fire in forest country if it's on a slope which is aligned with the direction of a prevailing wind.

Q. Before we leave this slide, as to the Baldy Range fire on the right-hand side, is there any prospect that that was in fact a separate fire started by lightning rather than a spot fire from the main fire at McIntyre's hut?
A. Identification of spot fires is always problematical. I looked at the Kattron data, which was registered - the presence of lightning strikes in all the other cases - there was no information of lightning discharges to the east of McIntyre's in this part of the range. The spot fires would normally fall out with the prevailing wind direction within an envelope of about 12 degrees. The wind, it appears, from the photographs that were taken was actually a little south of west, and Baldy Range really falls on the axis of that, and probably you could have got spot fires from about here up to about here. But we don't know - somebody may have gone up and lit it, but that's unlikely.

These have had the time cut off them, I think.

THE CORONER: Mr Cheney, on this small screen here, it says from Uriarra Road, 1712 hours.
A. Thank you, your Worship. Travelling down Uriarra Road looking north - if we look north-west towards the fire, that's a substantial column. I would expect there would be spot fires falling from a column of that intensity.

The next one is taken from the Brindabella Road at 1730 hours. The image was taken just above the pine plantation areas on the road that goes up across to Brindabella. We are looking across the eastern slopes of Devil's Peak and Mount Coree, and again that convection activity is indicative of a fairly severely burning fire. This is a few hours after the squall line had passed and everything was clear and bright and the wind is blowing quite strongly from the west.

At 1830, this is a panorama that Mr Cutting put together of two photographs and it shows that the convective activity that was obvious an hour before has now collapsed. I would interpret from this photograph that the fire has finished its uprun on the western aspects above Lowells Trail, and you will see here the Baldy Range spot fire, just as there was smoke in that area there.

Q. Is the original ignition point for the fire likely to be within that photograph or to the left of it?
A. It's down behind the ridge and it's out of photograph. I'd say the point about here is where the Webbs Ridge trail - and this is Webbs Ridge and Webbs Ridge trail - so around about where the pointer is, the edge of the fire is under that smoke, and then the spot fires have been splayed out further downwind.

There was another lightning strike which we didn't mention earlier, but that was due west of Mount Coree across a property called Mount Vale. Crews from Brindabella were directed to that, if not at this time within the next day to also attend this fire to the west of the ACT.

I just add this by saying that there were quite a large number of other fires that were picked up and were suppressed quite early in both New

South Wales fire service, state forests, in areas where they were accessible and easily attacked using bulldozers and hand crews.

The next indicates the road condition as registered on the MapInfo database. Two Sticks Road which comes from the ACT is classified as a two-wheel drive road. It is, however, a fairly narrow and torturous road and access along that road is relatively slow. The Dingi Dingi Trail is in good condition. It is accessible to two-wheel drive, but you'd really classify it as four-wheel drive. Webbing ridge Trail, coming from Doctor's Flat is accessible by two-wheel drive to about here, but further on these trails are four-wheel drive and in good conditions.

The importance of, I believe, rapid initial attack - because initial attack was not carried out, the agencies lost the opportunity to reduce the area that they had to deal with and although there was nothing that you could do with the head of the fire under those very high fire danger conditions, at this time, at 2000 hours when the fire had collapsed and even before on the back of the fire, it would have been possible to --

THE CORONER: I think it might take a couple of seconds to fix the pen and it might be just as well to have the morning adjournment at this stage if that's convenient.

ADJOURNED [11.17am]

RESUMED [11.35am]

THE CORONER: Please continue, Mr Cheney.

THE WITNESS: I'd just like to point out that although I have coloured the fire area in red, that's purely for illustrative purpose. The burning section of the fire is simply on the

perimeter, a narrow band. In all these photographs, although that's the red, the active fire is only on the perimeter. There is of course logs and material burning out within that red area, but from a firefighting point of view, because it's red, it doesn't mean you can't go in there and the hazards are principally from falling trees and timber.

I was at the point of saying from a firefighting point of view, at 2100 hours there were a number of actions that could have been taken if firefighters had been there and the principal action was the control of this part to the west of Lowells Fire Trail, and that really was a critical action in this fire because there is no accessible road between Lowells Fire Trail and the Goodradigbee River where it goes to the gorge. We will be looking at that in a couple of slides.

Likewise, Baldy Range fire up here was accessible and small and control of that fire, because it was on both sides of this fire trail, was also a critical spot fire from a fire suppression point of view. I don't believe that systems of forecasting fire behaviour are not good enough to say that what the fire behaviour will be at this time and because of the interaction between fires and the topography and the weather, it's essential that you get people on to the fires at the earliest and safest opportunity to assess the actual fire behaviour and whether or not there is suppression that can be undertaken.

The coalition of this fire was known. Its position in relation to the fire trail was known, and actions to suppress this small portion of the fire, which was in dry forest, the fuels were relatively light, easy access, the shrub was not high, and there's approximately 400 metres of fire perimeter which could have been controlled by a rake hoe team between 1.5 and two hours.

MR LASRY: Why was that so important that that be done at that point.
A. If you were going to take the option of indirect attack, this put the fire on the western boundary inside an accessible fire trail. To the west of this, as we'll see later, the containment line that was selected was a river and under conditions of high drought we cannot rely on a river to hold a fire, even a river the size of the Goodradigbee River. Even if fires stop down in wet creeks, they may be held up temporarily, but it's simply a small spot fire across it and if it's inaccessible and they're not firefighters, with access to get into the area to suppress those spots when they occur or soon after they occur, then you are then committed to falling back, often great distances, before you come to another accessible containment line.

Q. So is what you're describing as being an alternative strategy one which would have suppression on the western edge, to the west of Lowells Trail, in hours after 8 o'clock on the night of 8 January, so that Lowells Trail becomes in effect a western containment line?
A. Yes, I believe that firefighters coming in from the west, if they were available - and that is always a question that has to be investigated, and I don't know whether they were available or not - but tactically it's very important to hold this section of fire and the Baldy Range fire while they were small and overnight while firefighting conditions were easing.

Q. I think you also said in relation to a possible approach in that area west of Lowells Trail that there would be an approach with hand tools; am I right about that? Is that what you said a few minutes ago?
A. It would have been a task that could easily have been - well, as easy as hand-tool firefighting ever gets, but it could easily

have been contained with hand tools. Normally when you're looking at a fire of that size, to back up the hand tool line, if it was feasible, then you'd run a bulldozer line in to back it up. So you could provide on the bulldozer line access for a light unit to assist in mopping up that edge. You could put people with hand tools in there and they would control it within a couple of hours. You would expect them to stay all night and make sure that was held.

Q. Just on that, and which we'll probably come back to this in more detail, but you would envisage that crews that carried out that particular activity on the western edge in the Lowells Trail area, would not only use hand tools for fire suppression to make Lowells Trail a western containment line but that they would remain overnight at the fire. Are there difficulties or dangers in that being done?
A. In very general terms, in any of these fires, the first night is the safest it's ever going to be. You're going to face up with the same problems and the problems are essentially falling trees. They did occur when people were firefighting off roads. Most of the roads are narrow. We know that a number of trees fell on firefighting vehicles. It is a real hazard. It's one that has to be assessed. It's one that firefighters have to be trained to recognise, and trees that are hazardous should be identified. They should be taped off so that people walking, patrolling the line, new on the area, recognised that there's a dangerous tree in the area and principally if it's a dangerous tree in danger of falling across the line, you would get someone to sit there and watch it because sooner or later it's going to come down under these dry conditions and put the fire across the fire line you construct.

The next photograph is taken in the vicinity of - I believe it's this spot fire here, taken at around just after 2000, at about this time, and

this was also part of the information I used to reconstruct this fire perimeter.

At 2000 hours that is the fire that has crossed over - it's a cross-fire across Webb Spur. At this time of night the humidity is rising and the fire is burning brightest in the accumulations of stringy bark at the base of these gum trees where there is a large accumulation of bark. It is starting to self extinguish in parts where fine grasses and the fine leaf litter is starting to respond to the increase in relative humidity and is taking up moisture and so for virtually the next 12 hours, the fire behaviour in this area is going to continue to digress until about 6 o'clock in the morning, it would reach its minimum and then would start to become active again towards 8 o'clock in the morning.

So if we're looking at a fire which is going to get progressively milder for the next eight hours. One of the difficulties in firefighting at night is that you can construct hand line really close to this fire. Normally if you were doing it with hand tools, you normally can take the shortest boundary around these fires, just off it. You can work by the light of the fire. Once you've controlled the fire, it suddenly gets very dark and often the only thing you can do then is sit down and light a fire and sit it out until the next day, until it gets lighter again, perhaps around 4.30 in the morning. That also requires training to get people to do that, and as I said earlier, hand-tool firefighting is strenuous work. This is not a difficult fuel type to work in. The difficulty largely comes in hand tool construction from abundant large logs and a heavy shrub component.

This was the tactical containment decision that was made by the Rural Fire Service on the first night. It was decided straightaway that they would take an indirect attack approach to

containing this fire and they outlined the containment lines would be the Goodradigbee River to the west, the Powerline Trail, Two Sticks Road to the south - not entirely clear where they - they said the eastern boundary of the park in the situation report, so I presume that to be this road here, but subsequently a fire trail was put in closer to the actual boundary of the park to protect some pasture country on private property in this area of Dingo Dell. Then the north-east perimeter on Doctors Flat Road, and then the northern one along Webbs Ridge Road, Folly Fire Trail.

The red lines on this map indicate areas where they had to construct new fire line with bulldozers to complete the containment circle of that fire, or the containment area of that fire. A very steep pinch off this access to the last power line above the Goodradigbee River on - the Powerline is not marked on this map, but generally follows a trail here. You can see a bit of it in the forest down there, across this serpentine track across Flea Creek and across here past Brindabella going south to the Snowy.

There was a partial trail I believe in this area, but it had to be opened up and a new trail constructed. This little section here was done just to cut off this little section there, to shorten that tongue of fire there to make it a bit easier to subsequently patrol, and a new track was pushed in along here.

You can see that perhaps the importance of that little section there because there are sections of this river for which there are no access - no vehicular access for patrol of people along the river. Using Lowells Fire Trail as the western boundary would give them a greater chance of success, would have speeded up the operation, wouldn't require this fire line construction in steep country and the importance of the Baldy Range spot fire, which

is about here, which then opens up the possibility of doing this trail. There were some other options that I believe were canvassed within the planning meeting, and that was controlling this section of fire, which would require bulldozer operations, just to cut off those spot fires in that section there, which then opened up the possibility of using the Dingi-Dingi Fire Trail, which is this one, and shortening the area that they would commit to burning out. These two spot fires - the one here, which is not very clear on this map, but there's one here and there's another one here - always presented a problem, in that they were fairly deep into the area and controlling this section of fire still left them with the problem of what to do with those spot fires, whether they were going to have enough time to get in and carry out initial attack on those fires or whether in fact it would be faster to fall back into containing this fire on a larger area.

So in any planning section, the firefighters were faced with this option of either controlling the fire at minimum area or if you can't control the fire at minimum area, you certainly have to attempt to control it in minimum time. So it then requires knowledge and experience about fires and the terrain as to what you can work in and what you can do in the time available, and let's say, rule of thumb, if you don't know anything about the weather, a frontal has just gone through, within seven days, preferably much quicker, because you need a few days to be sure that the perimeter that you light up from is burnt out.

Q. You say in your report at page 12 that, as you understand it, the strategy was to complete the control lines, which you describe there, with the day shift on 9 January - that's the following day - and back-burn from there on the evening of 9 January, and consolidated with aerial incendiaries on 10 January, and then you

offer the opinion that the stated time frame for the suppression action was unrealistic, as you say, because of the area of planned containment, the time required to construct fire lines and the time required to burn out the fuel inside the containment lines. Do you want to say anything further about that?
A. Other than it was a considerable task to do and they decided to use this Powerline Trail, which is accessible, but it's a very serpentine road, as you can see. To do that easily, you had to get in very quickly nd control this in that period in the next day or so when the wind was from the south. As soon as the wind shifted to the north-east or east, as we will see later, the burning out operation became progressively more difficult and slowed down.

That area is about I think 10,000 hectares, from memory, and that's a pretty large area to get around, just physically getting around that area takes time. Also they seemed to want a strategy where they've completed their containment lines before they were prepared to do burning out. Now, in fact that didn't happen. They had to get in and start their burning out operations, but there was still a substantial delay before they started burning out.

One of the important things is to get experienced people on to the fire into the topography and assess the country and the danger and what you can do and then advise your planners on the possibility of various strategies.

This western slope did present a problem of getting a cut-off trail down the slope. We'll see subsequently how on the dry westerly slope this fire spread laterally, much faster than it spread on these moister - sorry, this is a dry western slope - spread more rapidly than on these moist eastern slopes.

Q. Your view as offered in your report is, and we've dealt with this already to an extent, but you're critical of there being that you describe as "no direct suppression" on the first night and I think what you are referring to is suppression which in effect turns that Lowells Trail into a western containment line by direct suppression on the western edge of the fire and also direct suppression on to the Baldy Range spot fire in order to perhaps make that track the eastern containment line. Am I right about that so far?
A. That's correct.

Q. And as to the north and south, what would you say about the containment lines as they were proposed and whether they were appropriate?
A. I believe that this flank between the Powerline Trail presented a problem of getting a cut-off point or a line down any of these ridges prior to this access trail and a relatively short length of bulldozer construction line in very steep country, pretty much at the limit that you could run a bulldozer downslope, practically impossible to work upslope, or impossible to work upslope.

It really depends on the resources that you can muster. This didn't spread rapidly on this eastern slope. If you had resources that were holding along here, it may have been possible to use waterfall trail, and slice off this section of fire, and then you would be confronted with the problem of this section and what you did with this section.

If it was decided that that was possible, indirect firefighting, remote indirect firefighting, is a legitimate fire tactic. I'm not being critical of that tactic in itself, but it has to be formulated within the framework of the time and space that you have to do it in. Whichever way you went,

considering this as a viable containment line really was not an option.

Q. The river?
A. Yes.

Q. Because it couldn't be controlled?
A. That's right. I understand from conversation and hearsay of people that were at that planning meeting that there was some reluctance to use the Powerline Trail, and an alternative strategy was suggested to come and burn out Flea Creek but that would have aggravated the problem even more. Again, if you extended down here, what were you going to do along this area on the Goodradigbee River?

Moving to the next one, I'm trying to illustrate the position of this fire within the topography and give you some idea of its orientation in relation to Canberra. This is looking, south-east. This is Lowells Fire Trail here. You can see these slopes into the Brindabella Valley are steep and this Waterfall Trail comes down through one of the few accessible ridges that's available. The country is to the east of this range and generally we're looking in an easterly direction and it's rugged but isn't as bad as the western slopes into the Goodradigbee. This is the Powerline Trail coming along here and down into Flea Creek, and it's a serpentine trail that gives access to the Powerline and it left them from I believe it's a point here where the Powerline takes off, constructing a bit of bulldozer trail down that ridge, again a very steep section of trail to construct a fire line, to cut off the southerly spread of that fire.

The overall containment lines that were adopted on this map - this was a section of line that actually had to be constructed down here into the valley and link up with another road that came through there. So we had Folly Fire

Trail, Webbs Ridge Trail and that sort of snakes back on to Doctors Flat Road, Dingo Del in here and the eastern perimeter, which probably comes along here, Baldy Range spot fire is sitting about there.

The two spot fires are not very clear here. There was one on this ridge. We'll see its development later and there was another one stuck in the valley down in there.

Q. Are you able to estimate how far the eastern containment line would be from the western edge of the Canberra urban area, what sort of distance is that?
A. I would say as a guess, and it is a guess, about 20 kilometres.

I think I'll take the next one, thanks, John. This is 9 January at 2.50. This is a line scan image. The fires have expanded. The interesting feature is that in this area here, the Lowells Fire Trail has held the spread of the western spread of this part of the fire without any fire suppression action being carried out on it. The Dingi-Dingi Trail was providing a barrier to that little section of fire, again without any suppression action on it. Even during the day, the wind was essentially from the south and so the major spread has been done along these ridges and in this area.

This has now extended it. Its previous position, if you recall, was about there and it's now extended a little further down into the creeks. It is still a feasible fire-fighting job, even at this point, but once it crosses this ridge, it crosses this creek, and climbs up on to that ridge, it's now becoming more difficult to seal off that little section of road.

At this time, although the wind was southerly, the fires are largely responding to the slope.

Winds were relatively light. This spot fire has run in this direction. This spot fire is running in this direction. The Baldy Range spot fire has simply expanded around its perimeter in all directions.

This one is sitting fairly high up on the ridge, and so it is burning downslope, all around its perimeter, and that means that there's no heading fire as such. This is a backing fire which was backing downslope with the flames leaning towards the burnt area. It's still a viable firefighting option to cut off that edge, but this is quite steep, quite rocky slope. It's difficult firefighting country, and as the fire gets larger, the task of getting a line around that becomes more difficult. The steepness of this country would make it difficult to use a bulldozer now to cut off that fire edge. Bulldozers don't like working on side slope, and if they're going to cut line, they have to side-cut into the slope and that creates a pretty major scar on the terrain. That's difficult to rehabilitate.

In general, on this shading that we've used, the lighter shading is westerly aspects, and that tends to be drier because it gets exposure to the western sun, and there's a small moisture difference between the easterly aspects and the westerly aspects. The darker shading tends to be southerly and easterly aspects.

It's the same time and same scan, but we've expanded the scale out to sort of prepare for the further development of the fire. At this stage firefighters are preparing to cut off the Powerline Trail and my notes have the times that these actions were put into place.

The next one, thanks. 10 January - you can see here that this has got across on to this ridge. The winds are now tending more easterly and the major spread of the fire, the most active

areas, are on this westerly aspect on the eastern side of the Goodradigbee River, crossed over the Lowells Fire Trail in quite a number of locations, and burning downslope towards the river. We said before, once it got across this little creek on to this ridge, in those conditions, that meant that there was now no chance of using Lowells Fire Trail here as a place where they could hold it.

At this time, the Rural Fire Service did change their tactic and they put crews in to work around this edge of this fire, and they did hold it for some time --

THE CORONER: Just for the record, that's the Baldy Range fire.

A. That is the Baldy Range spot fire, your Worship, yes. But again it became now a question of the size and the steepness of the terrain that that had got into which presented them with a difficult task to hold that. In this situation, if it were possible to back that up with a bulldozer line being pushed into it to provide some vehicular access down into the area so that mop-up could be more thorough, it is difficult to mop up logs and material when you are only using hand tools and perhaps carrying in a knapsack with 15 litres or so of water on your back. Basically you just have to cut it off, sit and wait for the material to burn out, break up as much as you can and remain on patrol on the line to try to get material as it falls over the line.

These spot fires which were in here have now expanded and linked up together and linked up back with the main fire. This section is spreading very slowly on this south-easterly aspect. The fire in this section is being held by the road. Again, nobody is on there, but the fire intensity is low enough that it's burning up to these narrow trails and doesn't have the intensity to carry it across. It's helped by the wind direction, which to this

point is generally south-easterly or easterly, so that's not surprising there's no spot fires being thrown across there.

The general pattern or spread on this westerly range was to spread at lower levels and then make little short, sharp upslope runs as happening here. And if we look at the line scan imagery, we can see that this is actually the head fire which is burning actively and progressing upslope, so the fire was burning across and then making a number of upslope runs on the dry westerly aspect against the direction of the prevailing wind, but in this case - as always in any wind that occurs in this situation at this wind strength.

Again, I keep reiterating this is always going to be a problem in this part of the world because we were relying on access on foot along the river wherever it's possible and at locations you can get in, but difficult to get firefighters in all along that planned containment line.

THE CORONER: Again, for the record, that's indicating on the Goodradigbee River.
A. Yes, your Worship.

MR LASRY: In your report you noted for each day the temperature, relative humidity and wind speed and direction. In this case, for example, at page 14 you note that the temperature at 3 o'clock in the afternoon was 26 degrees, relative humidity was 26%, wind was from the east at about 9 kilometres and the Forest Fire Danger Index was at 15, so fire danger was high. They're Canberra Airport conditions. As far as you're aware, what does that say about what the conditions would have been in the vicinity of that fire on 10 January? First of all, would the temperature be likely to be the same or a bit lower?
A. The temperature would be a bit lower because of the altitude, although down in the

Brindabella Valley that's still at a fairly low elevation down there. It was probably warm and similar to the conditions at Canberra Airport. The easterly wind may not have penetrated as strongly over into this area, so the wind strength could have been lighter, despite the higher elevation, and certainly down in the valley I'd expect the wind speed to be quite light. Although the humidity is low at 24%, there was no evidence of spot fires forming out in this direction on the line scan imagery, although this is a reconstruction of infra-red photographs at 2400 hours, which I wouldn't expect spot fires at that time of night anyway.

There may have been some spot fires during the afternoon across that area. That wouldn't have presented a problem, I believe, if people had been there and were capable of attacking them directly if the holding on Lowells Road had been an option that had been selected.

I'll take the next one. 11 January at 1600 hours - the fire here has progressed and again this process of spreading along at the lower elevations and then making short, little upslope runs here, another one happening here at this time. This is burning slowly down to the river, and these perimeters are expanding really quite slowly, although now the spot fires are linked up, just a little bit of area in here to burn out. The handline construction on the Baldy Range Trail is still holding at this point. This area here has not moved from the previous image and so far they are being successful and I believe their tactic, if they could hold that, was to use the Baldy Range Road or fire trail as a containment line and tie it back into Two Sticks Road.

The burning out from the Powerline Trail has commenced at this point and I think my notes say that it commenced around about 1200.

Q. Just hang on a second. This is at page

16:

Back-burning commenced along the transgrid Powerline Trail from two locations. One team started at the junction of Powerline Trail and Two Sticks Road, proceeded towards the west end of Flea Creek. Other teams started at the junction of Webbs Ridge and Powerline Trail. By 1600 hours, each team had completed between 1 and 1.5 kilometres of back-burning.

A. The start point, I believe, was somewhere here on the junction of Webbs Ridge and the Powerline Trail, and a team worked in this direction along the road and burning out, lighting fires there, and they also came down this way, with the intention of following along this road out to the transmission line point, which is there. The third team was starting here and was burning down the Powerline Road and setting the burning back towards the main fire.

The rate of spread in these perimeters was really quite slow. It was something less than 500 metres a day. That had to mean that there were quite long periods during the night where the fire was inactive and hardly spreading at all. It was really quite a very low rate of spread, even for a backing fire.

Q. Just before you go to that, in your notes you deal with the issue of the need to back-burn or burn-out overnight and you also refer to withdrawal of the ACT task force from this area. Just in relation to that diagram, you might have to go back to the 11th.
A. I understand from Mr Winter's statement that they were tasked on part of the burning out down this trail. They were asked to withdraw from that operation. His statement said that conditions that night were very favourable for burning out and he believed that

he should have been allowed to stay on the line with his views and continue on and carry on during the night while the firefighting conditions were very conducive to setting the fire safely.

Because of the serpentine nature of this road - and they had to burn out these little pockets - there was a chance with the easterly wind that parts of this would spot over, and I'm sure that happened in places as they were getting into this area if the conditions were hot. That's much easier to do it at night while humidities are high and spots are less likely to take. When the humidity is up over 60%, it is generally only the big flaming fire brands of bark which will start a spot fire. The smaller sparks don't have enough energy to ignite the fuels under those conditions.

I had understood from Mr Winter's statement that he felt that the firefighting operation was held up and the Rural Fire Service didn't continue that. Subsequent conversations with Rural Fire Service people may challenge that, that they keep burning overnight, but I think my interpretation from the scans is it really did slowdown the progress of working along that edge. You can see on the next slide that this is at 16 hours. They've made good progress and with overnight burning it should have been possible to connect this if they had little problems with firefighting.

Q. We'll come to this, but relatively speaking, of the fires that were burning to the west of Canberra that were of immediate concern to Canberra, was this the largest as at this stage?
A. At this stage it was by far the largest.

Q. Does it mean that because it was the largest it was potentially the most dangerous fire that was burning at the time?
A. Not necessarily. Really you would have to

weigh up the danger in terms of the ability to contain it.

Q. I asked you the question just to see if I can get some understanding as to the importance of the burning out that you've referred to, which apparently terminated on the night of the 11th. How important a task was that at the time that it was being undertaken? Is it because there was pressure of time and because the conditions were appropriate for that kind of activity that you think it was important?
A. I don't know the reasons for them terminating or taking the people home. It may have been to do with official shift lengths or matters such as that which have to be worked. I'm not aware. But I think in practical terms if a fire team is assigned to do a burning out program during the night, they should be assigned to work on the program right through the shift period until 6 o'clock in the morning because, a), they are already familiar with the work that they have to do and the conditions are suitable for them, and that's going to be the easiest operation that they can do.

There probably wasn't another team to replace them at that time and replacing them in the middle of the night anyway would be difficult, just through familiarisation with the terrain on the operation. So I think really the question about assigning a team - okay, you must give them the priority to work through what is a practical work period in terms of containment of the fire line.

Q. I'm sorry, you were wanting to go to 12 January.
A. I mean, the reason I think that they were delayed overnight is that we are now a full 24 hours later in when the time that this scan was taken, and this has been very slow. In the day they've only completed a section along here and it is sort of round about and the previous day at 1600 hours they've got to about this point.

So in 24 hours they have really made very little progress in that burning out operation. You might remind me of what the wind direction is, please.

Q. As at 1500 hours, 3 o'clock in the afternoon, the wind was east south-east at 26 kilometres an hour, temperature of 24.6 degrees.

A. At an east south-easterly wind, they're still getting some advantage by the wind sort of pushing out in this direction, but during the day the nature of this fire trail means it's almost inevitable that they will get spot fires coming across it and it's most likely that its breakaways from their burning out operation during the day slowed the progress in this section of the fire trail, and if they had have been allowed to burn outright through the night, they could have contained or got the line connected up in easy conditions and then had just the task of holding that and patrolling it during the day.

In some ways it's easy to say that without them being there, but I think the principle of working throughout that night is really important in this type of operation.

At this point they have actually - and I haven't marked it - but they have constructed the fire line down this ridge to connect up with the road and they probably started a little burning out in this area. They have had a breakaway just here, across their line, of which they had to withdraw the bulldozer and control that breakaway up that little bit of slope. So just at this point of time you can see, right, they were having problems holding the southerly flank of this fire on the slopes.

Q. In relation to the Baldy Range fire, does the eastern edge of that, as depicted there, mean that that containment line was held at

least at 4 o'clock on 12 January?
A. It does appear to me - again from the imagery there appears to have been no spread in this area, so it seems they have been able to hold this. I don't know how many crews or what resources they had on that fire edge. I walked a section of that line down around this area and could find no evidence of substantial hand line construction, so they may have adopted a hot and cold trialling technique where they've just put out bits of the fire that were burning at the time that they went through. I really don't know what effort was put in to patrolling that and maintaining it. I would have imagined that it was such an important section of line that it really would have been important to construct a substantial hand trial through there and apply very strenuous efforts to keep it under control, but one would have to talk with people in the Rural Fire Service that were engaged on that section of line to establish exactly what was done.

Q. When did you actually walk through there, Mr Cheney; some time after the event?
A. It was some time in July when I walked around through that trail, and I walked across the junction of where there had been high intensity fire behaviour from the subsequent breakaway and there was a change of evidence from very low fire intensity to quite significant fire intensity. I may well have been in the wrong place.

THE CORONER: Mr Cheney, just talking about fire intensity, we saw a photo, some slide a few slides back, which showed a fire in the bush. Is that about, if you're able to say, the intensity of the burning, if you're talking about the height of the flames? How would you describe the fire that's burning in this area at this stage?

MR LASRY: Your Worship means at, say, 4 in the afternoon?

THE CORONER: Yes.

MR LASRY: Because there's variations between the daytime and the night-time.

THE CORONER: Yes, but of a daytime.
A. I believe that in areas where it was making short upslope head fire runs - and this is one of them here, your Worship, going up there - that would probably have flame heights of between two and three metres on the head fire while it was making an upslope run. In other areas where it is essentially burning as a backing fire going downslope into creek lines, as along here, perhaps across this flank, the flame heights would probably be less than half a metre and with the flames leaning in towards the burnt area.

I did go out on to this area on the next day and came in and looked at a couple of sections of fire edge, just to evaluate, and that was more or less the description of the fire.

MR LASRY: Can I ask you this: you made the point much earlier that when we look at this diagram, it is not that the whole red area is a flame.
A. That's right.

Q. What we're seeing is a map of the fire edge, but with a view to inevitable forthcoming bad weather in the larger burnt out area, what in fact is happening in that area? Is it usually completely backed out, say, as at this stage or are there portions of that that are smoulders? Do you have burning logs that you referred to in your earlier description? If you walked through sections of that burnt out area in the middle, what would you be likely to see?
A. Sections back close to where the fire started, a lot of the heavy material would have burnt out completely. In some respects, firefighting under a high drought condition is

made a little more straightforward because you have very complete burn-out relatively quickly and you don't get logs hanging on for weeks and months afterwards because if they're going to burn, they tend to burn.

Within a couple of hundred metres, which probably would have sort of represented the last days burn coverage, there would be a substantial number of large logs and trees which are still remaining burning maybe 200 to 300 metres back from the edge of the fire edge.

At this point, the original fire - if we could try to see the point of separation - has actually come down to this point here and probably filled out sort of somewhere like there. So at this point, they are getting their fire perimeter just in time to contain the spread of both these and the general spread as it's gone this way and gone up that way on the westerly aspect at a much faster rate than the spread in these areas here on the easterly aspects. So the position of the fire within the topography is, if you like, setting this fire naturally to take advantage of an extreme weather and produce a very big fire.

I think the next one, thanks. Can you give me a black pen, please. This section of fire here has actually been contained on the track that they pushed down and the little breakaway here has been contained, so that edge is not active any longer. It's been contained and burnt out to that edge, and although on subsequent graphs that will show up as a red section, in fact that's where the edge stopped.

The burning out along the Powerline Trail has now progressed and I think by the 13th we were moving around to a north-easterly wind direction?

MR LASRY: East to north-easterly, yes.
A. That wind direction is tending to slow up

the operations along Two Sticks Road because they now no longer have the advantage of the fire, pushing away from the fire trail, but when they light up on the edge, the fire is blowing sparks across the trail and that's a slower job, much more mopping up of fire brands and the possibility of spotting across the road.

At about this time I had a look at this operation along the road, and that was exactly what was happening to them. The wind was blowing the fires that they were lighting and the sparks and smoke were back across the road that they were patrolling, and now the operation has slowed down on this southerly side considerably.

The Baldy Range part escaped here and has made a run-down this little ridge, come down, got across the creek and has now broken away. That breakaway has now made the use of Baldy Range Fire Trail as a fire control line impractical - well, it just ruined that strategy, and they are just starting to extend the burning out which is now going to go down around Two Sticks Road and in along the perimeter here where they set off to construct the new fire edge, the new fire line. So they've now then pushed back from their second strategy, which I hope I've made clear, that they changed from the original one to trying to hold it along the Baldy Range Fire Trail. They now have to fall back and work off the eastern perimeter of the park.

At about this time, they are constructing a fire line from Folly Trail here along this ridge and down this ridge, something like that. So that part of the trail was being put in and they're I think preparing now to burn out to contain this northerly spread on the westerly aspects.

Q. Does it follow at least at this stage that where the fire has burnt down to the

Goodradigbee River, the river has held the fire, it hasn't crossed?
A. Yes, that's correct.

Q. Notwithstanding any increase in the wind?
A. There was action along parts of this that I'm aware of. The firefighters did get into parts of the river and where they had access on the flats, their problem laid probably particularly in this little gorge area where there was no easy access and pretty much relying on the river to hold it at that point, without support.

Q. Could I ask you, going back to the Baldy Range for a minute, why does that have to be abandoned as an eastern containment line when at least part of that trail seems to be holding the fires, to the north - the section that's escaped?
A. I think really --

Q. There's no intermediate strategy that you can adopt to try to retrieve the situation?
A. It's a time and space decision about whether or not you can put machinery into this country now to more or less directly contain that fire, which would be really your only alternative strategy that you would have. That I think would have been too great a task to construct, by a line across these creeks and these gorges in here, than taking the time and space to fall back to established roads and burn out from them. A difficult decision because I think firefighters are always weighing up those two options.

Q. I'll probably come to it later. The next slide is a photograph. Could I just go back one and I'll just show where it was. In this vicinity of the fire edge, this photograph was taken at about this time, and when we look at the video there will be some video which has walked some distance along this flank and produced some video of the fire. I can't

recall, but there may also be some video of this burning out operation off Two Sticks Road in that location.

At 7 o'clock in the evening, the fire on the northern perimeter of Webbs Ridge Trail. Again, it's now starting to die out, still burning reasonably brightly at this point and starting to die out as the humidity is rising. Quite a lot of this large log material was very dry. It was catching alight and would remain burning overnight so that even if the humidity rose to a point where the fire and the eucalyptus litter died out, these large logs were big enough and they would remain burning overnight and have the capacity to relight this edge in many positions and it did appear from examining the scans that this reignition took place on an almost - well, did replace the fire line extremely rapidly when the conditions warmed up during the day.

Conversely, when you were doing a burning out operation it works against you in getting the area burnt out without additional ignition within the area. So it's a two-edged sword, as always. There were fire-damaged trees catching alight, and I think the next slide, this is fairly typical of what's happening in these hollow trees and this tree probably has another two hours life of standing upright, in which case it will fall down. The danger to firefighters when they're working in these areas is that this happens with very little warning. When it falls you have to be aware that it's there, assess where the fall zone is that it's going to go into, because when it comes, it comes without any warning. So this principally illustrates the hazard that firefighters are facing when they're working close. This tree is located about 60 metres from the edge of the fire. It's going to continue burning pretty much until it falls.

The next one. I've gone back another level on

the scale, so this is still 13 January, but we've fallen out to illustrate the Doctors Flat Road and now the final control line. As I said before, this trail has been taken from here sort of along the red, down this ridge and down into the river. It then hooks up with other trails. I'm not quite sure of the location, but they come up under the spurs and then go up to that road.

This edge is still being held. It's not active, as I said in the previous slide. That's held. So the task facing for the next work period is to try and contain the top of this large area and we got too smart with ourselves to work out areas automatically, so I can't give you the areas right now, but I'll have those by early next week. But with this roughly 10,000 hectares of burning out, we've burnt probably 60% of the area, just as a rough guess.

The next one. 1415 hours, this is line scan data. This trail has been connected through and has been on the edge there. That's been connected through and back-burned from at this point. The back-burning has now in the north progressed fairly rapidly. The wind direction, I believe, had switched to the north at this stage.

MR LASRY: You record it as west at Canberra Airport at 3 o'clock. 29.6 degrees, and the wind from the west at 11 kilometres an hour.
A. Okay. I would suspect up there they were getting a north-westerly influence, and you can see the difference it has made with the progress. You have now the wind - let's say it's in the west. They are proceeding along this trail pretty rapidly. Conversely, the section off here has only gone from here out to here in the same work period. So firefighters in this area are having problems because the wind is blowing the fire that they're lighting not towards the fire but away from it. Two

things would happen - the rate of spread back here would be very slow because it's backing back into the wind, and there's the extra hazard that they'll get spot fires across this edge, across the line there.

I'm indicating these areas but although the drier westerly aspects have burnt out quickly, we have had pockets here that have stayed burning out very slowly for over a number of days. In this operation, these pockets of unburnt country, even well within the control line, produce a threat of escaping if the weather conditions rise into the very high fire danger class.

The next one. At this point, this is at 1638 hours. Although the operation has proceeded rapidly in this area, there has been a breakaway at this point across the trail, which has had to be controlled by pretty much direct attack with a bulldozer and a line around it. Again, this burning out, they have pushed another trail which has come down and this is very roughly, it's in this area somewhere through here up something like that.

A new trail has been constructed away from the existing network, primarily to protect private property in Dingo Dell area which is here and a bit of grassland in here.

So again, falling back to the eastern perimeter, it meant that they had a significant length of fire line construction to do if they were to use the existing trails and burn out fuels on private property.

Q. Your evidence already indicates that by 15 January, towards the end of 15 January, the outlook for the following three days was obviously an outlook towards extreme weather, and I think by 15 January, Saturday the 18th

was being predicted to be the worst of those three days as the weather got gradually hotter

and drier. Assuming that knowledge and the lines of those controlling the way in which this fire was being contained, what sort of imperative does that add to the situation as it stood then at 15th January?

A. It really adds an imperative to burn out this large section of country that is left unburnt within the control line. Time is now running out for the operation - a lot of country left to burn out and my option at this stage would be, even though on 15 January they hadn't completed this burning out operation, but late in the evening the forecast for the 16th was not too bad fire weather.

Probably the last moderate day that they had on the forecast would be to aerially ignite in this area and do selective burning out by placing the ignition points where they would take out the dry westerly aspects overnight and attempt to burn out as much of this country because it was not going to burn out by the rates of spread of these perimeters. These off Doctors Flat Road in particular - there was quite a rapid upslope run off the road, but then as soon as it crossed over into this catchment, as you can see, where all the lines are coming down the major creek here, the rest of this fire is burning down slope and therefore burning slowly into this catchment area here.

Although the fire behaviour, when they were lighting up the roads, was active, the next photograph was taken in probably this little screen line here, I think. This has been the fire edge that's constructed there. I went into this area to look at the operation and came through to this area and this area and while there was active upslope fire spread, the fire spread where it was burning either on level ground or downslope was very mild.

Q. Just between the 8th and the 15th, had you visited this area on several occasions?

A. Yes, I didn't visit on the 8th. Members of my staff went up and took video. I came and visited it on the 13th and again on the 15th of January. The 15th - I sort of left at about this time when they were doing the burning out operation at this point coming into Doctors Flat.

Q. Did you form a view at that stage as to whether or not this fire would be able to be controlled or whether it might affect Canberra?
A. I didn't think that they would get it under control, a burn out of that area at that stage, and so I believed it had the potential to escape whatever control actions they were going to make.

Q. Had you formed a view about whether or not it would be likely to affect Canberra directly?
A. Under extreme weather, I was sure it would come into Canberra, yes.

MR LASRY: Your Worship, would that be a convenient time before we go on to the next day.

THE CORONER: Yes, thank you. You can have a seat, thank you, Mr Cheney. We'll adjourn until Monday at 10 o'clock.

MATTER ADJOURNED AT 1PM UNTIL MONDAY, 13 OCTOBER 2003

TRANSCRIPT OF PROCEEDINGS

CORONER'S COURT OF THE AUSTRALIAN CAPITAL TERRITORY

MRS M. DOOGAN, CORONER

CF No 154 of 2003

INQUEST AND INQUIRY

INTO

THE DEATHS OF DOROTHY MCGRATH, ALLISON MARY TENNER, PETER BROOKE, AND DOUGLAS JOHN FRASER, AND THE FIRES OF JANUARY 2003

CANBERRA

DAY 5

10.03 AM, MONDAY, 13 OCTOBER 2003

[10.03am]

MR LASRY: Your Worship, with the concurrence of my learned friends' and your Worship's approval, I'd like to interpose a witness who will only be fairly brief in his evidence. He's the witness who gives evidence in relation to the lightning spots, your Worship. Mr Kenneth Tycehurst, if we could call him.

<KENNETH VINCENT TYCEHURST, SWORN

<EXAMINATION-IN-CHIEF BY MR LASRY

MR LASRY: Before I start, I should indicate that the relevant material is in folder 11 of the brief and is the very first documents in that folder.

THE CORONER: Thank you.

MR LASRY: Mr Tycehurst, your full name is Kenneth Vincent Tycehurst.
A. That's correct.

Q. And is your professional address 211 B, The Entrance Road, The Entrance in New South Wales?
A. That's correct.

Q. And are you an electrical engineer by profession?
A. Yes, I am.

Q. And presently a member of the Federal Parliament?
A. That's correct.

Q. And are you a company director and, I think effectively, the owner of the company Kattron?
A. That's correct.

Q. And is Kattron a company which specialises in lightning detection systems?
A. It does.

Q. And does it do that for a number of particular commercial purposes?
A. It does. It was set up as a commercial realtime lightning tracking system back in 1990.

Q. Right. And, broadly speaking, what sort of people are interested in knowing about lightning in real time?
A. Primarily the electrical utilities, the State Rail, bushfire organisations, insurance companies use recorded data, also the weather bureau used to use our data at one time.

Q. All right. Now, during January of this year, did your lightning detectors record various lightning strikes which were able to be then provided to people who were interested in the information?
A. That's correct. We did a forensic report for the strike force Toronto.

Q. Yes. And you were able to provide details of lightning strikes in particular areas which I think were given to you by reference to a point which was a grid reference?
A. That's correct.

Q. So the idea was that they would give you a grid reference on the map, all of which were in the vicinity of Canberra, where these fires commenced, and you were then asked by reference to the information which you obtained through your detection system to give details of the lightning strikes nearest to that point over a particular period; is that correct?
A. That's correct.

Q. Would you just describe for the non-expert, Mr Tycehurst, how the lightning detection system actually works?

A. The lightning detection system consists of a number of centres and they're strategically located around south-east Australia on our particular network, and these receivers are essentially a high sensitivity AM radio and they have a sensitive time clock in them, which is updated by the GPS satellite network. So essentially a sensor detects a lightning signal, digitises the first 100 microseconds, puts a time stamp on the peak of that lightning current, and those references are then sent back to a central computer that is located at Tumbarumba on the Central Coast and, by taking the time difference of arrival at the lightning signal at a number of sensors, we're able to work backward to determine where that signal came from.

The system can do this at the rate of probably 15,000 strokes an hour is the most we've ever detected on the network, but it has a rearm time of about 6.5 milliseconds - sorry, microseconds.

Q. Is it theoretically possible that in that rearming time, a lightning strike could occur that wasn't recorded?
A. It can. No lightning tracker can be 100% accurate. We would say that in this particular area our detection efficiency would be greater than 90%.

Q. So although it can happen, it's unusual and unlikely, are they fair descriptions?
A. You wouldn't know really because you wouldn't detect them, but essentially from experience with a network and comparison with other networks we know from that is what's happening over a period of time.

Q. Yes. Now, on 30 January this year, Mr Prendergast, who is part of the data services of your company, forwarded some information to Detective Sergeant Adam Phillips of the Strike Force Toronto Penrith police station and

attached the lightning data searches. You've got copies of those in front of you?
A. That's correct, I have copies here.

MR LASRY: For the transcript, your Worship, I should indicate that the document I'm referring to is [SNP.AFP.0013.0154] and following. Perhaps before going to that letter I'll just take you across a couple of pages to the lightning data search at 0156, 157, 0158, 0159, 0160. There are lightning data searches for particular areas. If I can take you first of all to the witness which is described as McIntyre. You'll have the equivalent page in front of you, Mr Tycehurst. It's the one on the screen.
A. Yes.

Q. There are two diagrams on that page and they're perhaps self-evident. One is the area view which shows the broader area. That's the one just scrolling down now. The broader area of the storm activity and the period that we're referring to is in a two-day period between 11am on 7 January and about just before 11am on 9 January, but it's clear, is it not, that this activity is occurring on the afternoon of 8 January?
A. Yes, further down there are actually times of the strokes detected.

Q. So there's the general area, which includes the outline of the ACT border, and then we come down to the zoom view, as it's called in the document, and in the centre of the circle is a much smaller circle. Is that the grid reference point?
A. That would be the grid reference point that we've given.

Q. And in that circle, as far as I'm aware, there's only one dot which represents a lightning strike?
A. It's close. In fact, the one on the screen is slightly different than the one that

I have in the copy that you got this morning. That's showing a 5 kilometre radius. This is obviously a larger radius. This one is probably a 20-kilometre radius or a little greater. I notice on there that's one stroke that says 540 metres. That's the one closer to that reference point.

Q. Sorry, just say that again, if you wouldn't mind.
A. The lightning strike closest to the reference point is the stroke there that's 541 metres from that point.

Q. Yes. Just looking at that table underneath, what the table tells you, just going across, is the date on which the lightning strike occurred, the time that it's been recorded down to microseconds?
A. Microseconds.

Q. The latitude and longitude; is that correct?
A. That's correct.

Q. In effect, the strength of the lightning strike which is measured in amps?
A. Amplitude, yes, thousands of amps.

Q. And then finally the distance, and that's the distance from the reference point?
A. The reference point in kilometres.

Q. In kilometres, right. So there are a number of lightning strikes between, as this chart shows, 3.10 and 4.05 on that afternoon. Most of them - all of them bar one are in excess of 11 kilometres away. The second one is 11.169 kilometres. Others are of the order of 16, 19, 20. The third last one is a lightning strike on 8 January at what is 3.41pm, and it's within 541 metres?
A. That's correct.

Q. And you would deduce, wouldn't you, that

that's the only strike close to the reference point?
A. Correct.

Q. And it's for others to conclude whether or not that was the strike that caused the fire?
A. Sure.

Q. But it's certainly the only strike in the area as far as you can see?
A. We can just show that in the weather with our assisted detected lightning.

THE CORONER: It's the third last from the bottom.

MR LASRY: Correct. 0.541, that's 541 metres.
A. That's right.

Q. If we go over the page, which is 0157, this is the Bendora page. We follow the same broad process where you have an area view which shows generally the area and each time that is shown the number of lightning strikes in the broad vicinity are shown. Coming down to the Bendora area, you have then given a grid reference point again which is the centre of that circle. The zoom view appears to show only one lightning strike, and if we look at the table, it appears that that lightning strike is - the one at the top of the list occurring at a bit after 3.10 on 8 January at a particular latitude and longitude and it's 2.707 kilometres away from the reference point; is that correct?
A. That's correct.

Q. Going over the page, Broken Cart, which is fire which commenced in New South Wales, the information that you've been able to provide there, going straight to the zoom view in relation to this one further down the page, there are in fact, as the diagram shows, four lightning strikes within the radius, described on the map. And you can work out obviously

from the chart which are closest to the Centrepoint. But several of them are within two, three or four kilometres?
A. That's correct.

Q. Likewise, for Mount Morgan, the fire started there, the same process applies but in that case I think, again going straight to the zoom view, there's only one fire - only one lightning strike, I'm sorry, within close distance of the reference point, which is the second last one, at about 2.48pm on 8 January, and that's within 1.967 kilometres. That's the second last entry on that page.
A. That's correct.

Q. The last two are Stockyard and Gingera. Again, the likely - the closest lightning strike to the reference point you were given for Stockyard is the only one shown on the zoom view diagram at 3.38 kilometres?
A. That's correct.

Q. There is another one at 5.307, which would put it just outside that circle, I suspect; is that right, Mr Tycehurst?
A. That's correct.

Q. But otherwise, they're some distance away. And finally, in the case of the Gingera fire, again there's one lightning strike shown within 1.27 kilometres of the reference point on the zoom view.
A. That's correct. .

Q. That information you summarised in the letter from Mr Prendergast to Detective Sergeant Phillips and, as far as you know, his summary in that letter is true and correct and does reflect the records kept by Kattron; is that also correct?
A. That's correct.

MR LASRY: Thank you, Mr Tycehurst. There might be a question from others.

THE CORONER: Mr Johnson, any questions?

MR JOHNSON: No, thank you, your Worship.

THE CORONER: Mr Stitt, any questions?

MR STITT: Your Worship, I wasn't aware that this witness was to be called and I wasn't aware that he was to be interposed. I don't imagine that I've got any questions but I'd like to have the opportunity to look at the documents, which all of this has just taken me by surprise. I don't know that there's anything at this stage, and I certainly don't want to inconvenience this witness, but it could it be on the basis that, if there is something, that I would tell Mr Lasry and we can perhaps deal with it then? If I could just reserve my position.

THE CORONER: I don't know what Mr Tycehurst's commitments are for today, but you'll be in a position to --

MR LASRY: He's certainly in the area for at least the remainder of the parliamentary sittings. So my learned friend is quite right, your Worship. I did mention to Mr Johnson, but I hadn't had a chance to tell my learned friends that he was to be interposed and, if there's an issue that arises, I'm sure we can arrange to bring him back.

THE CORONER: That would be convenient to you as well, Mr Tycehurst, if there was an issue and you did need to come back briefly?
A. It would depend what I could organise within my web.

MR LASRY: There was one other matter that I was asked to raise, and I'll raise it as best I can.

Q. Mr Tycehurst, in your measurement of

distance and so on, is there, as far as you're aware, a built-in margin of error or an allowable margin of error?
A. Generally, we would say the system is accurate to within 500 metres. We have had experiences where we've had what we call a ground tooth, a known point of reference. We've had that down to probably 80 metres has been the closest we've detected from an incident on the ground and an actual system stroke. But generally we would say it's better than 500 metres.

MR LASRY: Yes, thank you, your Worship.

THE CORONER: Mr Begbie, I didn't ask you?

MR BEGBIE: No, I have no questions, your Worship.

THE CORONER: Thank you, Mr Tycehurst. You're free to leave for the time being, thank you.

<THE WITNESS WITHDREW

MR LASRY: Your Worship, I'll recall Mr Cheney.

<MR NOEL PHILLIP CHENEY, RESWORN

<EXAMINATION-IN-CHIEF BY MR LASRY CONTINUING:

MR LASRY: I don't mean to be so rude, but would you mind not sitting down, Mr Cheney. I'd ask you to go to the screen. I'm told, Mr Cheney, that, in order to make sure that your voice is better recorded than it was last week, there's a mobile microphone there. If you wouldn't mind just - I think there's an "on" switch. Just clip the microphone to you. I'll stay seated, your Worship.

Mr Cheney, I think on Friday we had - I think we actually reached or dealt with Wednesday, 15 January, if I'm correct about that, and we were about to embark on Thursday, the 16th, in

relevance to the McIntyre's Hut fire.
A. Yes, I think - I can't remember whether we showed - was that the last one we showed. There is just one more photograph, which was just upslope above Doctor's Flat Road, which indicates the intensity of the fire in short runs burning upslope.

The significance of that I think was discussed on the 16th. That's the next slide. By 2000 hours, the burning out operation from the edge of the control lines had been completed and the fires that had made short upslope runs from Doctor's Flat up this ridge and now had crossed over the ridge and run along there and were then burning downslope relatively slowly into this section, Mountain Creek. So although the containment line had been completed around the southern and eastern and northern ends of the fire, there still remained substantial area to burn out overnight. This progressed slowly overnight as things were getting a little bit drier.

The next slide, please. By 9 o'clock on 17 January, there remained about 1,260 hectares remaining in that unburnt area. That's a figure calculated for me over the weekend.

Q. Can I just interrupt you there. I'm just looking at page 20 of your report. I just want to refer to an opinion that you expressed. I'll read it to you. You don't need to turn it up. You say, as at 16 January:

In my opinion, the construction of containment lines and the burning out operations had proceeded too slowly to allow sufficient time to complete burning out large areas of unburnt fuel within the containment line. At this stage the only option left to the incident controller was to undertake judicious aerial ignition late in the evening with spot fires placed around

the westerly aspects so that these fires would link up overnight without creating too much convective interaction. I believe that if the agencies had been trained in, and practised, precision prescribed burning using aerial emission they could have conducted this operation safely before the containment lines had been back burnt. The lack of aerial ignition experience meant that the operation was delayed until all the following day when the weather conditions were unsuitable.

That's a comment made that I think is by you relevant to the overnight period between the 16th and 17th. Could you just explain how the precision aerial ignition would have worked as you would see it, this problem you just referred to?
A. Could I go briefly back to the other slide? If you just look at the increment of the perimeter, if you flip forward, see it has advanced maybe 200 metres in the overnight period, almost all around the perimeter. Now, basically overnight that was indicating that conditions were going to burn on all aspects, but the rate of spread was going to be slow. If you were calculating out using the prescribed burning guides, which would work quite well under these conditions, you could work out just how far the overnight spread was going to be, which would then allow you to say what the ignition spacing was you needed to use to ensure that that area was burnt out.

If we can just go back again, so it would require really taking advantage of upslope runs and placing incendiaries towards the bottom of the ridges and filling out and basically ensuring that those had a run from up towards the top of the local ridges because they weren't going to go far across them, but they would overnight make a run from the bottom up

to the top of the ridge, and essentially that could have been put in - well, operationally, it would be a task to put it in, probably using helicopters, fixed wing aircraft would be a bit risky in that area, and take advantage of the overnight burning conditions to complete the operation.

Q. What's the problem with leaving that area unburnt overnight? What's the consequence of not having done that?
A. The time is too short and you're still aiming to put sufficient incendiaries in to burn it out. As well as going into the more severe conditions that were forecast for the 17th, if the spacing is too close, then those spot fires will interact with each other and create even under relatively low wind conditions a sufficient convection column to carry fire brands from this area and throw these spot fires down, outside downwind.

Q. All right, thank you. Can you go forward to the next one.
A. Now, I believe the aerial ignition program did start around 1100 hours and then was - it ceased at 1345 because the conditions became too hot. While I don't know where these spot fires came from, I believe it was reported around 1400 hours that there were starting to get spot fires into the Dingo Dell area in that vicinity. That spotting distance is approximately - between approximately two kilometres from there to there, which is not an excessive distance for spot fires to occur under those conditions.

It didn't really matter that, if they hadn't have done the operation, it probably - sooner or later part of this edge during the 17th would have burnt down on to these westerly facing aspects and then even a single one, which would be similar to the origins of the McIntyre's fire on the first day, making an upslope run over one of these gorges, had the

capacity to throw spot fires up to six kilometres under those conditions. So they were between a rock and a hard place about what they could do.

The spots that occurred in the afternoon could not be contained and the fire then later on in the afternoon started to proceed along that creek line under the predominantly westerly wind, and, by about 1800 or 1900 hours, had burnt out on to the grasslands which - in the vicinity here under the Powerline, so we ended up out of the forest and into the grassland at about that point.

I think the next slide shows the spread up to about 2400 hours when I mapped it, but these spot fires that are indicated here had occurred earlier and were being controlled by a combination of forces, mostly large tankers operating in the grassland and supported by helicopter attack in that area.

The next slide is taken - can we just go back there. This was taken from a point here and looking across towards the transmission line. It just indicates the fire burning out of the timber country and throwing spot fires into grasslands where the Rural Fire Service tankers are able to start to bring the edge under control in the grassland.

Although they were able to suppress the fire in the grassland, the fire continued to burn overnight, and my next map is an aerial photo interpretation of the limited green ground. I identify it as being within the limits of slowing burning overnight spread and the position of the fire at around about 0800 when the weather conditions started to deteriorate and fire intensities increased, leading to fully scorched grounds.

The fire has burnt over this ridge here, which is a ridge called - it has a trail on it called

Gengis trail, and I think some witnesses from Uriarra may refer to that later if they're called, but it's the prominent ridge that you can see from Uriarra, and they certainly saw fire coming there overnight and, by 8 o'clock in the morning, it had burnt down into the top end of the Uriarra pine plantation, which actually extends a little outside the ACT border.

Overnight or late on the 17th, there was a breakaway in the vicinity of McIntyre's Hut across the Goodradigbee River in an area somewhere around about there. In the report on page 22, I've suggested in that report that that breakaway happened some time on the morning of the 18th, but in fact information that has come to me - I had some photographs of it delivered to me before midday on the 18th, which shows that that has been well and truly established. An examination of the aerial photos does indicate there's a patch of green crown at the base of the slopes there in that area, which suggests that that could well be the roundabout location that the fire spotted across the river.

Q. On page 22 of your report, you originally offer the view that some time around 1200 hours the western edge of the fire broke away across the Goodradigbee River, so it's well before that in fact?
A. It's well before that. The photographs taken from Sandy Flat, which is about there, and looking northwards up the river, suggest that the fire - this part of the fire has a perimeter down the ridge - I should rub that out there - the photograph suggests it was down the ridge there and examination of the intensity of the fire from the damage to the trees suggest that that had been burning upslope quite severely during the morning hours.

I would draw in some of this information - I

don't know whether you want to keep some of this extra information or do an amended map at some point.

Q. Probably an amended map, Mr Cheney, I think might be helpful at some time in the future. It doesn't have to be done now.
A. I just indicate the development of that edge of the fire as well, roughly on just the information.

Now, by 1100 hours, the phone call by the bureau was received, which is the sort of information that will keep coming in as this inquest proceeds. It reported that the fire was active in the Big Hill area, which is Big Hill is one of these hills maybe somewhere here in that area. A later scan on the map indicates that during the morning, perhaps there had been some burning out or lighting fires along Doctor's Flat Road --

Q. By whom?
A. I don't know.

Q. Would that be a legitimate fire suppression tactic in those circumstances, assuming it's been done by a fire person?
A. It could have been. It could have been done by a brigade in order to prevent the fire moving north of Doctor's Flat Road. It's an unwise tactic, I would have to add, fronting up to a forecast of extreme fire weather and where we would generally advise that you don't light additional fire anywhere under extreme fire danger as more likely than not, even if it's towards the back of the fire, the additional fire will create problems elsewhere downwind. But that's most likely the - you would be able to find evidence of that activity around 1100 hours and later.

By 1300 hours, I think that's the next one --

Q. That's a larger view --

A. That's just a larger view of - and the change of scale. I think I'm right in saying that's Big Hill about there. But the activity was south of Doctor's Flat Road that was being described by the person talking to the bureau.

I'll take the next one, thanks. By 1300 hours, it had burnt into the hills at the back of Uriarra. This is an interpretation based on comments and, I'd have to say, it's pretty rough, and particularly in this area here because I don't really know what went on in that area at what time.

The subsequent data was built up by segments of lines scanned. The fire was now so big and the conditions aloft were so rough that the aircraft was unable to take in the whole of the fire area in a single flight, and so it then flew between 1430 and 1530 a number of flights more or less north-south across the fire area and we needed to separate those out. They had been compacted altogether to make one image, but we needed to separate them out to identify different portions of fire spread, and so I've used a combination of the line scan imagery, where it was available, and interpolation to other data where I had observations either from video taken from Mount Stromlo or from records reported on the ESB log as far as I could identify them.

At 1300 hours, this fire which had broke away in the vicinity of McIntyre's Hut was burning down on the western side of the Goodradigbee River and had probably got into - towards the- the cut-off trail had come down from the Powerline. This fire was burning - it burnt - throwing spot fires across the grasslands to the north of Uriarra and was starting to - preparing to make a run from behind Uriarra Homestead, which is here, and across the grasslands as the wind strength was increasing.

The next slide - largely interpreted from video

evidence taken from Mount Stromlo, this fire had penetrated into this part of the Uriarra pine plantation to the west of the Murrumbidgee River. From a later scan, there was evidence that there was a fire breaking out in this area, which was producing another tongue of fire which was running down here, so we have - and this is running in several tongues because the fire front was broken up by the nature of the grassland.

The fire at the back here was continuing down and it probably started to get beyond the containment area and then be influenced by the westerly wind across there.

Q. Would there have been any containment area that would have - there was no containment area for that fire that broke away? So the containment area that you're referring to that it burnt past was that original south-western containment area, was it?
A. It was basically the burnt out area that had been burnt in the previous 10 days. There was no other action possible on that fire under those conditions.

Q. And do you know from the information that you've looked at whether that fire that burnt away from the west of the McIntyre's fire was effectively burning under control? Was there any response to that fire?
A. There was certainly sort of firefighting resources in Sandy Flat and people were evacuated from the flat during the morning, certainly before midday, but there was no possibility of taking direct suppression action on it. The fire was too intense, and I would accept that.

The indication - this part of the information - no, that's an interpolation factor. It's probably the next slide. I know that this was part of the - it was taken from line scan imagery in a belt somewhere across like that.

So I had details of a fair bit of the frontal movement of the fire from line scan to do this up. This little telltale burning out back along the road in the direction of the wind suggests that someone was lighting it up in that area or had been lighting it up for some time perhaps.

I suspect it probably contributed to extension of the spread in that area because one of the difficulties in doing that operation under extreme conditions is knowing where your fire is going to and, in fact, even knowing what the prevailing wind direction is when you're on the ground, and people there may well have thought that the wind was from the north because it was being sucked in to fire activity further south, but the fire eventually will travel in the direction of the prevailing wind and this north-westerly was very strong and all parts of this fire were travelling in a north-westerly direction.

By 1430, this area had probably - can I have a red pen, please? It probably burnt somewhere in that area and was now starting to make a run over Webbs Ridge and down into Flea Creek, which is this creek line here.

At 1430 hours - and you'll see the video from Mount Stromlo later on - but the fire had crossed the river and had also thrown a spot fire into the Stromlo pines in the vicinity underneath Stromlo, underneath Mount Stromlo. At that time, the crew were asked to leave Mount Stromlo by the police that were patrolling the area.

Q. One of the points that you make in your report is that the pasture country between the Murrumbidgee and Mount Stromlo had been eaten out and that one of the consequences of the eaten out condition is that it fragments the drier head; is that right?
A. That's correct. There were incidents

initially when the spot fires were coming out, there were observations that the spot fires were tending to light up along the ungrazed roadside verge of Uriarra Road and there was also a spot fire into the Molonglo River, which is this one, near the water treatment works. That was one of the early spot fires. I suspect that one probably had to come from a run of fire in this area, rather than the main part of the fire, which was further south. But you can see that in patches the scan suggests that it's broken up. It's tended to stick along the road there and it was held up in places, looking at the line scan, which subsequently narrowed this part of the fire before it got into the Stromlo pines.

At 1500 hours - and I think that's the next one - the line scan imagery now tends to be back in this area because we now have the line scan image which details the development of this fire, which has burnt down the river past the burn-out area of the previous day, and was now starting to make a very rapid run over the Webbs Ridge, across Flea Creek, now crossed over just to the south of Mount Coree and at this point is down to the arboretum and Blundells Farm. The multiple line scan imagery did show that the unrestricted spread of the flank fires was really relatively slow in comparison to the spread and they tended to remain parallel unless there was a separate head fire created that run down the flank fire.

This part of the fire had burnt up over Stromlo and engulfed the observatory area, and it was now burning on the slope, on the eastern slopes of Mount Stromlo. There's also evidence I think to be shown that, at this point - and this is just an interpretation, mostly in data from around the Stromlo area - that there was another run here, making a run up the ungrazed area of the Molonglo River corridor, and which essentially would be running parallel to this and had the potential to threaten Black

Mountain.

Q. And is that the fire which, in a sense, was affected by the fire which had occurred in December 2001? Is that the same area, the same broad area, where that fire had been?
A. I think that probably the previous fire was roughly - it may not have been quite that far north, but it was roughly in an area here, and I think that fire affected both this fire and the one coming up the corridor. Certainly had that still been sort of standing 12-year-old pines, it would have made an intense run through there and threatened other parts of Canberra.

I think the next is taken at around 1500 hours from Mount Taylor, which is to the northern side of the ACT and is the high flames burning up the western slopes of Mount Stromlo. The time there is very approximate, but by the analysis I'd say it's probably just before 1500 hours on Mount Stromlo, about the time the observatories were engulfed.

The next - could I just go back to 1500 hours. At about this time, there was another spot fire recorded in the vicinity of the Uriarra Crossing road and the Cotter Road at about the picnic area there. There were probably many more close in, but that was one of the most furtherest distanced ones.

The next slide and then the next, thanks. The main head fire came through Uriarra to the rest settlement and just to the east of the junction between Warragamba and Eucumbene Drive, the spot fire was that was reported was probably influenced and pulled around and, as happens in these cases, often spot fires don't advance because they're largely blocked by the wind of the advancing - the wind of - the advancing fire blocks the wind and creates a circulation around it, so the spot fire didn't appear to travel independently and probably reached -

probably merged just behind Stromlo settlement.

At 1515, this fire is making a very intense and very rapid run now through the Uriarra pine plantations. And the next please. At 1530, it's reported to have reached Pierce's Creek while the flanks of this fire, which was now the main head fire into this area of Duffy, but the flanks now were expanding relatively slowly, and generally we observed that the worst damage occurs on the point of contact where the head fire is put through, and then - although conditions are considerably unpleasant, lesser damage occurs as the flank fires expand because the intensity is very much reduced.

The next. This was the last time of interpretation that I made. The fire has now really pushed through and probably crossed the Murrumbidgee River. This is an interpolation. I believe I have an observation here and I have an observation at 1600 over the back of Arrawang, and that is about halfway in between. There is really quite a consistent high-speed rate of spread of around about 20 kilometres per hour, and I'll discuss later how that's induced by the interaction between this fire and the Bendora fire further south.

The next I think are just some close-ups into --

Q. Just before you leave that one, I'm not sure if it's now appropriate to just place it on the map, but you also in your report at page 23 refer to the tornado which started, as you say, in the lead of a hill called Sugar Loaf in Pierce's Creek plantation. You can see where that is on the map, and cut a swathe through the plantation between 150 and 200 metres wide from Sugar Loaf to the Bullen Range above the Murrumbidgee River. That's reasonably clear from that map, isn't it? You might just describe on there what that path was?

A. Sugar Loaf is in the vicinity, just here, just to the south of Pierce's Creek, and the general track of the tornado came through here, up, and lifted off the Bullen Range about here, came back down into Fairvale and then tracked more or less across here, into the back of Duffy, into Chapman and around there and lifted off to the suburbs of Duffy, and that's a very rough path of the fire. Both the observations from the blowing timber and the observations on video taken from Kambah indicated that that was sitting just in front of the head of this fire coming through, and the flames were being drawn at high intensity behind it and burning extremely rapidly, so its movement was probably associated with the whole process of that fire being drawn through between two other fires.

I think the next one is just a little more detail. At 1430, the spot fire on Mount Stromlo was somewhere in there and the fragmentation across the river and in the grasslands is a little more obvious there and the next one - we'll just run through these quickly - over up Mount Stromlo, just a generalised interpretation. Another spot fire was up here in this area.

This is about the time that the Channel 9 video starts, and you can get a glimpse if you're quick, when we show up the position of the fire on the back of Mount Stromlo, coming over the ridge and behind. The video was taken from here and indicates the fire flashes beyond that ridge.

The next one. And the fire sort of impinged in this area and then, although the wind was blowing in this direction, the lateral spread was relatively slow, and you'll see that in the video when they make a number of passes. In fact, this progression to the south and to the east was not very rapid.

The next one I think is 1530. This is filled

in down out at almost Hindmarsh Drive, and by 1545 pushed down past Hindmarsh Drive, and this fire is now pushing through at a great rate from the west. By 1600 hours, in the next 15 minute the whole of some 12 kilometres or so of perimeter between Hindmarsh Drive, which is here, and Woodcock Drive in Gordon was hit at much about the same time. At this time, of course, it was very dark, very chaotic, very difficult for people to see.

I think we now go on to the Bendora fire.

Q. Yes.
A. The radio logs on the Bendora fire suggest that the lightning was observed in the area of - from Mount Tennent around 1515 hours. I think the Kattron data indicates there were strikes in the area of Bendora around 1511 or 1512. The helicopter confirmed the location of the fire at 1602. The first slide I have is a photograph taken from Mount Coree and it was looking south, whereas previously at McIntyre's we were looking almost due north. We're looking almost due south and we have the Bendora fire and the Stockyard fire further over.

These fires came on the eastern slopes of the Brindabella Range and so they weren't exposed to the same wind force as was the McIntyre's fire and so you'll see that their development was very much slower. The firefighting resources at this time, I believe, have already arrived at the fire.

Q. That's at about 6.37pm on the night of the 8th or in the afternoon of the 8th, that photograph?
A. That photograph is at 6.37, yes, from Mount Coree.

Q. If we can go to the next slide, the start of the fire was somewhere in that vicinity. I could not identify a clear tree that had been

obviously hit by lightning. In an area that I visited here about two months later, there was an area where the trees had been killed in about a 20-metre radius circle, which is often a characteristic after lightning strikes, that the discharge of energy through the surface ground kills all the roots and the trees are killed. But that's about the only evidence that I could find which put it in consistent with the observations of the firefighters who first arrived, giving a pretty slow rate of spread.

The prevailing wind is just westerly or a little bit to the south of west and this range plus also the range of the Bendora Break is protecting that fire from the direct impact of the wind and wind conditions, when firefighters arrived, were reported to be fairly calm, and there was probably a light heady wind that was pushing the fire upslope in the opposite direction or more or less the opposite direction to the prevailing wind.

This indicates the mapped recorded condition of the roads, largely indicated as two-wheel drive. This is two-wheel drive downhill, if you're game, but it's four-wheel drive and it was not maintained, so this actually had been closed off at the ends and allowed to overgrow.

This was an overgrown road. It was a break that had been pushed in in 1979 when CSIRO did some fuel reduction burning in this area. There was a catchment experiment which occupied that watershed as an experiment, or catchment in that area, and the surrounding - the experiment was to cut off the transpiration of the pool of vegetation by burning with a scorching fire in the middle of February, and so, to allow that to be carried out safely, we had prescribe burnt an area roughly bounded by that creek, Warks Road and this break through here. So this area had been burnt probably December '78 into early January '79. This

experiment was carried out in mid-February '79.

So this road, in fact, had been allowed to overgrow and it wasn't a strategic road, but it was there and could have been relatively easily opened up. This track is an old logging road. Cliff Stephens, one of the early firefighters, knew about it and went down to see if he could open it up to get to a water point somewhere there. The other roads are this one and this one. They're reasonable two-wheel drive, which were narrow roads, but accessible.

Firefighters attended and withdrew around about 2100 hours. The condition of the fire at 2100 hours is shown in this slide. The area was around about 4.5 hectares, and the condition of the fire is illustrated in the next photograph. The next photograph is taken from this point here at the base just off Wombat Road.

The surface flames are reported to be half a metre or less, but the fires running up the fibrous bark, the alpine ash, and burning quite brightly - and the ash normally also have a fairly heavy accumulation of exfoliated bark accumulated around the bark - so the intensest parts of the fire are usually at the base of the trees and they run up the fibrous bark.

The observations from the firefighters were that the fire was, at least in this part of it, drawing in, as you would expect with both the convective activity within the fire area and this being the eastern edge, that eddy wind that would tend to pull the fire upslope a little bit. Elsewhere, there may have been some southerly wind influence coming in on this fire as well. There wasn't any - that wasn't recorded.

Pulling out of the fire overnight, I believe, lost a really valuable opportunity to bring this fire under control. The resources that were there, which were two large tankers and a

couple of light units, probably wouldn't have been able to control the fire, but they should have been able to make a fairly substantial start on the control.

Q. That would have involved crews remaining overnight?
A. Oh, very definitely, yes. I mean, they were just starting to work, I understand, when they were withdrawn and, although it's difficult firefighting - and eventually I believe you would need in those fuels to bring a bulldozer in to bring it under control - they could have done quite a lot of work and controlled at least one of the perimeters up to Bendora break, if not both of them, with water and hose lines, but they may not have been able to get it fully mopped up because of the large amount of log material. And so, even though they had controlled it, it would be difficult to keep under control when conditions warmed up the following day.

Q. Can we just go back to the previous slide, I think, just for the purpose of indicating where you would have thought it was appropriate for crews to work overnight on that containment.
A. Because the Bendora break wasn't open and wasn't accessible, it made it difficult for the tankers to get in, so they had to get in from bottom. That's the safest part to attack it. And, by and large, they would be trying to contain the spread on both sides of the fire as it burnt upslope towards the Bendora Break. Whether or not they had the resources or the capacity in terms of hose lay to go right to the top, I don't know. It is possible to do that, but --

Q. What would be the distance between the point you were working from off the road there to the head of the fire as at 9 o'clock at night? How far would that be?
A. From here to here would be between 200 and

300 metres. The next slide please --

Q. Just before we leave that, there's probably an issue that arises in relation to working overnight. I've asked you questions about this a bit earlier, but you have said that there are some dangers in crews working in fires such as this one overnight. What do you say about the relative dangers of the fires as opposed to the benefits of some control?
A. This area was alpine ash and had been regenerated in 1926 and so there was still some large old stags which were remnants of the original forest around. These undoubtedly would burn out and fall down overnight. They would have to be identified and firefighters kept clear of them. Usually this is done by taping off areas.

The tall forest trees contain dead branch material in it and the fire running out would burn out branches aloft and, probably within 30 minutes of the fire burning past a tree, there's potential for branches to fall out of it. It's rugged, rough terrain, so it's difficult to walk. There's a risk of injury from twisting ankles but, in many respects, that's the easiest your firefighting is ever going to get.

Q. On the first night?
A. On the first night. The area, because it had been prescribe burnt some 20 years earlier, although the fine fuels had burnt up, this particular part of the area north of Wombat Road was less hazardous than the areas which were unburnt to the south of Wombat Road. So in relative terms, the hazard had been reduced a little bit in these areas. Not enough to - after 20 years it would just make a small bit of difference to the effort required for firefighting and a small margin of safety over areas that had been urn burnt for a longer time.

MR LASRY: Is that a convenient time, your Worship.

THE CORONER: Yes. We'll take the morning adjournment.

ADJOURNED [11.20am]

RESUMED [11.43am]

MR LASRY: Your Worship, can I just raise a transcript correction. In relation to Mr Cheney's evidence earlier this morning, I was reading to him from a portion of his report, and the passage that I read included a section which commences on page 20 of his report. The particular sentence says:

"The lack of aerial ignition experience meant that the operation was delayed until all the following day when the

weather conditions were unsuitable."

I understood that Mr Cheney was, in effect, saying - it was in the context of him saying that the aerial ignition should have been conducted overnight rather than the following day when the weather was getting worse. When I read that passage, it appeared in the realtime transcript as saying "...until the following day when the weather conditions were suitable." It is important that that be corrected. I am not sure of the page of the realtime transcript, but I'm sure the operators will be able to find it and make the correction.

THE CORONER: The report in any event definitely says 'unsuitable', and that's certainly your opinion, Mr Cheney, that the conditions were unsuitable.

MR LASRY: Thank you, your Worship. I will resume my seat and we will go back to the Bendora fire.

Q. I just wanted to ask - we're dealing with, in effect, the period late on 8 January, and I think just before the break you'd been articulating some of the dangers of firefighting in this area and you referred to the roughness of the terrain and falling branches and so on. Are those risks more particularly pronounced at night? They are obviously dangers that are there during the day as well, but is it more dangerous at night to conduct this sort of operation you're suggesting should have been conducted?
A. Not necessarily for some of the hazards. I mean, obviously lack of visibility of where you're walking and obstructions on the ground are more difficult to see at night, particularly once you're outside the light of the fire itself.

Q. Yes.
A. The fire does illuminate the ground where you're working fairly well. In terms of seeing whether trees are alight high up in the trees, sometime's that's clearer at night because you can see it's burning high up in the trees, but that's not necessarily more dangerous than during the day when the burning in the tree is not visible and all you can see is smoke coming from it.

Q. Yes. Firefighting in forest areas like this overnight, is that an unusual thing to occur, given your experience and knowledge of the history of firefighting?
A. It certainly was not in the past, in my experience. When I was doing more active firefighting, it was mostly done at night in areas like this.

Q. And you referred earlier in the earlier presentation to the Pago fire in 1972. Had there been an overnight firefight in the course of suppressing that fire?
A. It was almost all done overnight, starting around 8 o'clock when bulldozers started

working both in direct attack and indirect attack. But if you're using machinery, it does mean that they're well equipped with lights. When they're working both close to the fire and away from it, if you're doing more indirect attack and even for clearing out established breaks and roads, you'll want lights fitted to the bulldozers, and that's normally done.

Q. Thank you. Now, before I asked you those questions before, you were about to go to the next slide, which is 9 January, just before 3 o'clock in the afternoon.
A. Suppression forces were sent to this fire in the morning of 9 January and they first attempted in the morning to control the southern edge of the fire, which I don't know exactly where it was, but it would have been somewhere in this vicinity in here. They were withdrawn from that action and they opened up the Bendora Break by hand, I presume. From the statements of the firefighters, they had to slash material off that break so they could get a tanker up to the top to try to stop it going across the Bendora Break. But they were successful at doing that and then they came back and attempted to stop the road fire from going eastward along that road, and they were unsuccessful in that.

The fire was affected both by the south-easterly wind, which was pushing it up the slope, and later on in the afternoon came under a more easterly wind, which tended to push the fire up this ridge towards a high point, which is about here, and towards the green square, which is the Bendora arboretum plantation of exotic trees that was put in in the 1920s for testing trees in forestry around Canberra.

The firefighters were withdrawn in the evening. There are a couple of photographs. The first is taken from about this point at around 8 o'clock in the evening, the fire in the afternoon and

the easterly advanced further up, and later on there was a photograph taken from Mount Franklin Road looking across this flank on the northern side of the Bendora Break.

Q. Are they the next two slides, those photographs?
A. Yes. Thanks. This is the fire from the southern flank of the fire, from Wombat Road, in the vicinity of that small track that was overgrown but went up towards the Bendora arboretum.

The next slide - this is Wombat Road in the foreground and the fire is burning quite brightly on the ridge and is also burning down across Wombat Road in the vegetation on the eastern side of the road.

The third slide is taken from the Mount Franklin Road at about 8.30, and you can see the ridge line of the Bendora Break is through there and the fire is now burning downslope on the northerly aspect of the Bendora Break.

Finally, the line scan taken at 2300 hours illustrates the progress of the fire and the photographs were taken in this vicinity off Wombat Road. The fire is now moving with the easterly during the night and has reached the top of the high point above the arboretum. The arboretum is located here and now it's burning downslope towards the arboretum.

Q. In your report, you express at page 29 the opinion that the fire was, as you put it, "severely underresourced". And you go on to say:

The incident controller had effectively one hand tool team or a tanker and light unit. With this team, he was unable to construct a control line and patrol Wombat Road at the same time.

Now, pausing there, that control line was where on that diagram?
A. I think we need to go back to the previous diagram before the slides, please, John. I don't know exactly, but in the southern flank there's a time that they started - it probably would have been somewhere in that vicinity - to try and hold that southern flank. And the tanker crew and light unit crew, they didn't have enough people to do any of the jobs that were assigned to them, except perhaps hold the fire from moving across Wombat Road. That would have taken those resources to do that because by this stage there would be trees falling across Wombat Road, and even though it was a favourable wind direction from the east, there's turbulence which can take spots against the direction of the prevailing wind and, quite likely, there would be trees falling which would light up the fuels on the eastern side of the road.

So they effectively had attempted to do three tasks. One was to put an hand tool line in and the second was to try to hold it across on the Bendora Break till a little later and, if the break had been cleared, that probably would have exceeded those resources as well. The third task, which was probably the only feasible one they could have done with that resource, was hold it on Wombat Road and just ensure that that could be held as a secure control line.

Q. In your report you go on to say that the lack of sufficient forces to carry out effective suppression on day two meant fire officers lost two potential control lines on the Bendora Break and Wombat Road, and you go on to describe that the Bendora Break was overgrown.
A. Yes, we may as well go ahead, John.

Q. And as far as you're aware, on the night

of 9 January no firefighting personnel remained with the fire; is that what you understand?
A. That's my understanding. I believe that the first crews were overnight on 10 January.

Q. Yes.
A. And 10 January was mostly spent starting to clear some of the trails and protect the Bendora arboretum and put a control line along the ground of the Bendora arboretum.

Q. Is there a 10 January slide?
A. Yes, I think that's the next one, which we'll go to. That's 2400 hours on 10 January. The action overnight was primarily to try and hold the fire on the Chalet Road and protect the arboretum and to hold the fire on this section of Warks Road to the east, particularly the far north of the extension of the Bendora Break.

I understand that there was a flare-up, and at some time in the morning, the fire went across the Chalet Road and most of the effort was to try and hold the fire there and control that kind of fire.

Q. In your report you say that on 4 and 10 January the main suppression action was to clear fallen trees from Wombat Road and open up the Bendora Break with a bulldozer and to clear around the Bendora arboretum and to protect the arboretum and Bendora Hut, and you go on to say:

A RAFT crew attempted to put a rake hoe line around the fire that had crossed the Wombat Road. The RAFT teams that had been working on the Gingera fire was brought back from the Gingera late in the afternoon to assist with the hand line construction east of Wombat Road. This effort was unsuccessful and was abandoned at around 1730 hours.

A. I don't know where they were working. That's taken off radio log transcripts and statements. Presumably they were trying to work somewhere down along this flank here, or in here, I don't know. But that was really difficult country down below there for a rake line and the fire is now getting substantial in size.

Q. What area is depicted in that slide, approximately?
A. I calculated the previous one was about 100 hectares, and so this is two kilometres by one-half, so it's probably approaching between 300 and 400 hectares.

Q. All right. We'll go to the next slide.
A. This is on 11 January, and it's from Chalet Road where the direct attack was virtually to try and contain the fire on Chalet Road, and this is upslope, upwind of the fire which is burning below the firefighters. Although the fire intensity initially was not very high, this is a more dangerous position to be in fighting fire, working around the back of the fire and working up the flanks, because it only requires a breakaway further down the slope and an increase in wind and you can get quite a sudden surge up the hill. Eventually a flare-up such as this one caused spot fires to go across the road and the firefighting effort on the road had to be abandoned.

The fire then ran up the slope towards the top of the border break - it's illustrated on the slide after next. The next slide is taken late in the afternoon, which is doing a backburning operation off the border break to try and contain the spread of the fire which is now moving upslope from Chalet Road, moving towards the west, and now the objective is to try and contain it along the border break.

Q. And that's 5pm on the --
A. That's 5pm on 11 January. This fire is

burning up towards this break and also spotted across - excuse me - the back burn and the Bendora Break, and by 2400 hours on 11 January - we'll go to the next one. This was the border break in the area where they'd put in the back-burn along there to try and contain the fire moving upslope from Chalet Road, and that has spotted across and is now burning on the western slopes down towards the Mount Franklin Road, which is the main access road along the ranges.

The other spread of the fire is laterally - it's slowly expanding towards the south and towards the north and occasionally being delayed by the creek lines but not held up by them, so the creek lines would delay them. Sometimes they'd delay them for a couple of days, but they were never effective as control lines.

I'll go to the next slide, John. At 1500 hours, this area along the Mount Franklin Road was now - a little burning out had been carried out to try and secure that. They were looking to put in a break somewhere between the border fire break, which is the pink, and cut that off down to the Mount Franklin Road. The southern part

of the fire has now crossed the creek and made on the sort of drier northerly slopes a fast upslope run towards the top of the ridge and expanding to the south.

This flank is pushing down into Bushranger Creek, where it was being slowed down by under the easterly wind, was sort of burning up in the head waters of the Bushrangers Creek, as it was, slowly expanding northwards. The fire edge had been controlled along the north section of Warks Road and to a spot over in that creek, which was controlled by hand tools.

At this time, there were resources stationed along Moonlight Hollow Road, which is this one

coming through here, and they were trying to stop the fire from going across Moonlight Hollow Road. Some time after 1500 hours, the easterly wind picked up a little in strength and there were spot fires across in this vicinity and this made a run up Bushrangers Creek and further up over Bushrangers Hill, which is in that area there, and that broke away I think around about 1600 hours.

Q. Just in relation to that area, in your report you say that in your opinion it was obvious that spots would occur across Moonlight Hollow Road, which is the road you were referring to, if the fire intensity increased, which it of course did, but you're critical of the fact that there was no scout place above the road to look out for the spots. What do you mean by that?
A. I think inevitably there would be spots upslope with that prevailing wind direction and those fuels, and normally you would prepare by putting some firefighters up there to essentially pick them up as they occur.

Q. You go on to say the spots that occurred could easily have been put out with hand tools within five minutes of ignition if crews had been in place with suppression and helicopter support, and you conclude by saying that crews are not permitted to work beneath helicopter drops which, if correct, almost completely negates their effectiveness, and you touched on this last week. There had been some emphasis on helicopter drops on this fire, had there, about this point of the procedure?
A. Helicopters were being used to try and cool this portion of the flank as it was approaching the road.

Q. Yes.
A. And, when the spot fires occurred, they were attacked by up to I think four helicopters working on it and drawing water from Bendora Dam, which is otherwise down here. And from my

observations, that just was not effective in controlling the spots. The helicopters were small. They are useful for supporting hand crews but by themselves have very little effect.

The run up here threw spot fires well down into the western slopes of the Brindabella Range. I think that's the next one, thanks, John.

There was a little run-up through this catchment and a number of spot fires - maybe more than one, certainly one there and one there. This then produced - where it had been fought fairly closely, the option now of holding it on the Mount Franklin Road or the border break had disappeared. We were now looking at some fairly indirect firefighting. The fire had crossed into New South Wales and so that became a task taken on by the Rural Fire Service, and we still had the problem of trying to contain the southern spread of the fire, and I think we might go out to a wider one on the next slide.

Q. And we've gone to the next day, Wednesday.
A. The next day, okay. A consolidation of effort - the lower part of Bushrangers Creek is in fact holding the fire, but this now is expanding on the western slopes of the

Brindabella Range and, again, as observed on the McIntyre's fire, there tends to be faster lateral spread on those drier western slopes, more exposed to the sun. The other actions - by this time, I believe, the Spur down at Flat Rock Spur had been opened up and they were setting out to do burning out operations from Flat Rock Spur.

We can go to the next slide, thanks, just to illustrate graphically where this fire sat in relation to Canberra at this point, and a couple of the features. Bendora Dam is tucked out of view along this three-dimensional view, somewhere down in this area. To the east, you

have the rugged and inaccessible western slopes of the Tidbinbilla Range. The fire had been blown from its origin here up over into Bushrangers Creek, which is this creek running down here, and then the last little effort ran up over the top of the range and set spot fires, which went quite a long way down in the terrain, and further downslope than is illustrated and appears just on the previous map.

So the tactic now - there's little chance of putting in intermediate trails within this area, so the tactic is to now burn out from

this trail, which is the Honeysuckle Trail, and the Brindabella Road, which is this road up here, and to Piccadilly Circus, located about there, and along the Mount Franklin Road, that runs along the top there.

It is important to try and contain this section of the fire before the onset of severe westerly wind weather, and so now this brings in this area down Flat Rock Spur to be contained along the Bendora Dam Road and tied back up into Warks Road in the north-east section of the fire.

The next photograph is an oblique photo sort of looking in this direction, and we're looking at this little portion of the fire edge here burning into Moonlight Hollow.

Next slide. You can see that, although again that area is all marked as being burnt, there were quite extensive sections of the perimeter that in this area down here had gone out in Bushrangers Creek or it was being held up at Bushrangers Creek and not giving a visible infra-red image, although it could have still been smouldering in logs and controlled around the Warks Road back to the Bendora Break.

This is just a little section that's burning out round the easterly wind which is blowing

the fire into New South Wales. In the background, you can see the long-distance view of the McIntyre's fire, also with the easterly wind blowing the smoke across into New South Wales.

The next slide, please, John. Again, this is just an expansion out of the previous one which we were looking at, and a few more features start to come in - Honeysuckle Trail, which New South Wales was going to use as a control line, Flat Rock Spur comes off Longback Road and goes down to Bendora Dam Road, the Bendora Dam located here. The Bendora Dam Road comes up and around that way.

This is the extension of the Bendora Break down here, and so the tactic now was needed to tie off this section between Mount Franklin Road and Wombat Road, and I think from memory this is called Parrot Road through here, that one, and close off this section here, which is burning down into Moonlight Hollow and closed off around Gravel Road and perhaps Moonlight Hollow Road up to Bulls Head.

Q. Approximately, what sort of total area would be occupied by the total of containment lines?
A. Now you're pressing me, Lex. Let's say four by four kilometres, 400 hectares - 1,600 hectares, sorry. And the only option to virtually reduce the size is to get it under control on established roads. Thanks, John.

Another photo which was tossed in, mostly because it was a lovely photo of the dam, illustrates the rugged terrain on the eastern side of the dam and the eastern side of the Cotter River, which as soon as a spot fire came under a westerly wind into anywhere on this area, access was extraordinarily difficult and, under a westerly wind under these conditions, unlikely to be contained until it had gone across the Tidbinbilla Range.

Q. Can you put a date on that photo, or is that not possible?
A. It's 13 January, and I think it's about 1700 hours. The next one is 14 January. A new trail had to be cut down this spur to link up Mount Franklin Road with Wombat Road and with Flat Rock Spur so that we could contain the southern part of the fire. So burning out operations had commenced eastward down the Bendora Break to the Bendora Dam Road on the eastern section of the fire, and earlier in the evening burning out was commenced along Flat Rock Spur Road and that was progressing downslope to the Bendora Road. In New South Wales, crews were gathering to prepare for burning out operations off the Honeysuckle Trail.

Next. By 1613 on 15 January, this track down here had been completed and burning out operations had progressed along the Mount Franklin Road, down this trail, which I think they call the Marty's Trail, and down Flat Rock Spur to Bendora Dam Road, and I'm a little uncertain of the action here, but I think by this time this had been linked up around here. Although most of this was line scanned, this was a section here which was covered in cloud and not clearly visible.

In New South Wales, this fire was just progressing on the eastern slopes and again doing the same thing as it did as McIntyre, progressing towards the north on the drier ridge lines and starting to fill out that area and, importantly, it was extending past the areas that had been burnt out in the ACT.

Thanks. By 2400 hours on the 16th, the burning out had come down Honeysuckle Trail to the open grasslands in the bottom of the Brindabella valley. The burning out had gone along here, Warks Road to Gravel Road, and up Moonlight Hollow Road. And, during the afternoon, there

had been a breakaway across Moonlight Hollow Road - they pulled up on the Bendora Dam Road, which was a larger, wider road than most, and used a combination of helicopters, bulldozers or direct attack off that road.

Although they were able to stop it from crossing Bendora Dam Road, that meant that this was no longer available as a control line, and a new control line had to be set back along Warks Road to the Bendora Dam Road and then up Bendora Dam Road towards Bulls Head. The burning out operations in the south were pretty successful and the fire was being held and mopped up along Flat Rock Spur and Marty's Spur here.

My next slide - my next map is an illustration which says "Bendora Fire 17 January at 0800 hours". It's actually 18 January at 0800 hours. I'll make that correction when I come to it. This is 17 January at around about 7.20, and you can see here the Bendora fire and two quite distinct columns - one being more active than the other, the one to the north, and another one where it was burning out and around and crossed over and broke away from the junction of Warks Road and Bendora Dam Road.

Perhaps I'd better go back to the other one, which is on the 16th, and discuss the progress on this of what happened on the 17th, because my next slide is the 18th.

In the evening from 1600 hours, this control line was put in along there and this area was burnt out on the morning of the 17th. This was extended further down here and by, say, 17 January at, say, 1400 hours, what had happened was this part of the perimeter - this had probably linked up across here, up on to this ridge, and part of this perimeter had extended further north into the bottom of that creek line to the east of Bulls Head.

Late in the afternoon of the 17th, this then made a fairly intense run up the back-burning along here and was stopped at around about I think 11.30, from memory. But late in the afternoon, somewhere around 1500 or 1600 hours, or perhaps a little bit later, this northern part of the fire made a run up this creek line driven by the westerly wind, and then threw spot fires some distance down here and possibly as far as down across the Cotter River.

At around 1530 there was a breakaway somewhere along this section of the road, I think it was near the junction of Gravel Road and Bendora. So the spot fires over here started to roll over with the westerly wind. On 17 January, it was into the very high fire danger conditions and the conditions were quite severe.

Q. I just noticed in your report you refer to the fact that there were some firefighters at Bulls Head during the course of the progress of that fire from the northern edge travelling east that were evacuated. It was obviously a fairly intense fire, was it, as it burnt in that direction?
A. Once this had broken away down to the east of Warks Road and it was obvious that we were getting quite an intense fire from that convection column, which I think it's the next slide, it was prudent to pull firefighters out because they were going to have to see what could be done on the following days.

The next one. We'll make that 18 January. During the day before, this run that we see has now filled out all of this catchment to the west of the Mount Franklin Road between Bulls Head here and Piccadilly Circus, and quite a number of spot fires would have occurred down in that area - a photograph elsewhere of the spot fire sitting up here at around about 1900, and obviously there had to have been spot fires to make this extension of the fire right down into the valley there, and the breakaway from

this part of the flank and, once the firefighters left, there could well have been other breakaways. It filled out this section so we had the fire sitting between Mount Franklin Road and Cotter River. It burnt up the western side of the northern part of the Tidbinbilla Range and had burnt out into the grasslands out in this area where it was being held by firefighters in grassland on at least the northern part of that eastern perimeter.

I think that's about where I leave the Bendora fire. That's 8 o'clock, and we'll later catch up with the development of Bendora fire when it broke away later in the day. There were breakaways later in the day because this is all uncontained edge and few observations because it was covered with smoke. You just get some indication from pieces of line scan - and they're only fragments of line scan - information taken later on the 18th down in this area.

It's possible that there was a breakaway down in this latter part off Flat Rock Spur later on the 17th, but I don't have any real evidence of it except from a fire fairly late in the afternoon of the 18th in that area.

We'll go to the next one.

Q. Your Worship, apparently an issue has arisen my learned friends want to raise with me

before we go to this part of the presentation. I wonder if your Worship would mind standing down for five or 10 minutes or so.

THE CORONER: That's fine.

ADJOURNED [12.34PM]

RESUMED [12.47PM]

MR LASRY: I might just go to the first slide, when you're ready, Mr Cheney.

A. The Stockyard Spur fire was believed to be a lightning strike in the vicinity of the Stockyard Spur Trail, which is an old fire trail that sort of ran down Stockyard Spur. Like the Bendora fire early in the piece, from the 9th, the fire was protected from the prevailing westerly wind by its location down on the eastern aspect, and the reports were that its development was very slow in the initial stages.

The fire was in an inaccessible location, as we described very early on in the piece, with the difficulty of getting access into this part of the national park. At the time, I believe that this road was almost completely overgrown. It had not been maintained probably for many years. I'm not aware of the condition either at this road or at this one, but I suspect they may well also have been allowed to revegetate in those areas.

Q. Now, that fire started or was detected at about 3.30 on the afternoon of 8 January. I think the evidence is going to show, isn't it, that there wasn't any suppression action taken of that fire on the afternoon of 8 January, other than helicopter, that is?
A. There was one where helicopters were directed to drop water on it --

Q. Yes.
A. -- early on in the piece. And, in fact, for a helicopter attack it was given priority over the Bendora fire further north, possibly due to its proximity to Corin Dam, which meant that that return could be fairly rapid. A crew was sent out to it and, as I understand from the tapes that I have looked at, they got to the Ginini Gates, which I think are somewhere in this vicinity here, and they then set out to - they drove around and couldn't find the Stockyard Spur Trail, and I don't know the reasons for them not finding it, whether they didn't go far enough or whether it was so

overgrown it wasn't visible, and then thought about walking into it, and decided at that time of night, perhaps around after 6 o'clock, if I refer to my notes --

Q. Yes, I think it was. I'm just trying to pick that up.
A. In any event, they decided that the task of walking into it was likely to be too great and they decided that they wouldn't attempt to do a hand line attack on that evening.

Q. Yes. According to your notes, the incident controller decided not to walk his team into the fire and abandoned suppression action at 1915 and returned to Canberra. Is that the specific passage you're referring to on page 40?
A. Yes. The following day --

Q. We've dealt with Stockyard but not Gingera.
A. The Gingera fire - and again from the reports of the early statements - appeared to be just inside the ACT, close to where the border is marked there. In this part of the ACT, there is no break at the border, so it's just a line on the map. It also must have been just on the easterly side of the wind because if it had been on the westerly side of the ridge with the prevailing wind after the storm, it could have made a more significant run. So I think the interpretation that it's just on the easterly side of the ridge - and even in that location, the lower high altitude, it would have protected in this eddy wind during the initial stages. The vegetation in the high country is mostly snow gums, and they're not prone to a lot of spotting, although it will produce some spot fires. So it spread really quite slowly in the fields there. I've not been able to inspect that on the ground. That's one fire I haven't gone into on the ground, so my knowledge of it is limited.

Q. Before we leave this, in your report you note - and you've given some evidence about this earlier - that the travel time to this part of the ACT is long. Firefighters must either approach the fire from the Brindabella Road to the north - if you just point out where the Brindabella Road would bring you out from the north.
A. The Brindabella Road is north of the Bendora fire, and you would come down what starts off as the Mount Franklin Road and then continues on and eventually goes down into a place called the Cotter Hut in the south of the ACT.

Q. The other alternative you refer to on page 40 of your report is the Orroral Valley Road from the south.
A. From the south. And you would come back in down here and up back along Mount Franklin Road, and, depending on where you start in Canberra, it's six of one, half a dozen of the other.

Q. And you offer the opinion that not only should the Stockyard Spur fire trail have been maintained in a trafficable condition but the fire trail should be linked to the Corin Dam Road. There is a spur with reasonable gradient about one kilometre north of the Corin Dam and, in your opinion, this connection should be constructed in the future. The link would provide rapid access to the mountain country west of the Corin Dam via the Corin Dam Road. I think that's all evident, looking at that map.

You also in that context refer to the policy of locking up fire trails in the Namadgi National Park and suggest that should be reconsidered as regular vehicular access would help to ensure that the trails had been maintained.
A. Yes, that's my opinion.

Q. Yes, all right. We'll go to 9 January, then.

A. This is the line scan dated 1456 of the Stockyard spot fire. It's mostly expanded from its origin somewhere in this location under a southerly and then upslope pushing it up this part, which is quite a steep rocky slope, towards the west, and firefighting crews were sent in to attempt to control the westerly spread of that fire.

Q. And that was a RAFT team, as it appears?
A. That was a remote area fire team.

Q. Arriving about 10 o'clock in the morning?
A. As I understand, yes.

Q. And, as far as you understand, what tactics did they employ?
A. From Mr MacNamara's statement when I read it, I had the impression that, when the fire was burning in this area, they stood back some distance from the fire and attempted to construct a fire line somewhere across the front of it.

In the discussions we've just had, Mr MacNamara has clarified that they in fact started closer to the fire edge and proceeded, and the distances that he quoted in his statement were the distances between the fire line and fingers of the fire - which, if I may use this as a small diagram over here, if this is the fire, then someone using a rake line will cut off those sections to make the fire line shorter and speed up the operation.

He did say, though, that he didn't have the equipment to burn out those sections, and so that still makes it problematical for control, because, if there is a wind shift which takes the fire from this direction to this direction, then these fingers can pick up quite rapidly and the progress through here could easily go across that line, unless there were people on it. And if there were people on it, it's quite a dangerous position to be in because you may

be cut off from getting back on to the burnt ground where you're close to the fire edge. I just add, it's still a legitimate tactic, but I would hope that the progress would be to burn out from your line and hold that - complete this before you moved on to the fire around the edge of the fire.

Q. So on page 42 of your report, on the second photograph, in commenting on these tactics as you originally understood them, that comment now had to be seen in the context of what you've been told by Mr MacNamara at the break we just had and your present understanding of the way in which an attempt was made to contain the fire.
A. Yes, I'd hoped to go up with Mr McNamara sometime beforehand, but we didn't quite make that. If I had made that trip, I would have been better informed.

MR LASRY: Your Worship, would that be a convenient time?
A. Yes, thank you.

ADJOURNED [1.00pm]

RESUMED [2.02pm]

MR LASRY: Mr Cheney, if we could go back to the board, if we could. I think we're at the stage of - if you take your microphone - we're at the stage of dealing with the Gingera fire, I think, on 9 January.
A. The Gingera fire was burning under the sort of south-easterly and was progressing - it progressed into New South Wales on the western side of the border. It was generally burning slowly on this southerly aspect of Mount Gingera. I understand that at about the time the scan was taken, crews came into the back of the Gingera fire, decided that there was not enough of them to do effective break line and construction, and essentially started overnight

to ensure that the fire didn't cross the Mount Franklin Road to the east.

Q. You say in your report at page 43:

If they [that is, the fire crews that were at that fire] were properly equipped with rake-hoes, chainsaw and a slasher, I believe the crew could have done some useful hand-line construction from the Mount Franklin Road to the southern edge of the fire, where it was burning downhill in the six or seven hours of daylight available to them. This could have been held overnight and provided a useful start for the RAFT team arriving the following day.

I think that's clear enough on there. But you describe the rake hoe team working on the southern edge of the fire in effect and east, are you, to the Mount Franklin Road?
A. South and west, they'd start off at the road and cut in along the southern side, right on the edge of the fire as close as possible, and just - even at a slow pace, seven or eight hours of work with four men would have covered some ground, and I don't believe that the fire intensity on that sort of downslope edge would have been difficult to control, but it would have required constructing a bare earth line to stop it.

Q. We'll go to 10 January.
A. A couple of photos of the RAFT team going in on 9 January, which were taken by one of the members, Mr Dearlsley, which illustrates the fuels, and the next couple are a couple of shots of the fire. This one obviously towards the upwind edge of the fire, where normally you would say that downslope and upwind would be the normal place that you would put an anchor point in and control it and hold it and then work progressively from that point around the

fire as far as you could go.

And just a final shot, this is again, I suspect, a little more towards 1100 hours, but the fire is a little more active and it is still a backing fire and sort of progressing into the local wind, a straightforward job to get it under control. Hand tool construction breaks down when the fire is about 1,000 kilowatts per metre of intensity, and that's flames which are about twice that height. It breaks down mainly because of spot fires across the line, which become - rather than the intensity of the fire, but spot fires which occur in too great a frequency for the people to mop up as they're progressing, and so the whole progress is slowed down because of spotting across the line.

The next one. This is on the 10th at 2400 hours, and it's an aerial photo interpretation, supported by line scan data either side of it. I deal with just the behaviour of the Stockyard Spur. Although it's a generally easterly wind which is pushing the fire in this direction, the fire had during the day of the 10th crossed this saddle and had made a short, sharp upslope run in the opposite direction of the wind and taken the fire up on to this part of the Stockyard Spur.

As I understand, there was no suppression action carried out on that fire during the day. A team was sent in to the Mount Gingera fire and, again, I haven't been up in the air, but, as I understand from the statements, they started to construct a fire line around the southern side.

Q. In the course of your report on page 44, you refer to an understanding you had that, at about 11am on 10 January, the crews that were working on the Gingera fire were directed to leave that fire and go to the Bendora fire. Is that the understanding you had?

A. That was the understanding I got from the statements of one of the firefighters.

Q. And does the information available to you tend to suggest that at the time they were withdrawn they were making satisfactory progress in the work that they were doing?
A. The statement was, yes, suggested that they were progressing quite well. But I haven't talked personally to that person and I don't know how far they got.

Q. Yes, all right.
A. I think from about this point on there was little other effective suppression action taken, so these fires then continued to expand over the next four or five days, and, if there was effort, it was primarily to hold the Gingera fire to the west of the Mount Franklin Road, and some tankers were sent up to do that, but I don't know the details. So basically I'll just run through the progressive increase of the fire over the following days.

Q. Yes.
A. The next one. The Stockyard Spur fire spread really quite uniformly around all perimeters and just continued to expand in much the same rate in all directions, with a little bit more emphasis because of the easterly - pushing it over the spur and down into Stockyard Creek, just to the north. The Mount Gingera fire - the scan suggested that it was quite a fragmented edge, which just may indicate that there was quite rocky terrain towards the top of Mount Gingera, which broke up the fire spread.

The 11th is the next one. Again, over the next day and a little bit, this fire got across on to the southern slopes, with the easterly behind it, and so it made more rapid spread up in this direction and by 12 o'clock it had crossed the border into New South Wales. You can see these creek lines held up portions of

the fire for short periods, but usually within the day fire had crossed over it and got on to the next upslope, and where that slope had the wind behind it, it then progressed.

But, despite the indentations, there was pretty regular spread of the fire - a slower spread towards the east on these steep slopes above Corin Dam and it was just backing quite slowly down that steep slope towards the dam. The Mount Gingera fire was held up by Mount Franklin Road, with probably some - there could have been tankers up there while that was happening.

The 13th is further expansion, the next one. It filled out around all perimeters. This had pushed down to this creek, which just held up that section of the fire for a brief period. These areas where it had been held up by the fire were helpful for me in reconstructing the fire spread because I could use those areas to correct the geographic location of the scan images when placed on these DDM models. The regular spread of the fire helped me to identify those areas where the fire was mild overnight by looking at area photographs and interpolating between the two line scan images.

At about this time there was some effort to protect an arboretum and Pryor's Hut, which I think is this area here, between the two fires. That was an historic hut for Lindsay Pryor, who was an ex-professor of botany, and had been instrumental in setting up the arboretum in that high country. So bulldozers were assigned and there was some construction effort to protect the arboretum and the historic hut.

Because of the nature of the country, putting additional containment lines required scouting, and I understand that there was some scouting done to look at possible places where this might be cut off to look down at this road and to try to tie it to the Corin Dam. It's not

very obvious at all where the possible cut-off would be on the western side because there is literally no access north/south of the head waters of the Goodradigbee River.

The next one is falling out to a larger scale, and that illustrates the road network that's available. Some roads have pushed down spurs but they are largely dead end, it seems. That in itself is a tricky situation for a firefighter to go pushing down on to those westerly slopes because there's only one way out and not a very comfortable position to be in if things get a little more severe.

Although the Corin Dam appears to be a substantial break on the planar view, I think the next one is a sort of topographic view, which illustrates the position of these fires high in the terrain and, in the advent of a strong westerly wind, it's not a great distance for a spot fire to be blown off part of this fire on to the other side of the dam, which is eventually what happened on 17 January. So they were sitting up - capped on the high country and spreading inexorably in all directions.

The next slide is 14 January. Basically this was pushed on and, apart from being held up on the Mount Franklin Road, that's spread in all directions. You can see the sort of interest where this creek has held up the southern spread until something has gone across the creek and then it's made a rapid upslope run in a northerly direction. It's slow spreading but difficult to get around unless you're prepared to commit heavy equipment and, at this size and this terrain, that's still quite a difficult job to do, and it is going to require considerable rehabilitation later.

Some of the slopes on the western side of Gingera are probably too steep to run a bulldozer on and, once the slopes are over 25 degrees, it becomes very difficult to work a

bulldozer on anything except straight up and down a slope. It's very difficult to go across slopes.

On the 15th, the two fires at this point had linked up in the vicinity of Pryor's Hut in the middle and had crossed over the Mount Franklin Road down in the southern end and, again, we have somewhat more rapid spread on the western slopes, compared to the eastern slopes, slightly more exposed and generally a drier fuel type.

The 16th - most of the progress has been towards the north and down towards the south - the fire seemingly wanting to set itself up for the inevitable westerly wind that's going to come, and so it's getting quite a width on it. A very slow spread in this area. Although it must have died down at night, the uniformity of the spread is quite interesting because just about all the way along that perimeter it expanded by the same amount.

On 17 January - and I'll just hold it at this one before we go on to the 17th. When the westerly winds that cropped up on the 17th began to blow strongly some time around 3 o'clock, there was a spot over in this area here, and I think later there was - this either burnt across or spotted over in this area, and this southern portion of the Stockyard fire made a run, and I think that was observed just shortly after 3 o'clock on 17 January.

The next slide - under those strong conditions, this made a very strong run which persisted through until about midnight. The winds remained and there was active spread during the night and by midnight the fire had spotted across Mount Tennent, to the south of Tharwa. I'm not too sure of the time it went in, but this up here is the backburn that the southern brigade put around Tharwa. It wasn't a spot fire but a back-burn that was put around to

protect the township of Tharwa.

THE CORONER: So that area of burn around Tharwa, is that the spot fire or is that the burn that you said the brigade put there?
A. No, that's the burn the brigade did, your Worship.

THE CORONER: Thank you, Mr Cheney.
A. And I think they started around midnight.

THE CORONER: On the 17th?
A. On the 17th, yes. I just put it in there for illustrative purposes.

MR LASRY: How far south of the urban edge of Canberra is that vicinity? How far?
A. I think it's probably about four to five kilometres. I think these are the black roads near the bottom of Banks and Gordon, suburbs south of the ACT, just up there.

That's about as far as I have been able to reconstruct the spread of the fire, and I know there is more data for the 18th, but I focused most of my efforts on the northern part of the ACT. We can make some comments in general terms about where the fire spread on the 18th, but I'll do that in combination with considering the interaction between pairs of the fires.

The first one is the interaction between the McIntyre's Hut and the Bendora fires on 18 January.

The next one. The reconstruction of the line scan information, which I indicated earlier was principally a swathe coming through something like this in the area. What it did allow me to do was make some quite detailed locations of the perimeter, the flank, of this fire here. By this time, the Bendora fire had been held up in the Tidbinbilla Valley until around about 2 o'clock, and then there was a strong increase

in wind, but the spread across this part of the valley was relatively considerably slower than the spread of the Bendora fire to the north. So in this area --

MR LASRY: In McIntyre's --
A. I'm sorry, the McIntyre's fire, yes. In this area there was quite a lot of unburnt country in the grasslands, and, although in this area the fire had actually been making quite severe runs in parts of this area, I don't have the information for that, but there is information available which I will pull together at a later point.

One of the problems for an immediate interpretation from the aerial photos was that the fire almost reversed the direction after the wind change and so the normal pattern of fire scarring or the burn pattern in grassland wasn't clear. There were lines and you didn't quite know which way they were going.

At this time the breakaway from McIntyre's Hut has burnt down and is setting up somewhere in this area here.

Q. That's as at 2.30 on the 18th. Bearing in mind the weather conditions that had been prevailing over the previous few days, by then of course they were extreme. Is there anything particularly unpredictable about the fire behaviour that has occurred between, say, the 14th and the 18th of January?
A. No, between the 14th and 18th it was fire behaviour which I think would be pretty typical of high - moderate to high fire danger conditions through most of the day. The southerly spread of this fire, I'd have to say, was a bit of a surprise and the extent that it spread to the south, considering the relatively low spreads of parts of the flanks of both these fires, where they were visible on the scans, and this suggests that in the Brindabella Valley there was a strong valley

wind from the north which was driving underneath the prevailing north-westerly wind.

THE CORONER: Mr Cheney, where is the Goodradigbee River in the McIntyre's Hut fire situation?
A. Can I have a blue pen, please. It was travelling along the edge of the fire. It goes through there and tracks up through the Brindabella. Something like that.

THE CORONER: On the 18th, that McIntyre's Hut fire jumped over the river, in that bottom portion?
A. I believe it jumped over on the 17th, somewhere in this area near McIntyre's Hut. It was in an area of the river where it went through a steep gorge and was one of the problems that I alerted to earlier of using the river as a containment line when you haven't got access for firefighters to be available to handle spot fires across - when they're small.

THE CORONER: Thank you.
A. By this time, the southern part of the ACT was very heavily shrouded in smoke and it was very difficult for anybody to make any distant observations. The usual information I get is from someone who's at a point location who can give me a time that it went through that point. That's about all I can ask them about because they can't see much. From the videos that were taken from Mount Stromlo and later from a point here just off the end of Hindmarsh Drive, about there, will illustrate some of the fire activity which is on this part of the flank of the Bendora fire, and we mentioned earlier the video is showing some flames in that vicinity, but largely the flames are obscured over most of the area because of the smoke that's now coming up, and the considerable density.

Very often under these conditions people know that there's fire out there but they don't know or they can't see it approaching until it's

literally within a kilometre of them or so, and that really only gives them a few minutes between first seeing the flames and it being over the top of them.

The next slide, please. The line scan, which in this case - and I'll go back to red again, thanks. This is line scan imagery for probably about the latter part of the fire, something like that. The overlap of these two line scans for the half-hour time period between them indicated that these edges were spreading very slowly unless there was a breakaway upwind, which, like this, then meant a separate head fire parallel to the flank, and these probably weren't progressing much more than about 200 metres an hour, whereas there was considerably much faster spread elsewhere.

This fire that broke away in the valley has pushed along the valley as far south as the junction of Flea Creek and the Goodradigbee River, and it's made one run over the Brindabella, down into Flea Creek, which is down there, and then up again over Mount Coree, and this one has just crossed over Webbs Spur and is making spot fires quite a strong run.

The behaviour often in these areas, although it looks as though it's all going in one direction, is that the fire makes a rush up the ridge and then fills in and leaves it here behind the ridge with spot fires, which very rapidly join together and are dragged back up in the slope bedding to produce more fires which are thrown further down end, so it's basically - it's the way fires under these conditions run across very broken topography almost as though it wasn't there, and at the top end of our scales we take out the slope effects from the rate of spread because the fire effectively has the capacity to ignore the slope.

Again, the spread of this end of the Bendora

fire was really relatively slow in this area. We didn't have a lot of information, except some observations from the Tidbinbilla tracking station, which on this map I'm not sure where it is, but it's somewhere in the middle here. We weren't able to pick this up until it crossed over the Bullen Range, which is this range here, some time after 1500 hours. It's apparent that the fire was burning strongly up on this part of the ridge, this part of the flank here was obvious from video that was taken there, and the fire now was across Mount Stromlo.

The next, please. It wasn't until about 3.15 that we got a glimpse of the fire across the Bullen Range from a couple of points in Canberra. One of them was from the chap that was down on the Kambah ovals, which was here. He scanned around and at some stage picked up a short glimpse of the fire as it had come across the Bullen Range. There was another cameraman in Gilmore who was also taking some film back in that direction that picked up a glimpse of it beyond the Hyperdome, which is this area here. It may have progressed further, and certainly there were spot fires progressing further, but, under the extremely smoky conditions, it was difficult to get.

This fire, I believe, was now being pulled through between the two fires. People at Pierce's Creek at about this time had gone down to the Cotter River and the Cotter Reserve and had actually driven out and ran into the fire at this location - no, sorry, I'm in the wrong spot. That's Stromlo. It was about here. It was just past the Cotter camp ground and then decided to return to Pierce's Creek. At that stage they considered that this fire was quite a long way away from them and their concern was that they had the McIntyre's fire coming through the Uriarra plantations, and at this point just to the north of the Cotter Dam, which is here, and they thought that they may

be able to sit it out. They had under the darkness very little inclination of this sort of warning that this fire was pushing through, which was travelling at about five kilometres every 15 minutes or 20 kilometres an hour.

The next slide is the next 15-minute step, I think a pretty reliable observation of how it came into Pierce's Creek settlement. That little white spot above the red mark came in from the south. A man looked at his watch and said it was 1530, and it's about as good a timing as you'll ever get from interviewing people in this situation.

He thought it was this fire, but the previous line scan imagery had indicated that that lateral spread was really slow, so I believe that it was this fire powering through the centre. At about this time, the whirlwind started generating behind Sugar Loaf, which is - probably in this location, and I indicated before, its path generally came down there to Mount Arrawang, and Chapman was close.

The next one is 1545. I suspect that from the rate that these catchments here filled up under high intensity fire, it was these two linked together. By this time it was entering the property of Fairvale.

The work that had been done across Flea Creek on the Powerline Trail were still held up, along Powerline Trail, and Two Sticks Road, so that was holding, as most of the area back along Doctor's Flat Road on McIntyre's was still holding up. By this stage there would be nobody on those trails, attributed to the effort of the work they did to hold those areas, plus that they were done in sufficient time for the area to burn out and there was to be no trees still alight that could throw spot fires across the line.

There were about half a dozen reports - I

haven't drawn any further, but we do know that the video shows just after 4 o'clock the whirlwind is in this area, which was I believe an extension of this tongue of fire, being drawn between the two, and that at a number of locations from Woodcock Drive down in Gordon, to the back of the Hyperdome, an area up here in Kambah, behind the golf course, the reports were generally 4 o'clock that the fire had come in, so effectively by 4 o'clock this had filled in an area something like that and had burnt out down to this area in Gordon.

Mount Taylor was well alight by a separate spot fire at this point and there were spot fires on the Urambi Hills at about this time, which I think is about this area, just hanging off the map. It was the rest of that area, this little extension, and of course this was still pushed up the Molonglo River there. I don't know exactly how far up the river it had gone.

I think that's probably that slide. Any questions?

Q. Mr Cheney, during the week leading up to 18 January, had your views been sought by anybody as to the likelihood of something like this happening in Canberra?
A. Not officially.

Q. You said you had a view as of, I think, 14 January as to what might happen.
A. Well, in general terms, simply that if we got extreme weather, the positioning of these fires and the behaviour of fires under extreme weather would push them into Canberra. It was just that, if we did get an extreme day, the wind direction would be somewhere between north-west and west and it would have the capacity to burn into Canberra.

Q. The view you formed, as I understood the evidence you gave last Friday, was that you'd formed a view that that would occur if the

extreme weather occurred; you'd formed that view by about 14 January?
A. Yes, after I had inspected - I went around the fires on Sunday and looked at their position and the extent of them. I didn't think they had - it was possible to get them under control within the next five to six days.

Q. Did you have occasion to speak with anyone - any authority within the Emergency Services Bureau about that opinion that you held?
A. I was contacted by our press liaison officer on the Monday, who was handling inquiries from the media, and had lined up that I talk to Win Television, and I rang Mr Lucas-Smith on Monday afternoon, towards the evening, and advised him that I was going to be asked questions from Win Television and I expressed my opinion to Peter that, if they asked me, I would have to tell them that in my opinion it was a very dangerous situation and that these fires were likely to burn into Canberra, and the Win Television decided not to interview me.

Q. They decided not to?
A. No, they didn't.

MR STITT: I can't hear you.
A. Win Television decided not to interview me.

MR LASRY: So your opinion never went to air?
A. No.

Q. So, upon you expressing the view you just said you expressed to Mr Lucas-Smith, did he respond?
A. Yes, as I remember, he said that they had formed the same opinion.

Q. And did he give you any indication as to what "they" meant?
A. I took it that he and people in Emergency Services Bureau.

Q. Thank you, Mr Cheney. Is that the end?
A. I think there's just a little more question on Stockyard and the Broken Cart fire.

Q. Oh, yes.

A. Just a couple more slides and that will finish it off. I just added this one. The distribution of house loss was primarily - the most severe damage was associated with the point of the head fire, of the McIntyre's fire coming into Duffy, and this area to the east of the Narrabundah pine plantation. This area in Chapman is opposite the horse paddocks and really you couldn't get a much clearer area in terms of an urban boundary. And it surprised me that - the extent of house damage within

particularly sections like this, where there was mown grass and then eaten out pasture to the west of it, and I believe that I certainly had underestimated the contribution of the native gardens and the fuels within the suburb had made to the threat, compared to other cities, which on the face of it have a much more hazardous boundary than Canberra does anywhere.

The track of the cyclone came and dipped into this section of Chapman at Lincoln Close, the tornado, and then drove through here and up Inkster Street carrying fire with it as far as to this portion of north Canberra, but, by the time it got up Inkster Street in Kambah, it just did roof damage and it wasn't followed by a mass of sparks. So only one house in that section was burnt, in fact.

The next slide is just consideration of the Stockyard and Bendora and Broken Cart fire. Underneath there, the darker red colour indicates where Stockyard-Gingera fire had got to on the 17th at midnight, and that's out here, and back through this area. Is that clear, your Worship?

THE CORONER: Yes, thank you.
A. Snippets of line scan indicated that there was fire burning - it burnt in this direction and had broken away on this portion of the Bendora fire and had gone in that direction. This one - the line scan extended to about that point.

By 1500 on the 18th, although I don't have any details, this fire had burnt out into this area here, so most of this area was burnt and it came up in this part and stopped literally just above the river, even though elsewhere the fires were travelling very rapidly. Conditions in this part of the world were very dark, but the winds were calm and fire, even on an upslope out at the Murrumbidgee River, had flames of half a metre high or so and was spreading rapidly.

The Broken Cart fire, which came from further back in Kosciuszko National Park, had pushed through to this point on the 17th, with a spot fire in this area here, across the Goodradigbee River. Although it was there by midnight on the 17th, by 1500 this was covered with line scan information, so it had been blown up. The spot fire and this fire had blown up into the back of the Stockyard-Gingera fire.

At about 1545, down at the deep space tracking station at Tidbinbilla, it indicates that the wind had swung to the westerly, and I suspect that observations from residents in the Brindabella Valley also suggest that by 4 o'clock it was a more westerly trend across, I suspect, most of the fire area. And so by 4 o'clock I think this had tended to straighten up and was probably filling out into this area behind the Tidbinbilla Range and was starting to link up with the Bendora fire. I think the last photograph I have is a view looking up the valley at this fire as it's approaching the open country, just about where the pen is.

That's looking south at around about 4 o'clock in the Brindabella Valley. The Broken Cart fire - the flank - that's the northern flank and at this point you can see what I was describing before, throwing massive spot fires which are now very rapidly filling in the lead side of the hill, with the smoke pouring over the top, and this happens within literally a matter of 15 minutes.

I think that's the end. If you hit it once more, it does something flash. There you go!

MR LASRY: Your Worship, the final instalment of Mr Cheney's evidence-in-chief is intended to be the playing of the compilation of video which I mentioned during the course of the opening. It will take probably two or three hours to play, so maybe to launch straight into it, the opening portions of it. Indeed I think the majority of it is video without any sound. As long as Mr Cheney can see the screen from sitting in the witness box, there will be points along the way where it will be appropriate for him to offer comments as to what we're looking at. Indeed, with your Worship's permission, I'd encourage him to provide as much commentary of what we're seeing as we go as he can. So I'll proceed with that now, if that's convenient. Can I just inquire of the witness - Mr Cheney, can you see that screen from there.
A. I have it here.

Q. You'll need to be able to see the screen. It may be if you move your chair to the right, you'll have sufficient view of it.

THE CORONER: We'll just move that smaller screen out of your way too, and out of your line of sight.

MR LASRY: It may be it might be easier for Mr Cheney to sit in a chair here if he has his radio microphone. He'll just have a better

view, that's all.

(Video was then played)

A. The first snippet is, I think, of us driving down Uriarra Road towards Uriarra Crossing. It doesn't last very long but it's a view taken by people travelling out to the fire at around about 7 o'clock. This was taken around about 2000 hours by the CSIRO bushfire behaviour team, who were out there trying to identify the number of spot fires that had occurred to try and collect data for a spot fire prediction that a couple of those guys were working on. They normally go out, take additional measurements of the weather, and comment on the behaviour of the fires and the fuels that are burning.

That was a spot fire adjacent to Dingi-Dingi Road, and they're now walking upslope towards the trail on Webbs Ridge and run into another spot fire that was located closer to the ridge. They're probably within 200 metres of the crest of the ridge at this point.

The view here is predominantly towards the west or to the south-west, and you can see that the wind is blowing from the south north-east. It's blowing the fire back towards the general position of the Goodradigbee River, towards the west. He's taking measurements of relative humidity in the air to fit with observations of fire behaviour.

You'll notice that the snow grass still has a green appearance. That's often a bit misleading because the amount of green is probably less than 10% of the total grass bulk matter. It just looks green on the surface. The snow grass is something that takes up moisture very quickly in the evening and it's one of the first fuels to stop burning because it takes up moisture faster than the leaf litter.

You can see the major fire activity is in the heavier accumulations of leaf litter at the base of the trees. You can see in places where the fire has in fact petered out in areas where it's either been a bit of grass fuel that's taken up moisture or it's perhaps a little rocky spot.

This fuel type is relatively easy to build hand line construction with, in fact almost as easy as you get, except that the snow grass can be a little difficult to dig out. It's an open forest with little shrub under storey.

Old dead hollow stumps catch alight because of the high drought index and do burn out relatively quickly. Right through, all the video shots do tend to make it appear much lighter than it actually is because of the capacity to operate under low light conditions. It is a bit darker than it looks, but the flames of the fire do illuminate where you were working. If you were working close to that fire, or within a couple of the metres of the fire, you can see where you're going and you can see well enough to operate chainsaws if you had to cut off logs.

As it does get dark there, you can pick up more reflection off the smoke, and so fires at a distance do appear to be worse than they actually are, because of basically the light reflecting from the smoke, which you don't see during the daytime.

This now is about 8.30 and it's up on Baldy Range, and this is the spot fire which is across the Baldy Range Road, which in places is only trickling, although burning in casual patches of heavy slash fields. The wind is from the east and sort of blowing sparks across, but, under these conditions, these sparks don't have enough energy to light up the fine fuels which have taken up moisture.

Q. What sort of ambient temperature would it be in that vicinity at 8.30 or 9 o'clock on 8 January, putting aside the effect of the fires?
A. On-site at Dingi trail it was 15 degrees at 8.10 and the relative humidity was 60%. They said it was a light easterly drift there, and it appears that the wind may have increased a little bit on Baldy Range. So I would suspect it's at this time probably still 14 to 15 degrees. The fire is, in places, struggling to stay alight, except where there is heavier log material, which does tend to maintain the fire on the edge. This is looking across on to the western side of the trail, up Baldy Range.

This is - standing there on Moonlight Hollow Road and this is the fire burning out of - burning in parts of Bushrangers Creek and approaching the Moonlight Hollow Road, and firefighters are trying to just keep pace with the lateral spread of the fire as it comes up to Moonlight Hollow Road. You will see usually it comes up in a number of tongues which separate it out. Helicopters are being used to try and dampen these tongues of fire as they approach the road. You can probably see them.

If one of those buckets of water hits the flame, it will temporarily douse about two to three metres of fire edge, but it won't extinguish it fully. So all it does have is a slight cooling effect on the fire, and dropping such small amounts, it's virtually impossible to build a progressive line using those small and medium sized helicopters. It's most effective if he's flying over and watching for spot fires and it's much easier to detect a spot from the air and drop a load of water on it just as it forms, and in that role it can be an enormous tool to help save whole spot fires.

It's an awkward operation, firefighting in this way. You need to spray water on the fire to try to cool the fire down. They can also wet

the fuel closer to the trail. The water will eventually dry out and those fuels will burn, and sometimes, as the fire moves along, they've got to keep coming back to ensure that the areas that had been wetted earlier actually burn out completely.

There might be a situation where the back-burning - and it would be the true definition of back-burning, setting fire along the road - it might be employed but, again, that's a two-edged operation. You will increase the width a bit, but the draw from the back-burn will accelerate the fire down slope up towards your lighting the back-burn, and you may not gain any benefit from it.

This fire is probably approaching the limits of intensity that you could hope to control under these conditions. Even so, it's not particularly severe.

This was a situation where the breakaway is going to happen because of the spot some distance on the uphillside of the road, and I had a question earlier of putting a scout up there and, if you have a person or a couple of people with a knapsack spray that pick up the embers as they land and you can put them out before they have burnt a square foot or so, then that is possible, and the easiest is having someone on the spot watching for things, fire brands, to land.

The pilot is going to be very precise with the positioning of drops. The main problem is it doesn't go very far.

THE CORONER: What date is this, Mr Cheney?
A. This is on Sunday, the 13th, your Worship.

The problem with wetting the fuels along the road is that you increase the amount of smoke, which makes it difficult to pick up spot fires on the other side of the road. Now, it has

spotted above the road and the helicopters are going up to it. The spot fire was about three

metres long by about two metres wide when they first started working on it, but they were unable to control it. I observed about 16 drops on that small spot fire and it still managed to get away from them - well, until a hose line was run up from the tankers on the road, and by that time several more spot fires had occurred and fire was at the point of breaking away and the firefighters had to pull out.

A small nest of wagtails which are probably no longer there. That was just on the edge of the road.

Shortly after this time, a bit further along the road the fire had picked up in the headwaters of Bushrangers Creek, and, as the easterly wind increased just a little bit in strength, pushed it upslope and over the Brindabella Road. As would happen, the cameraman's battery went flat at this point and we missed all the good stuff.

MR LASRY: So that was Sunday the 12th. This is Monday the 13th.
A. This is Monday the 13th, and this is from a hill just inside the Uriarra plantation, looking north towards the smoke column of the McIntyre's Hut fire, I think, or am I looking in the wrong direction? No, I think it's probably looking towards the Bendora fire, across Coree Creek.

The wind was from the east and it's blowing the smoke away from Canberra. Now panning around towards - looking now towards the McIntyre's fire, which is beyond Mount Coree. Looking back to Bendora fire, and the smoke on the far left would be probably smoke coming from Stockyard, further south. That would be parts of the northern perimeter of the Stockyard fire burning. Most of Bendora was behind that

range.

A little bit of extra column there - it was probably at about this time that the burning out from the Powerline Trail and Two Sticks Road linked up. We're now looking at the burning out operation as it was proceeding along Two Sticks Road to the east of the junction with the Baldy fire trail and Dingi-Dingi Road.

This is the New South Wales Rural Fire Service. They had a fair contingent of people up there, but you can see that there is enough northerly component - we're looking about due west on Two Sticks Road, and there's enough northerly component that lighting up has to proceed slowly because of spot fires being generated and thrown across. So this was one section and, compared to the northern side, this proceeded very slowly on the southern side, once the wind had shifted to the north of east.

This section is on the northern perimeter of McIntyre's fire on Webbs Ridge trail, where it was burning out towards Doctor's Flat Road, some five or six kilometres from Doctor's Flat Road.

The principal hazards on the burnt area are really stepping into a smouldering stump hole of a big old stump that has died out and has burnt out. And, if you're walking across the burnt ground, you have to be careful not to stand in a stump hole because you can go up to your knees in hot coals, which for quite a time in Victoria was the principal injury to forest firefighters - standing in burning stump holes or getting leg injuries.

I think the time was probably approaching 7 o'clock in the morning at this time. This was taking a walk towards the east of the trail, and this is just walking along a section of the fire edge.

For much of the period of the slow expansion of the McIntyre's fire on the country to the west of Webbs Ridge, this would have been very characteristic of this type of fire, only making brief runs which have worked on a slope which was lined with the direction of the wind, run up to the top of that ridge and then continued on as a backing fire under the light winds, much as you see in here.

Q. Was that a stump hole?
A. I don't think so. It might have been a wombat hole. At this time of day it would be highly unlikely that there would be any escalation of the fire behaviour. If the staff are working in this area during the day, their instruction is to stay close to the fire and, if there's a change, to walk on to the burnt area before the fire picks up intensity.

Q. There's a section which is now out of picture where the edge seems to have extinguished?
A. Yes, there would be - and I believe that, later in the night, most of the edge would have been extinguished. But I maintain that the heavy log material and the smouldering material could have reignited during the day. Though it may appear relatively mild and going out in places, to stop the fire you have to remove all the fuels and make sure there's a continuations line of bare earth around the fire, and logs and roots that might cross that have to be cut off and dug out.

This is a flight on the 14th. I very quickly get lost on this flight so I can't pass many comments. We're flying south over the Murrumbidgee River. The Bullen Range is in the foreground.

Now, I think that's in the south of the ACT, in the Namadgi park somewhere, but someone more familiar with the area may know better than I.

This perhaps highlights the difficulty of reconnaissance of fires and why line scanning equipment is such an invaluable tool telling them exactly where the fire is.

This was the day that the helicopter went into Bendora Dam and the flight was associated with the rescue or the recovery of the helicopter from the dam.

Q. How many litres do those buckets hold - that one, for example?
A. I don't know. They come in various sizes - 200, maybe 400 litres. There are larger ones that can carry a bit more.

I think this is in the vicinity of Falls Head.

Q. That is McIntyre's Hut?
A. I think that's the Bendora hut.

THE CORONER: Mr Cheney, is this part of the burning out operation.
A. Yes, this is up on that break that I had some photographs on, on the top break, above Chalet Road, between Chalet Road and Mount Franklin Road.

How you light up a burn can have a big influence on fire behaviour, and how many points you light at or how you light can change from a relatively benign fire to a seriously hot fire. In very general terms, the more fire you put in, the hotter the result is going to be as these fires interact with each other. As conditions become moister at night, sometimes this burning out effort can be thwarted because you can't get effective spread until the conditions warm up the next day.

MR LASRY: No problem getting it to light there. It lights pretty easy.
A. He's putting a lot of diesel on it. They have lit along the edge and some distance in to rapidly achieve some depth in the break that

they're putting in.

This is taken from Mount Taylor on 17 January. It's looking towards Bendora fire. The original video did have a time stamp on it and so I can be easily proven wrong if I open my mouth about the time, but I think it's probably around 4 o'clock in the afternoon and perhaps going on to 5 o'clock.

This is the two major columns coming out of the Bendora fire, and on the far right you will see one of the spot fires which has been thrown from the convection column and the major smoke is coming up from Brindabella Creek as it burns up towards the Mount Franklin Road, just south of Piccadilly Circus, and the fire is now throwing spot fires between the Mount Franklin Road and the Cotter River.

This is a view towards the McIntyre fire, and the fire there is similar to that photograph I showed on the slides where it had burnt out into the grasslands near the Powerline break. Looking to the south, there's a mass of smoke from the major one that's the Stockyard fire, which is now at this time burning probably in the vicinity of Corin ski resort, or south of the Corin ski resort, making quite a strong run across that country between Corin Dam and Mount Tennent.

The lights of spot fires plus flashing light from the vehicles who are attempting to control the spot fires as it's coming out into the grassland, east of Dingo Dell and just to the south of Doctor's Flat Road, and the fire is now burning out on to grazing country. That was McIntyre's. Now, looking back south towards the extension of the Stockyard Spur and now the substantial convection column - the fire is now burning intensely towards Mount Tennent.

This is probably around 8.30 in the evening

now, between 9.30 and 9 o'clock perhaps.

This is video taken from the car park at Mount Stromlo, next to the major observatory, looking towards the north-west.

MR LASRY: Your Worship, may we just pause that for a moment. It might be easier, if it's possible, and I don't know whether it is, to show this with the date time stamp on it. There's a digital version of this particular piece of film that might assist Mr Cheney in nailing down the time. Is that immediately to hand?
A. It would certainly help me, your Worship.

THE CORONER: If that's available, that should be shown.

MR STITT: I want to raise something.

MR LASRY: Mr Stitt wants to raise a matter, so perhaps we can pause the evidence there and leave it until the morning.

THE CORONER: Yes, we'll start with that segment of film tomorrow morning. Thank you, Mr Cheney. Yes, Mr Stitt.

MR STITT: Your Worship, I wanted to raise a matter in terms of guidance from your Worship, and it seems that we are reaching the point where it would be necessary for that guidance to be given.

You will recall that at the outset I asked whether this inquiry was to be subjected to the rule in Browne v Dunn, and I don't understand that we ever got a clear answer to that. But what has happened now with Mr Cheney's evidence nearly finished in chief, it throws up into sharp focus the question of how the rest of his evidence is to be dealt with. It's plain from what happened today that my learned friend Mr Johnson at least has some evidence which tends

to contradict the evidence that's given by Mr Cheney and he, I assume, would wish to challenge some of the criticisms that are prevalent throughout Mr Cheney's report.

If the rule in Browne v Dunn does apply, then he would be required to put all of that material to Mr Cheney. If you rule that it does not apply, then he doesn't have to put any of it to Mr Cheney and he's perfectly entitled to keep that part of his case up his sleeve, as it were, until he goes into evidence or some of his witnesses go into evidence.

From my point of view, being somewhat indirectly involved, I would like to know very much just how this matter is to proceed from now on and whether my learned friend Mr Johnson will be bound by the rule in Browne v Dunn and whether he will not be, because it will have a very real bearing on the way this inquiry now proceeds. I'm not being critical, but I did raise this right at the outset and I think we really need to know where we're going now.

I would be grateful, your Worship. I don't even need to know now - perhaps in the morning - but I raise it now because I don't want to take up time tomorrow when Mr Cheney's evidence-in-chief will in fact be concluded because that will be the time that we need to know the answer to that question.

MR JOHNSON: Could I be heard on this, thank you, your Worship.

THE CORONER: Yes, Mr Johnson.

MR JOHNSON: I was conscious of reading the transcript of an early day when this point had been raised, and I made a mental note of it, but it hasn't been raised since. It would certainly be my submission to the court that, consistent with the practice in inquiries, coronial and indeed other sorts of commissions

of inquiry, that the rule of Browne v Dunn would not apply, and indeed it is difficult in many ways for that rule to apply.

This is not an ordinary piece of criminal or civil litigation where there are cases to be put with one case being led and then the opposing party leading another case, and indeed what's happened in the present situation is that, at the early stage in the inquiry, evidence has been called from Mr Cheney which deals with a range of issues and as to which his report, as is apparent on its face, sources a number of things to a number of statements, but those of course are statements of people who haven't given evidence and indeed there may be more statements which deal with the same subject matter.

The issue that arose this morning, and which led to a short adjournment, was perhaps an example of what could happen in this type of situation. I have taken the view to date, perhaps wrongly - perhaps it's appropriate it is raised now - that the evidence of Mr Cheney is before the inquiry. I propose to cross-examine him on some issues at this stage, but it's quite apparent that there is likely to be a substantial additional factual body of material before this court in the new year which may lead to some changes in the opinions of Mr Cheney.

To test it all now is in some ways probably a fairly arid process. Put to him a series of assumptions perhaps which may or may in the alter the position. I certainly propose to cross-examine to some extent, but it will be on the basis, as I would seek to indicate, that there may be additional facts bearing on these issues which will be before the court at a later time.

As I understand also, it's likely that the present witness would be called back again,

perhaps even on more than one occasion, not only on issues in the report which are before the court now but on issues of hazard reduction and other matters which have not been touched on yet. So I have to say that perhaps wrongly I had taken the view that this is a process which has some flexibility, where it is clearly highly appropriate that there be detailed evidence in particular about the fire behaviour and the movement of the fire, as to which it is an area that is well and truly in the expertise of the witness, and indeed it's been very helpful to get some clarity in that area at this time.

So I would anticipate cross-examining the witness, but I would submit that, in accordance with the usual practice, the rule in Browne v Dunn would not apply, and indeed, if it was to apply, I would probably have to ask that at the end of the evidence-in-chief of the witness, he be stood down and I don't attempt to cross-examine him at all because, if it's effectively to be a witness and for all exercise, I would certainly need some time.

As your Worship has observed, quite apart from the statements that have been referred to in the report of Mr Cheney, issues have been raised orally for the first time and, if the rule in Browne v Dunn was to have some application, it would be a very large task and unwise for me even to embark upon it. But I have taken the view, and I would submit it is the correct view as a matter of law, that the rule in Browne v Dunn really has nothing to do with this inquiry and that the inquiry can proceed upon the basis that there may be cross-examination of the witness at this stage that may be of some assistance to the court at this stage. There may be further evidence at a later time from factual witnesses and indeed from Mr Cheney. The critical thing at the end of the day is what is the body of evidence which is before the court, which at the end of

the day will be the subject of submissions no doubt.

I've stood to say those things now without realising the issue was to be raised, but it is perhaps highly appropriate that it is raised now so that everyone perhaps understands the ground rules at this stage of the inquest, your Worship.

THE CORONER: Yes, I agree with that, Mr Johnson.

MR STITT: Could I just raise a couple of things. I don't know what my learned friend means when he talks about the "usual practice" in inquiries and commissions. I have appeared I think in all Royal Commissions and commissions of inquiry, 15 in number, and in almost every one of those the rule in Browne v Dunn was applied because it's a rule of fairness and it's a rule of procedural fairness. Now, if it's to be envisaged that poor Mr Cheney is to come back and back and back, making repeated returns to the witness box, every time there's a different piece of evidence or every time there's another statement, then not only is it inefficient, but it's highly unfair because the thing will emerge in piecemeal, segmented, incoherent ways.

Whilst it is true that we don't have an adversarial situation in an inquiry such as this, what we do have is a factual gathering exercise and, whilst my learned friend says he's not ready to cross-examine Mr Cheney, he must at least have available to him, which I don't have available to me, a vast body of evidence that bears upon the various matters that Mr Cheney has given evidence about. Fairness would indicate that, if there is to be a challenge made based upon that material, it ought to be put to Mr Cheney and it ought to be put in circumstances where the rest of us are

able to see what's happening. If it's not done that way, what will happen is that there will be, as I say, segmented pieces of information coming out at different times which presumably Mr Cheney - and this seems to be the way my learned friend Mr Johnson wants to proceed - will be required to keep coming back to deal with it.

Now, that is not only inefficient but, as I say, it's unfair, and I don't want to embarrass my learned friend. I don't want to put him under any pressure, but it only has to be stated to see how it can work in an unfair way, and in an inefficient way.

I would suggest, with great respect, that there ought to be some direction given that, if there are to be contrary assertions and opinions based upon other and different evidence, which we saw today when you had an adjournment so that Mr MacNamara could be consulted, it ought to be done now, and we ought to be told, and we ought to all be brought into the picture as to which way these matters are going to be dealt with. If it's all going to be accepted that what Mr Cheney says is right and there's no contrary view and there's no contrary fact, well then we should be told. If there is a different view and a different set of facts, then we should be told that as well. It's a principle of basic fairness.

THE CORONER: I accept that, Mr Stitt. Do you wish to be heard, Mr Lasry? I certainly have a view.

MR LASRY: I was caught in the middle of the two explosive arguments but I think, on balance, at this stage I'm more inclined to submit that my learned friend Mr Stitt is nearer to the ideal situation, although it's got to be said that that's subject to the fact that Mr Cheney's evidence is obviously incomplete.

But in so far as it's possible for my learned friend Mr Johnson particularly to cross-examine Mr Cheney and put matters to him that in fairness to his clients he thinks should be put and challenge those aspects of Mr Cheney's evidence that should be challenged, then I must say I'm inclined to agree with Mr Stitt, that he should be in a position to do this at this stage, subject to the qualification that Mr Cheney's evidence is based to some significant extent on what he's been told by other people. It's not all first-hand observation but nonetheless he's expressed some opinions that are of some considerable importance to your Worship's inquiry, and, if they're to be subject to challenge, then it's not clear to me now as to why they shouldn't be challenged, albeit that that's got to be said subject to the qualification that we've made it clear that in a sense, although this is the bulk of Mr Cheney's evidence, it will be incomplete and he will be recalled. But it's going to assist, apart from anything else, the development of the list of issues for the remainder of this inquiry for the issues to be articulated.

I don't like the sound of Mr Johnson, for example, not cross-examining at any length and simply keeping information that he might have which is contradictory to Mr Cheney to himself until some appropriate time. We're caught in the middle because, as counsel assisting you, our obligation is to present as much material to you as would assist you to reach the conclusion that you need the reach. So, if there's contradictory information, rather than playing it as an adversarial situation, ideally it should either be presented or we should be informed so that we can present that material. Mr Cheney has made it clear that his opinions are subject to correction by people who are better placed, if there are any, to offer evidence than he is.

But, in so far as it's necessary for any of the

represented parties to confront Mr Cheney on his conclusions, my submission is that, subject to Mr Cheney's return, wherever possible that should be done forthwith.

THE CORONER: That is the only way that it can proceed, Mr Johnson, that, if you do have a position or information that is contrary to what Mr Cheney is putting, then the only fair way to present that evidence to this inquiry, and the only way that it can possibly be beneficial to me, is if you do put that matter or those matters to Mr Cheney, as you're aware of them, because I have some difficulty to see how this information can ultimately be put

before me if you don't inform counsel assisting and don't give counsel assisting the opportunity to lead that information from witnesses, which or perhaps who you may be aware of who may have a contrary view and then leave it open for other people to cross-examine those witnesses.

So the only fair way is for you to cross-examine Mr Cheney as the matter proceeds, but I am very mindful of the fact that this is not the only evidence that Mr Cheney will be giving and that there will be an opportunity to cross-examine him later on other aspects of his evidence. But I agree with what Mr Stitt said. The only fair way is for everybody who does have a contrary position or who does have information to the contrary, in fairness to this witness and certainly in fairness to the integrity of this inquiry, is to put that information, put those questions, to the witness and give that witness an opportunity to comment on that evidence. It's the only way that it can possibly be helpful to me. And that should happen ideally as the matter progresses rather than saving it all up and then producing it as one body of evidence or cross-examination.

MR JOHNSON: I don't think I said I was going to

do that, your Worship. I think I indicated I did intend to cross-examine the witness, and I will indicate by way of cross-examination issues which appear to be genuinely in dispute, but we do have a situation where, before the facts are in, the witness is expressing opinions. Now, there's reference to some factual material. I'll do the best I can at this stage, your Worship, but this is an expert witness giving opinions on issues before the factual evidence is in.

Now, perhaps I'll say nothing more than that at this stage, your Worship. I've had an opportunity to hear what's been said. I will do the best I can at this stage. If I feel I need time and I'm not in a position to do justice to my client's case at this stage, I'll ask your Worship for more time if it arises, but this is a report from Mr Cheney which of course came to us in relatively recent times and it does raise a series of factual issues as to which I've been seeking to get instructions and will continue to do so.

I would submit, as a matter of law, the rule in Browne v Dunn is not applicable in this inquiry. The experience of Mr Stitt is not my experience. He, of course, is much more experienced than I am, but ultimately the rule in Browne v Dunn is a question of fairness to witnesses. This present witness is an expert witness. I will seek to do what I can so that your Worship has an understanding of what appears to be in issue in so far as the report of Mr Cheney is concerned, and I'll certainly be seeking to do that tomorrow when the opportunity arises.

Perhaps there's nothing more I'll put by way of submission at this stage, your Worship. I've had an opportunity to hear what's been said by all involved and I'll seek to deal with the consequence of your Worship's ruling, I'll take that up in cross-examination tomorrow with the

witness.

THE CORONER: Thank you, Mr Johnson. You can step down, Mr Cheney, thank you. So is there anything else, Mr Lasry?

MR LASRY: No, your Worship. We'll continue with the video in the morning. I suspect that will take another hour or so.

THE CORONER: Is that to finish playing the video?

MR LASRY: Yes, that will be the end of Mr Cheney's evidence-in-chief, your Worship.

THE CORONER: We'll adjourn until 10 o'clock tomorrow morning.

MATTER ADJOURNED AT 4.08pm UNTIL TUESDAY, 14 OCTOBER 2003