

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 7

10.03 AM, THURSDAY, 15 OCTOBER 2003

[10.03am]

MR BEGBIE: Your Worship, I wonder if I might
clear up a matter for me which was raised with
5 your Worship in chambers yesterday morning;
that is, to clarify that I appear for the
Commissioner, that Mr Murray does not seek
separate representation at this stage, but, as
is the usual practice, so far as his interests
10 align with those of the Commissioner, he will
be protected in the inquest.

THE CORONER: Thank you, Mr Begbie.

15 MR LASRY: I recall Mr Cheney, your Worship.

<MR NOEL PHILLIP CHENEY, RESWORN

<CROSS-EXAMINATION BY MR JOHNSON CONTINUING

20 MR JOHNSON: In your report, Mr Cheney, at
page 39 and following, you made reference to
aspects of the Stockyard Spur fire and the
Mount Gingera fire. Do you understand that the
view was taken that access to that fire was to
25 be effectively via the Franklin Road and it
would be necessary to have safe access and
egress past the Bendora fire to fight those
fires? Did you understand that was a
30 consideration in the minds of those who were
trying to determine how to deal with the
Stockyard and Gingera fires?

A. I would expect it to be a consideration,
yes.

35 Q. So, quite apart from issues that may arise
from access, which is a matter referred to
I think in the first paragraph on page 39,
there was the additional fact that the Bendora
40 fire constituted another issue that had to be
grappled with for access and egress purposes?
A. Certainly.

45 Q. And access and egress are important issues
for any operational firefighters to determine

in deciding when and how to deal with a particular fire; is that so?

A. Yes.

5 Q. Was it the case that, as you understand the terrain, access by plant such as bulldozers may have been more difficult to the Stockyard and Mount Gingera fires?

10 A. I believe the windy nature of the Mount Franklin Road would make it difficult to float big machines right up to the closest point of the fire.

15 Q. And, again, for people having to make decisions about the distribution of resources such as bulldozers, there were a number of active fires - Bendora, Stockyard - which in effect had competing demands for resources; that was a fact as you understood it?

20 A. Yes.

Q. So it was a matter of weighing up where the particular priorities may be from time to time during the course of the fires?

25 A. Yes.

Q. And that involved, as you understand it, people having to make judgment calls as to where at particular times the priority may lie in that respect?

30 A. Yes.

35 Q. I just wanted to ask you some questions about evidence you gave at page 434 of the transcript, on 13 October. Just to remind you of it, you referred to a conversation you had with Mr Lucas-Smith in advance of what was proposed to be a television interview, although as it happened the television interview didn't go ahead. Do you recall that evidence?

40 A. That's correct.

45 Q. Now, in the course of that information, did you say to Mr Lucas-Smith words to the effect that any strong westerly gusts of wind

could turn the fire towards the urban areas?
A. Well, words to that effect, yes. I don't
know that I would have used "gusts" but a
strong westerly wind would be expected later
5 in the week.

Q. Did you make any note yourself of what
you'd said at about that time or soon after?

A. No, I didn't.

10

Q. So in giving evidence on 13 October, as to
that issue, you were working off your memory?

A. That's correct.

15

Q. As to what was said effectively nine
months ago?

A. Yes.

20

MR JOHNSON: Could I have one moment,
thank you, your Worship?

THE CORONER: Yes, certainly.

25

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

THE CORONER: Yes, Mr Stitt.

<CROSS-EXAMINATION BY MR STITT

30

MR STITT: Mr Cheney, at page 247 of the
transcript, you gave evidence about your
qualifications, including the fact that you
were a lecturer in combustion physics and
chemistry, which was part of the VSC forestry
35 course. Do you remember giving that evidence?

A. I think that's in my curriculum vitae,
sir.

40

Q. Does that follow that you have relevant
expertise in combustion physics and combustion
chemistry so far as it relates to forestry
fuels?

45

A. In my capacity as research leader, I have
two physicists who are working under me.

Q. I'm just asking about you. Do you have expertise in combustion physics and combustion chemistry insofar as it relates to forestry fuels?

A. I'd say practical expertise.

Q. Did you in fact lecture in that subject on combustion physics and combustion chemistry?

A. Yes.

Q. At page 285 of the transcript, you gave a description of what happens during combustion, and you said this:

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'd like to name. Because the reaction is a chaotic one where the fuels are literally torn apart and then reformed in a number of different hydrocarbon combinations.

Was that a description of combustion chemistry in action?

A. Yes, sir.

Q. Some of the products of combustion - carbon monoxide and carbon dioxide?

A. Carbon dioxide is the principal combustion gas. Small amounts of carbon monoxide are also produced, yes.

Q. And are each of those gases highly toxic to humans?

A. I wouldn't say that carbon monoxide is highly toxic in the amounts that are produced in a bushfire.

Q. Just at the moment could I ask you - we'll get to the amounts in a moment - are each of those gases toxic to humans?

A. Yes, they can be toxic to humans.

5 Q. Indeed, was that what you were talking about at page 282 when you gave evidence about firefighters who died at Daylesford? You said at page 282:

They had just managed to get on to the burnt area. They were overcome by hot gases and were killed.

10

Were they the gases that you had in mind?

15 A. I think they were primarily killed because their airways were burnt. I don't think the evidence that was presented at that inquiry was that they were killed by carbon monoxide or carbon dioxide poisoning. It was more the temperature they had breathed in.

20 Q. Is it a fact that humans can breathe in carbon dioxide and carbon monoxide as a product of combustion with fatal consequences?

25 A. In a closed situation, that can be quite common. In an open situation such as a bushfire, I am not aware of any incident where that has happened.

30 Q. If, in fact, there was present in the blood chemistry of some of the deceaseds into which her Worship is inquiring either carbon dioxide or carbon monoxide, would that be consistent with the products of combustion to which you've just referred?

A. Yes.

35 Q. And is, therefore, the danger of inhaling carbon dioxide one of the dangers associated with bushfires?

40 A. Again, in the open situation that bushfires are burning, the concentration of carbon dioxide and carbon monoxide is so small that people who have been working --

Q. The question is: is it a danger? It's either yes or no, with respect, Mr Cheney.

45 A. It is a danger, but I have to say it's

a relatively small one.

5 Q. Now, you gave some evidence about the dynamics of fire in forests. Indeed, you've given quite a lot of evidence about that. Is that a product which is complex and scientific to study?

A. It is.

10 Q. It's a subject that you have devoted your professional life to, isn't it?

A. Yes.

15 Q. And it involves a great many complex questions and complex issues to understand the dynamics of the fire and the circumstances under which that fire occurs; do you agree?

20 A. In detail, yes. But we attempt to put that so that we can give practical guidelines to people.

25 Q. I understand that, but that's not what I'm asking you. I'm asking you about the study. Do you agree that the study of fire dynamics is a complex and scientific one, particularly in forests?

A. Yes.

30 Q. And it has a number of factors which are relevant to those dynamics, including obviously the fuel; do you agree?

A. Yes.

35 Q. The prevailing terrain?

A. Yes.

Q. The weather conditions?

A. Yes.

40 Q. Including heat and wind?

A. Yes.

Q. Direction of wind?

45 A. Yes.

Q. And the actual dynamics of the fire itself as it moves through a fuel load; do you agree?

A. Yes.

5

Q. That science is quite different from the scientific study of fires in an urban environment, is it not?

A. Yes.

10

Q. That study requires equally complex and scientific matters but of quite different complexity; do you agree?

A. I agree.

15

Q. Because obviously in an urban environment you are dealing with different fuels?

A. Yes.

20

Q. Fuels that have different chemical composition?

A. Yes.

25

Q. Fuels that have different concentrations?

A. Yes.

Q. Fuels that may respond in a quite unexpected way?

A. Well, yes.

30

Q. And you are also, when one's concerned with fires in an urban environment, again concerned about the movement of that fire through the urban areas; is that so?

35

A. That's so.

Q. And that movement, do you agree, also depends upon a number of complex factors, such as prevailing wind?

40

A. Yes.

Q. The nature of the fire itself?

A. Yes.

45

Q. The type of fuel that is being consumed?

A. Yes.

Q. And a number of other factors quite separate and distinct from those factors that bear upon the science of fire dynamics in a forest?

A. Well, not all are separate and distinct.

Q. No, there are some --

10 A. There are some, yes.

Q. But it's certainly not a simplistic matter, the study of the movement of fire in urban structures, is it?

15 A. No.

Q. Mr Cheney, we have heard a lot about this what I call American jargon of "urban interface". Nobody has defined it for us. What do you understand by an "urban interface"?

20 A. The point where urban development or urban buildings abut a vegetated area.

Q. Do you agree that the urban interface, and I apologise for using such a grotesque phrase, could consist of, for example, in this case the Tuggeranong Parkway?

25 A. Yes, although that's not normally considered the definition.

30 Q. But it would meet the definition, would it not?

A. It's usually buildings which are associated with --

35 Q. I understand that, but I'm asking you about a structure such as the Tuggeranong Parkway. Do you believe it could meet such a definition?

40 A. I really don't think so because you would have all highways classified in that as urban interfaces, which would not make a lot of sense.

45 Q. Let's come to the specifics. In this case,

would you say that the urban interface with the suburbs of Duffy and Chapman was to be drawn where the pine forests ended?

A. Yes.

5

Q. Or would it be drawn where the parkland between the pine forest and Eucumbene Road ended?

A. Both would --

10

Q. Or would it be Eucumbene Road itself?

A. Both would be considered as the urban interface and the road would be a point or a structure which separates those two.

15

Q. Would it be the front fences of the houses in Duffy? Would that be the urban interface?

A. If we're talking about spatial separation on the urban interface, we normally talk about from the fence to the vegetation.

20

Q. So it's the fence on the house that you normally describe as the point of urban interface; is that your understanding?

25

A. No, my understanding it has a concept of area in it which goes from the back fence out to the vegetation.

Q. Or in the case of the Duffy houses that fronted on to Eucumbene Drive, the front fence?

30

A. The front fence or, if they weren't there, the property line.

Q. Not the structures themselves? Is that part of the urban interface?

35

A. As I say, I believe there's an area concept which includes the structures, the gardens, any separation of fuels between those within the private property and those within property adjacent to it.

40

Q. Did you have regard to that spatial concept when you prepared these maps? And I particularly refer to the slide of the McIntyre Hut fire of 18 January of 1515, 1530, 1545, and

45

so you are at no disadvantage you should have those in front of you, Mr Cheney. Do you have them there?

A. No.

5

THE CORONER: I think we're making arrangements to bring them up.

MR STITT: I thought Mr Cheney had those in his bag.

10

THE CORONER: You don't have the hard copies of the slides?

A. I have the slides, but they're very small. I don't know what detail Mr Stitt wants to go into.

15

THE CORONER: We'll bring them up on the screen.

MR STITT: Slide 71 and slide 76 might be helpful, please. We can just start with that one. That is a map which shows the progress of the McIntyre Hut fire past Mount Stromlo and on to the edge of the suburb of Duffy, does it not?

25

A. Yes.

Q. And as it's drawn there, the fire is not shown as entering the suburb of Duffy but rather stopping at the urban interface, does it not?

30

A. That's correct.

Q. But is it not a fact that, as at 1515, the fire, in truth, had passed beyond the urban interface and was well within the suburb of Duffy?

35

A. Yes.

Q. And I'm not being critical, but to that extent that map is somewhat misleading, is it not?

40

A. Not where the lines are drawn. That line indicates where the fire was burning in the fuels across the road from the suburban area. I

45

didn't attempt to --

Q. Do you agree with me that, as it's shown there, it appears as though the fire has
5 stopped at the urban interface of Duffy?

A. Yes.

Q. And I don't want to waste time over it, but you agree with me that, in truth, the fire
10 had progressed well beyond that urban interface by the time of 1515?

A. By 1515 I believe it had penetrated a couple of blocks into Duffy.

15 Q. Could we then go, please, to the 76 slide. That's a close-up version of the previous one. Again, it shows the fire stopping at the urban interface of Duffy. And you agree with me that by that time in truth the fire had moved well
20 beyond the urban interface and into Duffy; is that accurate?

A. Yes.

Q. Could we look then please at 77. Again, that's showing the fire at 1530 hours from the
25 McIntyre Hut fire. Again that map shows the fire ceasing at the urban interface of Duffy but, again, in truth, the fire had progressed far beyond that point, had it not?

30 A. Yes.

Q. And, again, to that extent that map is somewhat misleading, is it not?

A. It is incomplete.

35 Q. It's a map which purports to show the progress of the fire at a particular temporal point - namely, 1530 - sorry, yes, 1530 hours; isn't that so?

40 A. Yes.

Q. Well, at that temporal point, in truth, the fire had progressed well beyond the point shown on that map?

45 A. Yes.

Q. Does that mean that the fire, in fact, may have entered the suburbs at a much earlier time than shown on these maps?

5 A. I don't believe so from the first map, but my observations from the evidence that was presented was that it entered the suburbs shortly after 1500 hours.

10 Q. But your maps are based on the line image scanning process, which you've explained, and that depends upon the existence of lines of heat, does it not?

A. Yes.

15

Q. Well, would the image scan have shown the lines of heat extending into Duffy?

A. If the image had been scanned at that time, these particular periods were picked up from observations on video and --

20

Q. I was just asking you about the image lines. Would the image lines have picked up the heat in Duffy at a particular time?

25 A. Yes, they would.

Q. Are there in existence image lines which show where the heat was in Duffy at any particular time?

30 A. Not that I'm aware of.

Q. So this is, in effect, a compilation based on the best information available to you?

A. That's correct.

35

Q. But you agree that it's inadequate to the extent that it does not show the extension of the fire into the suburbs of Duffy as at that time there delineated?

40 A. Certainly.

Q. Now, in your study of fire dynamics, I take it that it's possible to make quite scientific judgments about the rate, progress, spread and intensity of a particular fire;

45

is that so?

A. We use science to make those predictions. I'd have to say there is a fairly wide error band on any prediction that's made because of the variability which is generally unmeasured of the fire.

Q. But the purpose of the study of fire dynamics is to permit assessments, if you like, or judgments to be made about the way in which a particular fire may or may not react, if that's the right word; isn't that so?

A. Well, yes, to predict its - it's basically to predict its speed of travel as far as possible.

Q. And the speed of travel involves concept of spread, does it not?

A. Oh, yes.

Q. Now, you've explained in careful detail about the progress of these respective fires. But do you agree with me that this fire on the 18th and perhaps the days before did not follow the standard behaviour of bushfires?

A. No, I wouldn't agree with that.

Q. Did you ever make that statement to anybody?

A. I don't think so.

Q. Is it a view which you have held at some time that this bushfire did not follow the standard pattern or behaviour of bushfires?

A. The observation of a fire being --

Q. No, did you ever hold that view that this bushfire did not follow the standard pattern of behaviour of bushfires?

A. I don't think so.

Q. And you've never expressed that view to anybody?

A. I don't think so.

45

Q. Let me suggest to you a couple of things that would indicate that this bushfire did not follow the standard behaviour of bushfires. Do you agree with me that this bushfire, certainly
5 on the 18th, had the embers preceding the fire front rather than following the fire front?
A. I would agree with that.

10 Q. Do you agree that that state of affairs is not the standard pattern of behaviour of bushfires?
A. No, I don't.

15 Q. Do you not agree that the embers normally follow the fire front?
A. There are embers that are preceding the fire front which create spot fires ahead of the fire, and that's present in all fires once
20 the wind strength exceeds a certain value which is not very high.

Q. Did you in the course of your evidence do drawings to explain the movement and profile
25 of flame?
A. Yes.

Q. And in that evidence did you not explain how the flame moves up and forward and embers
30 come behind because of the downward effect of the following wind? Wasn't that part of the evidence which you gave?
A. That is correct.

35 Q. And you gave that evidence, I take it, because you were illustrating the standard behaviour pattern of bushfires?
A. I was illustrating the downdraught, which picks up a lot of embers which do follow behind
40 the fire front. I didn't say at any time, I don't think, that embers precede the fire front.

Q. But is this an accurate statement, that
45 you, speaking about the fire on the 18th of

January, had never seen an ember attack like this before?

A. Of that magnitude, yes. I would say that's correct.

5

Q. Did you say that?

A. I would say that's a correct statement.

Q. And was that your opinion and belief?

10 A. Yes, that I had not seen it.

Q. Well, was it not in fact an ember attack of unprecedented proportions?

15 A. I would believe that, under those conditions, there were other fires that would behave exactly the same way. That's why I don't think it is particularly unique and, at the levels that I have observed this phenomena, which are a lower level, there's certainly a
20 large mass of embers that follow behind the fire front, and I have observed that on lower intensity fires. I had not observed it on a fire of this intensity.

25 Q. So this fire had, amongst other things, the relevant pattern of embers that there was a huge quantity of embers preceding the fire front and a huge quantity of embers following the fire front; is that accurate?

30 A. It's normal that the amount --

Q. No, I'm just asking about this fire on this day. Is it true to say that this fire had a huge quantity of embers preceding the
35 fire front and a huge quantity of embers following the fire front; is that accurate?

A. I would say no because you'd have to quantify "huge". It had embers preceding and a huge amount following.

40

Q. How would you qualify "huge" in that answer, Mr Cheney?

A. There's a very big difference in the relevant numbers.

45

Q. But in this fire on the 18th, there was in truth a substantial ember attack which preceded the fire front, was there not?

A. There was.

5

Q. And the fire front was followed by a substantial ember attack, if that's the right word?

A. I don't think it is, but that's used.

10

Q. You're the expert.

A. I don't know a better word.

Q. What word would you like to use, if it's not an ember attack?

15

A. A substantial number of embers.

Q. Now, so far as the embers were concerned, is it a fact that the behaviour of the embers depends again on a number of factors?

20

A. Yes.

Q. And does the type of fuel from which the embers are being drawn have an effect on the forward spread both of embers and of the fire?

25

A. Yes.

Q. Do different pine trees create different embers?

30

A. Different conifers would be a better way of putting it. Different trees create different embers, yes. Most pines have very similar embers, high genus pines.

Q. But the pine forests through which this fire moved, after it crossed into the ACT, were trees of a particular genus, were they?

35

A. They were mostly radiata pines.

Q. Were there other kinds of pine?

40

A. Not in great numbers.

Q. Do you agree that pines of different types throw different embers?

45

A. Yes.

Q. Which genus of pine throws the worst ember?

A. I don't know that I could answer that.

5

Q. Another factor which I suggest this bushfire exhibited which did not follow the standard behaviour of bushfires was the surprising pattern of house destruction; would you agree with that?

10

A. Yes.

Q. And the surprising pattern of house destruction manifested itself in the suburbs of Duffy, Chapman and Kambah, did it not?

15

A. Yes.

Q. And what was surprising about the house destruction was that it occurred in circumstances where it was not ever envisaged those houses would be burnt by bushfire, wasn't it?

20

A. No.

Q. Well, did you not think that there were areas which you thought were safe but, because of the extraordinary high winds, they ceased to be safe?

25

A. The depth of penetration of house destruction was what surprised me.

30

Q. And that was a view that you formed after looking at the damage and the destruction shortly after the fire on the 18th?

35

A. Yes.

Q. Is that so?

A. That's correct.

Q. And what you thought was that you were surprised by the burning material coming out of the forest and the paddocks and the extent of the spread of that material; isn't that so?

40

A. More out of the paddocks than the forest.

45

Q. But, from whatever source, you were surprised at the extent of the spread of that burning material?

A. Yes.

5

Q. Wasn't that another factor that made this bushfire different from the standard behaviour patterns of bushfires?

A. It was different to the normal pattern because it was of higher intensity.

10

Q. And did that mean that areas which you thought were safe turned out to be unsafe?

A. Yes.

15

Q. And that involved areas in the suburbs of Duffy, Chapman and Kambah?

A. Yes.

20

Q. Now, you have explained to us the dynamics of the fires as they progressed towards Canberra and you have explained the joining up of these fires. Did that joiner of fires add to the intensity of the burn?

25

A. Yes.

Q. In what way?

A. In increasing the spread of the fire between the established patterns of Bendora and the McIntyre fire.

30

Q. Was that something that you thought would happen?

A. No.

35

Q. Did that take you by surprise?

A. It was surprising, yes.

40

Q. When did you become aware that these fires had, in truth, merged?

A. I would say probably in the afternoon, about 4 o'clock in the afternoon.

45

Q. Of?

A. Of the 18th of January.

Q. Is this the position that, prior to 4 o'clock on the afternoon of the 18th, you personally did not anticipate these fires to merge in the way in which they did?

5

A. I expected them to merge, but it's correct, not in the way in which they did.

Q. How did you expect them to merge?

10

A. I expected they would have drawn together the two - that the interaction of the two fires would have drawn them together.

Q. But when that occurred, did you understand that the intensity of the fire would then, thereby, be greatly increased?

15

A. Not to the extent that it was. You normally get some increase of intensity when fires draw together, but not the intensity of the fire that came through between the two fires.

20

Q. When did you believe that that merger would occur?

25

A. I don't know.

Q. I'm sorry?

A. I don't know. I can't answer that question.

30

Q. Well, did you put your mind to it prior to the 18th?

A. It would occur some time during the 18th? I didn't have any - didn't make any prediction of when it would occur.

35

Q. The wind which was driving this fire or these fires on the 18th was extremely high, was it not?

40

A. It was high.

Q. And did the pattern of this wind conform with the standard behaviour of bushfires, as you expected it?

45

A. Yes.

Q. Did you not say that you thought that the wind was in a surprising pattern?

A. I don't think so.

5

Q. The surprising pattern being that the wind preceded the fire front; did you not say that?

A. No, I'm sure I didn't.

10 Q. Did you ever have the view that the wind preceded the fire front?

A. The wind is all around. What normally happens ahead of the fire front and happened on these fires is that there was a lull in the
15 wind strength before the fires actually hit, and I observed that and that was observed by other people.

Q. But didn't you think that the pattern of the wind in this fire was somewhat surprising?

20 A. No.

Q. Did you not think that the direction that the trees were broken off - namely, that they
25 were all lying in the same direction - was inconsistent with a circular, twisting wind? Did you not think that?

A. In the area of - no, I think - I didn't
30 think that they were all lying in the same direction because that was not how they were lying.

Q. Did you take part in a Project Vesta?

A. Yes.
35

Q. Was that a project after the fire?

A. No.

Q. When was the Project Vesta?

A. Planning started in about 1990 and the
40 field work was carried out between 1995 and 1999, and we are still writing up the results.

Q. After the fire, did you in fact do an
45 investigation and examination of the fire and

its aftermath?

5 A. Well, I did the examination that produced these maps and I did inspect the fire damage mostly in the rural areas, particularly where the fire tornado burnt through from Pierce's Creek through to Mount Arawang.

10 Q. Did you think, based on your investigation, that this fire spread three times faster than you previously thought possible?

15 A. That is the fire coming through the centre between the Bendora and the McIntyre's fire, that's correct.

20 Q. Well, is it accurate to say that you, following your investigation, came to the view that this fire spread three times faster than was previously thought possible?

25 A. You would have to identify that part of the fire. The head fire of both the McIntyre fire and the Bendora fire, when they came out of the forest, did not spread as fast as other fires that I have studied. The fast section of the fire was the section that came through between the two fires.

30 Q. Was that the fire that originated - I'm sorry, where did that fire originate?

35 A. That originated back on the Goodradigbee River and burnt initially to the south along the Goodradigbee Valley and then came from the west between the flanks of the two fires that were already approaching or had almost reached the Canberra suburbs.

40 Q. And it was, as you say, that fire which spread three times faster than you thought possible?

A. That's correct.

45 Q. You gave some evidence at 332 and you said this when you were talking about the fire on the morning of 18 January, and so that you are at no disadvantage, I'll just read what you

said:

5 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 the 18th of
 January, they were getting similar
 conditions to the day at around about
10 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
15 control action when the fire goes into
 the very high range.

Do you remember giving that evidence?

20 A. Yes, I do.

Q. Did you mean to convey by that that by
 8 o'clock on the morning of 18 January, in
 truth there was nothing which could have been
 done to control this fire?

25 A. That's correct.

Q. Was that a judgment that you had made at a
 time earlier than 8 o'clock on the morning
 of the 18th of January?

30 A. It would be a judgment that I'd have
 formed on the morning of 18 January, yes.

Q. No, I asked you did you form that judgment
 at an earlier time than 8 o'clock on the
35 morning of 18 January?

 A. The judgment I formed - I made or maybe
 statements that I made was that if we got
 extreme weather, the fire would be impossible
 to stop.

40

Q. But you knew that extreme weather
 was forecast, did you not?

 A. Yes.

45 Q. When did you know that?

A. Probably the night before.

Q. Was there an earlier time than 8 o'clock
on the morning of 18 January when, in truth,
5 this fire was uncontrollable?

A. With the resources available, yes, I would
say.

Q. When was that?

10 A. Probably the 16th of January.

Q. Is it your evidence that, prior to the
16th of January, with the resources available,
the fire was then controllable?

15 A. I had severe misgivings from 13 January
myself.

Q. Does that mean that, from 13 January, you
formed the view that, with the resources
20 available, it was highly likely that this fire
would be uncontrollable?

A. Yes, it was.

Q. And when a fire is uncontrollable, does
25 that mean it just simply burns wherever nature
takes it?

A. Yes.

Q. How does one then predict where nature is
30 going to take it?

A. The fires are driven by the wind and so
you use the prediction of the wind direction
from the Bureau of Meteorology and the wind
patterns - the general synoptic wind patterns
35 that are likely to come during the day.

Q. I want to come back briefly to the
combustion products of burning and the dynamics
of burning. Do you agree that in a fire of this
40 intensity the gases mix turbulently?

A. Yes.

Q. Do you agree that the oxygen surrounding
the flame is burnt?

45 A. Yes.

Q. And depending on the intensity of the flame depends on the quantity of oxygen which is so consumed?

5 A. Yes.

Q. If, in fact, you have a fire of the enormous intensity of this fire, do you agree that a considerable quantity of oxygen is burnt by the progress of the flame?

10 A. Yes.

Q. I realise this is not your field of expertise, but do you agree that in that situation the burning of oxygen can create a situation where structures implode?

15 A. I'd say it's not my area of expertise.

Q. All right. I don't want to pressure you. Have you seen situations where structures implode - not explode, but implode?

20 A. I have seen neither.

Q. Or the effects of?

25 A. No.

Q. Thank you. Now, you said that the fire and the flame profile precedes - I withdraw that. You said that, in respect of this fire, the flame profile preceded with great intensity and that the temperature of the flame at its top might have been as high as 3,000 degrees Centigrade?

30 A. No, the figure was 300 degrees Centigrade.
35

Q. But you went on to say that, lower down in the flame, the temperature could raise to something of the order of 1,200 degrees Centigrade?

40 A. That's correct.

Q. And you went on to make plain that the progress of the flame and the profile of the flame being driven by the wind was such that, when it left the pine forest, it came out more

horizontal than vertical?

5 A. Yes, when it loses the buoyant convection from the massive fuel within the pine forest that's being burnt, the last part of the flame is being blown straight out generally at a low angle.

Q. And when you say "a low angle", you mean at a low height above the ground?

10 A. Well --

Q. Compared with the other top of the flame in the forest?

15 A. The flames then are basically coming from the last part of the canopy that's burning and, because of the downdraught that follows behind the flame, these may have been directed downwards in some circumstances.

20 Q. Now, does that mean when this fire emerged from the pine forest at - let's just take the Eucumbene Drive. When that fire emerged from the pine forest at whatever time it was - 4 o'clock or whatever - it then emerged with a flame profile which was travelling more horizontally than vertically?

25 A. When it first emerged, the flames had a high angle, and that was evident in the video we saw yesterday. As the pine forest burnt out, 30 the last residual burning of the pine forest is more likely to be horizontal or even at a negative angle.

35 Q. And does that mean that temperatures of the order of 1,200 degrees Centigrade are then carried in a horizontal plane forward?

A. Only to the extent that the flames extend forward.

40 Q. And the extent or length of those flames would then depend on a number of factors, such as fuel, wind and prevailing conditions?

A. They principally depend on the amount of fuel that's left within the tree canopy.

45

Q. But it's not unreal to say that, when the fire emerged from the pine forest at Eucumbene Drive, the flames were then travelling in a horizontal position at temperatures up to 1,200 degrees Centigrade?

A. Yes. Parts of the flames were of that temperature.

Q. And then the additional complicating factor was that the flames then went up over the structures such as the houses in the suburbs of Duffy, Chapman and Kambah?

A. The flames that then went up over the houses were flames that were generated by the fuels around the houses.

Q. Those houses having been apparently set alight by the passage of the flame?

A. They were set alight by --

Q. Whatever.

A. Whatever, yeah.

Q. But once they were alight, the wind was of such intensity that it would carry those flames further into the suburb; is that right?

A. Yes.

Q. And that's in fact what happened?

A. Yes. There was movement through the suburbs because of the vegetation within the gardens, because of vegetation within walkways and park areas, and from house-to-house contact where flames from one house were blown on to the residence next door.

Q. But blown by the presence of this wind at whatever intensity it was blowing?

A. Yes.

Q. And I think you in your report said that that part of the wind which travelled between Chapman and Kambah was of tornado force, perhaps 200 kilometres per hour?

A. That's correct.

Q. And that passage of wind was then followed by the attack of embers, if that's the right word; was it not?

5 A. Immediately behind the path of the vortices, yes.

Q. I don't want to go over old ground, but that ember attack was of considerable quantity?

10 A. Yes.

Q. And the ember attack was not only considerable quantity in terms of volume but also in terms of heat, was it not?

15 A. Yes, although the heat was not - once the flames had passed, the heat was not excessive.

Q. But the embers themselves contain heat, do they not?

20 A. Yes.

Q. And depending on the size of the product and the actual fuel, the temperature of the ember can vary, can it not?

25 A. Yes.

Q. And some of the embers in fact travel with high temperatures?

30 A. Yes.

Q. And they remain as high temperatures until eventually they extinguish themselves through lack of fuel?

35 A. They burn out, yes.

Q. And it's not possible, is it, to assess the temperature at which these embers were following the fire front, particularly where you had winds of that magnitude?

40 A. The temperatures would have the temperature of glowing - cellulosic materials and they would be in the order of 500 to 600 degrees Celsius, and that's the temperature of combustion. The temperature is not increased by
45 the wind because they are being carried forward

by the wind. So the relative wind speed on the
ember is low.

5 Q. But it has a factor in maintaining the
burning, does it not?

A. They burn because they're dry and they
burn regardless of the wind until they burn
out.

10 Q. The evidence which you gave about the
intensity of this fire is I think reasonably
clear. But you expressed the intensity in
kilowatts per metre of fire edge with the
equation 'I' equals 'H' times 'W' times 'R'.

15 A. That's correct.

Q. That's the standard basis upon which fire
intensity is calculated?

A. Yes, for vegetation fires.

20

Q. Now, the intensity of the fire depends
again on a number of factors, does it not?

A. It depends principally on those three
factors, which is the heat of combustion of the
fuel that's being burnt, the --

25

Q. And that's expressed in kilojoules per
kilogram?

A. Yes, that's the heat content of the
material, the actual amount of fuel that is
consumed - and that's the 'W'. It's not the
amount that is there, but the amount that is
burnt and then the rate that that is burnt,
which is expressed by the rate of spread of the
fire.

35

Q. Now, the rate of spread means the rate
over which the fire travels through the fuel
load?

40

A. Yes. It's the rate that that metre that
we're describing - and it is in kilowatts per
metre because we're describing a metre edge of
the fire - the speed that you project that
metre over a certain time period.

45

Q. And, if that speed increases, does the intensity of the fire increase?

A. The other factors being the same, yes.

5 Q. The speed or the rate of spread would depend, would it not, on the wind?

A. Yes.

10 Q. And where you had a wind of the speed we are here concerned with, does that add to the intensity expressed in kilowatts per metre?

A. Yes --

15 THE CORONER: Are you talking about the 200 kilometre an hour wind in the tornado or are you talking about - because the wind speed through various days and the progress of this fire varied?

20 MR STITT: Your Worship is absolutely correct, and I didn't make it clear and I apologise. I was wishing to confine myself to the 18th. I'm sorry, Mr Cheney, I was really talking about the prevailing conditions on the 18th between,

25 say, 8am and Armageddon?
A. Can I finish your question?

Q. Yes, please.

30 A. It also depends on that position of that metre relative to the direction of the wind. At one extreme you have the back of the fire, a fire progressing into the wind, and its speed is not affected by the wind speed and is travelling very slowly. So you have a range of

35 intensity around the fire perimeter which varies from a minimum of the upwind edge of the fire to a maximum at the downwind point of the fire.

40 Q. If we can just take the downwind point of this fire on the 18th. What assessment did you make of the intensity of this fire at or shortly before it entered the suburbs of Canberra expressed in kilowatts per metre?

45 A. I have not made a numerical calculation of

that intensity at this point.

Q. Well, are you aware that it's been suggested that it was as high as 100,000?

5 A. I suspect - without doing the calculation, I suspect that that's high.

Q. Too high you mean?

10 A. It's a bit too high.

Q. Where would you, doing the best you can, put it?

15 A. Off the top of my head - and I have to say it's off the top of my head - I would put it around 60,000 kilowatts per metre.

Q. Per metre?

A. Mmm.

20 Q. But however expressed, it was a fire of great intensity?

A. Oh, yes.

25 Q. Were you aware as to what advice residents were given on the 17th?

A. Only through listening to public radio.

Q. You, of course, didn't participate in that exercise?

30 A. No.

Q. If late on the 17th advice was given to residents and others that they should not be unduly concerned about the progress of this fire, would that have been advice that you agreed with?

35 A. No.

Q. Does that mean that, in your judgment, late on the 17th residents and others such as providers of utilities should have been given different advice?

40 A. Yes.

45 Q. You gave some evidence, and you made it

clear, that you didn't actually accept the concept of fire ball.

A. Yes.

5 Q. I remember you said it's frequently expressed as a fire ball when in truth it's a crowning effect from the trees.

A. It's flames - I think my understanding of what people perceive as fire balls are simply
10 flames of different dimensions.

Q. But they have another or additional characteristic, do they not, in that they carry forward in a ball shape?

15 A. Well, that I think, but I don't know how other people think, but as far as I can gather there is this impression that there is a ball of flame which separates from the fire and is carried some considerable distance downwind.

20 Q. And just assume for a moment that that is an accurate description. Does that mean that the flame which has been separated from the fire front is actually launched much further
25 ahead of the actual fire front?

A. Well, that would be implied with that concept, yes.

30 Q. And the distance that it travels obviously would depend upon the sort of factors you've been talking about?

A. The problem with it is that the material is - there's a limited amount of gas which can burn in context with the oxygen and it
35 principally burns out before it can travel much distance unless it's somehow confined, as I tried to explain during my evidence.

40 Q. You said that the rate of spread at or before 1545 on 18 January was at approximately 25 kilometres per hour. Do you remember giving that evidence?

A. I thought I said 20 kilometres per hour,
45 sir.

Q. But did that rate of spread during the 18th increase?

5 A. No, I think that was the average rate of spread of the fire that was penetrating between McIntyre's and Bendora fire.

10 Q. When we saw the video yesterday of the fire coming over Mount Arawang which seemed to my untrained eye to be travelling very fast, was that travelling at a rate of spread of 20 kilometres per hour or was it faster?

15 A. There are individual parts which probably would have been faster because the fire reacts like the wind and some parts are faster and some parts are slower. Normally you can only measure the average rate of spread.

20 Q. But in that video we saw the tongue of fire on one side and the tongue of fire on the other and then the two sort of joining up as they came down the hill and they seemed to be travelling very rapidly. Did that joining up effect increase the rate of spread?

25 A. Yes, it would have, locally behind the hill, yes, that's correct.

30 Q. Well, I know it's difficult but, in respect of that rate of spread, what would be your assessment of the speed at which it was then travelling?

35 A. I suspect it could have been between, you know, 30 kilometres per hour over short distances in that area, but I haven't measured that.

40 Q. In your judgment, was the time at which this fire was likely to reach the suburbs of Canberra an important topic?

A. Prior to the 18th?

45 Q. At any time?

A. Oh, yes.

Q. And as you've said, you were not consulted to express an opinion about that matter?

A. That's correct.

MR STITT: Nothing further.

5 THE CORONER: Yes, Mr Begbie, do you wish to ask any questions?

MR BEGBIE: I will ask a few questions, but I'm
10 happy to do so after the adjournment if that's convenient.

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

15 **ADJOURNED** [11.15am]

RESUMED [11.40am]

THE CORONER: Yes, Mr Stitt, you'd finished?

20 MR STITT: Yes, your Worship.

<CROSS-EXAMINATION BY MR BEGBIE

25 MR BEGBIE: Mr Cheney, I'd like to explore a bit, if I could, the knowledge or expectation you had in the days leading up to 18 January as to what might happen with the fires that were
30 burning in the ranges west of Canberra. I think you were aware on 8 January that lightning strikes had ignited fires; is that right?

A. That is correct.

Q. And presumably at that time you had
35 in your mind something like you've expressed that these fires should be attacked fast and immediately?

A. Yes, as a sort of standard operating principle.

40 Q. And you presumably also had in your mind that seven-day rule of thumb that you referred to regarding weather patterns; is that right?

A. That is correct.

45

Q. So at 8 January you might have expected the next dangerous weather to come through on 15 January?

A. That's correct.

5

Q. Were you turning your mind at all at that stage to potential damage to suburbs within Canberra?

A. On the 8th and 9th of January, not directly, no.

10

Q. And I think some CSIRO people were examining the fires then by taking video and that sort of thing; that's on the 8th?

15

A. Yes, a team went out to try and collect data on spot fire distances to see if they could collect perhaps embers or things that were starting spot fires to just build a database on building spotting models.

20

Q. How close an eye on it had you kept over the following days, say, the 9th and 10th?

25

A. My first concern was a selfish one. I went to see a fire that was threatening a property that I share south of Captains Flat and went out to that fire to see what was happening there.

Q. I take it you weren't really turning your mind to the detail of what was happening in the ranges west of Canberra on the 9th and 10th?

30

A. On the first night - on the 9th certainly I was only generally aware of the extent of the spot fire pattern, and when I came back on the 10th, I probably started to turn my mind more towards what was happening around Canberra.

35

Q. Certainly by the 12th you visited Bendora Hut fire; is that right?

40

A. That's correct.

Q. And obviously assessed what had been done at that stage in terms of containment and how the fire progressed over those four days?

45

A. Basically I was interested in how the fire

was burning and how difficult it would be to suppress.

5 Q. Did you still have in your mind on the 12th that seven-day estimate as to the next bad weather cell?

A. Just in general terms.

10 Q. To put it another way, had you gone to the bureau or done anything more empirical than that rule of thumb?

A. Only to follow their forecasts on the Internet. That's the extent that I --

15 Q. And following the forecasts on the Internet, as at 12 January were you still expecting a bad weather cell on around about Wednesday, 15 January?

20 A. Tempered by their reports that at that stage they weren't forecasting bad weather at that time. So I believed their assessment that the normal pattern wasn't going to come through on schedule and it would be a little bit later.

25 Q. So as early as the 12th the firefighters might have had longer than 15 January to work on the fires?

30 A. Yeah, it did seem even at that time it was a prolonged period of easterly weather that was a little unusual for summer in Canberra.

35 Q. Were you considering the risk to Canberra on the 12th, so when you were at the Bendora Hut fire did you have a picture in your mind that this was a fire that might sweep into Canberra?

A. Only in general terms, as a consequence of extreme fire weather it would result in it burning into Canberra.

40 Q. So the big "if", if you like, was whether we would get extreme fire weather?

45 A. Yes. Even if the frontal pattern came through, it may not be associated with extreme fire weather, but it's something that we have

the bureau to forecast.

Q. The 13th was the date on which you spoke
with Mr Lucas-Smith because of a media inquiry
5 that had been made of you?

A. That's correct.

Q. And your view at that time, as expressed
to Mr Lucas-Smith, was that the situation was
10 then very dangerous and that the fires were
likely to burn into Canberra?

A. I think my words were that, if we got
westerly winds as would be associated with the
pattern that I would normally expect as the
15 weather systems form to produce extreme fire
weather, that it would swing to the west, and
if we get westerly winds, the fire could burn
into Canberra.

Q. So in terms of the weather you were
expecting, it's the case, isn't it, that a
westerly wind was going to happen; it was just
a matter of when?

A. Yes.

25

Q. And so when you were speaking to
Mr Lucas-Smith on the 13th, your view is we
will get a westerly and when that happens we
have a dangerous situation; is that right?

A. Yes, and depending on the strength of that
wind it would determine the degree of danger
and how far the fires would spread. But, in any
case, I felt that it was unlikely that we would
get them in under control before that change
35 would come through and, even if that frontal
system didn't push it into Canberra, then -
we'd normally expect two or three of these
systems coming through during the summer
months.

40

Q. So when you gave evidence on Monday,
you said the following:

45 I expressed my opinion to Peter that,
if they asked me [that being the

media], 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.

5

Do you remember giving that evidence?

A. Yes.

THE CORONER: What page is that?

10

MR BEGBIE: That's page 434 of the transcript.

Q. Is it the case that you there summarised
what you said to Mr Lucas-Smith in a way which
perhaps doesn't reflect what you said to him?

15

A. I think what was pretty close. It wasn't
a very long conversation.

Q. Did you qualify that opinion that there
presently was a very dangerous situation and
that the fires were likely to burn into
Canberra? Did you qualify that by reference to
weather patterns - when weather was likely to
arise and how severe it might be?

20

A. No.

25

Q. Was it the case that you had an actual
view then that the fires were likely to burn
into Canberra, or was it the case that you had
a qualified view that under certain
circumstances they couldn't burn into Canberra?

30

A. The latter would be more accurate because
it depended on the strength of the wind
associated with the change.

35

Q. It was the case you didn't express it
that way to Mr Lucas-Smith?

A. I expressed it as an unqualified statement
that if we got strong westerly winds we would
get the fire into Canberra.

40

Q. I don't want to quarrel with you but
you've just qualified it, the qualification
being "if we got strong westerly winds".

A. The "if" was always there.

45

Q. And Mr Lucas-Smith was aware of the "if", as you understood it?

A. As I understood it.

5 Q. Now, obviously we're talking about 13 January, which is some five days after the fire started. Any weather cell that's approaching is coming sooner rather than later; is that right?

10 A. Yes.

Q. So the "if" that you've spoken about is looming larger?

A. Yes.

15 Q. Did you have a personal relationship with Mr Lucas-Smith, in that you contacted him as someone you've dealt with regularly?

20 A. We didn't get in contact on a regular basis, no.

Q. Did you contact him in his capacity as the person who you thought would be responsible for appropriate warnings?

25 A. Well, I knew that the ESB were putting out warnings and I didn't want to be seen to be contradicting their warnings, but I felt I needed to let him know in advance what I was going to say if the media interviewed me.

30 Q. I understand that. And I certainly am not suggesting that you had an independent role, as it were, to contact warnings or anything like that. It's precisely that point you're making, that they were the authority you saw as responsible for the warnings; is that right?

35 A. That's correct.

40 Q. And you didn't want to trammel on what they may be doing by conducting your own interview?

A. That's correct.

45 Q. But certainly at that time you thought there was a warning that needed to be given,

did you?

A. Yes, and if I was asked directly, that's what I would have to say.

5 Q. Did Mr Lucas-Smith know that you had been visiting the fires and you had been following them in the way that you had?

A. I believe so.

10 Q. Through your dealings with other people in Emergency Services, did other people know that?

A. In Emergency Services?

Q. In Emergency Services.

15 A. I'm sure some did.

MR JOHNSON: Your Worship, I object. If it's to be helpful to your Worship, if there's an assumption that we're dealing with Emergency Services, perhaps if my learned friend wants to ask the witness were there dealings and, if so, who and when otherwise it may not be very helpful.

25 THE CORONER: If you're able to do that.

MR BEGBIE: Certainly, your Worship. I start from the assumption that he spoke to Mr Lucas-Smith, and we have at least that degree of dealings.

Did you have dealings leading up to the period of 13 January with people in Emergency Services?

35 A. Before - and I don't know the date - but before 13 January I went into the Emergency Services Bureau and inquired where the fires were, and I was shown, and then I used that information to go and visit them on the fire ground. I met a number of people that I know and discussed the fire fighting that was going on at that stage.

45 Q. Were you having any official role in relation to emergency services before

13 January in relation to providing advice or opinions?

A. No.

5 Q. In the past, had they come to you and sought your opinion in relation to these sorts of things?

A. From time to time, yes.

10 Q. So there was, if you like, that sort of relationship in existence?

A. Yes, I was available to discuss anything.

15 Q. Just moving forward then a couple of days to the 15th. We're now a week after the lightning strikes. And I think you visited the McIntyre's fire Hut on that day; is that right?

A. That's correct.

20 Q. You expressed the opinion at page 371 that:

25 I didn't think they would get it under control, a burnout of that area at that stage, and so I believed it had the potential to escape whatever control actions they were going to make.

30 Do you recall giving that evidence?

A. Yes.

Q. And then you gave evidence that:

35 Under extreme weather I was sure it would come into Canberra.

A. Yes.

40 Q. So by the 15th is it the case that your confidence had grown as to the likelihood of this fire coming into Canberra?

A. Yes. Reluctantly.

45 Q. Sorry?

A. Reluctantly.

Q. Obviously it's not a conclusion you'd come to lightly. I take it you were checking the bureau reports regularly at around this time, the 15th?

A. Only the general weather forecast, not the specific fire weather forecast.

10 Q. Weren't you interested in the specific fire weather forecast?

A. I do my own calculations from the general weather forecast.

15 Q. And were your own calculations indicating that extreme weather was coming?

A. Yes, again, as far as there is an availability to predict wind strength, which is difficult for the bureau to predict.

20 Q. So by the 15th, did you have in your mind a picture that fires could come into Canberra in the way we saw in that video yesterday?

25 A. The general path would be directly downwind of whatever wind direction was forecast, yes.

30 Q. I appreciate that. What I'm asking is perhaps what's going through your mind on the 15th in view of your involvement in the fires at that stage and in view of the calculations you'd made of likely extreme weather; do you understand that?

A. Yes.

35 Q. Did you as a result of that information have a view or a picture on the 15th of January that fires of the kind that we saw on the video would be coming into Canberra?

40 A. Yes, I think that opinion was exactly as I expressed in 1991 or 1992 when I wrote the paper on the impact of extreme weather on bushfires coming into Canberra.

45 Q. So, in effect, what we saw on the video

and what you would have seen after 18 January
married up the kinds of images that you had in
mind three days before the fire?

A. Pretty well, yes.

5

Q. Did anyone contact you from emergency
services at around that time to ask for your
opinion?

A. No, I did go to a morning briefing on one
10 morning, which I think was either Thursday or
Friday, and listened in on the briefing.

Q. Did you express any views at that
briefing?

15 A. Not directly, no.

Q. When we were looking at that video, we saw
a couple of your colleagues driving around I
think it was the Chapman outskirts filming the
20 fire; do you recall that?

A. Yes.

Q. And there was a little bit of audio where
they were saying things like, "Look at everyone
panicking", or something like that. Do you
25 recall that?

A. Yes.

Q. Did you get the impression from that that
30 they themselves weren't panicked at that stage?

A. I didn't think they were. They were
experienced in fires. I think they knew what
the situation was and what they had to do.

35 Q. Had you discussed what was likely to
happen to suburban Canberra with those
colleagues?

A. Not directly. But I sent them to Mount
40 Stromlo to make as many observations as they
could and to withdraw when they thought it
prudent to withdraw, and our objective was to
try to document what was happening.

45 Q. Is it the case that by the 15th, the 16th
and the 17th of January, you were growing

increasingly concerned about the lack of warnings that were apparently being given?

A. Yes.

5 Q. At the same time I think you were growing increasingly certain that fires would hit Canberra in the way that they did; is that right?

A. Yes.

10

Q. I don't intend for a moment to imply any criticism of you in asking this question, Mr Cheney, but would it have been appropriate for you to have advised someone of the opinions you'd formed in those days?

15

A. Well, I didn't attend the briefing and I got the tenure from the briefing that the emergency service people were aware of the situation, except they weren't issuing the warnings at the time that I was briefing them.

20

I talked with Mr Koperberg at that time, and we were both of the same opinion that a serious situation was on our hands, and I expected the emergency service bureau to give the appropriate warnings at some time, and I still felt that it wasn't my role, although immediately after the fires I did feel badly and I felt I could have done more. But in that situation I was hoping that the Emergency Service Bureaus would give the warnings.

25

30

MR BEGBIE: Thank you, sir.

35

THE CORONER: Yes, do you have any questions, Mr Lowe?

MR LOWE: Yes, your Worship.

40

<CROSS-EXAMINATION BY MR LOWE

MR LOWE: Could I go back to your earlier evidence, Mr Cheney, where you talk about the Pago fire which occurred in the area which is not dissimilar to the Bendora fire.

45

5 A. Yes, there's a set of alpine ash which hadn't been burnt, except for a couple of small experimental pockets in that area. But where the fire started was an area that hadn't been burnt since the fire regenerated.

Q. You noted the fire actions taken on the ground at that time, particularly the use of two bulldozers; is that correct?

10 A. Yes.

Q. Do you know where those bulldozers were located immediately prior to the fire?

15 A. No, I don't specifically. But the normal practice was at that time to have bulldozers at Uriarra forestry depot, and very often these were positioned on those days at Bulls Head. But I suspect on that occasion that the bulldozer may have been elsewhere because there
20 was another fire out towards the Mullion at the same time that was occurring.

Q. Are you aware in 2003 where bulldozers are located?

25 A. No.

Q. Mr Johnson has expressed some concern about access to bulldozers. I was just wondering if you could give us any information
30 you might have gathered on the number of bulldozers that you saw at the fire grounds on about the 15th or 12th when you visited? Did you notice any bulldozers on the fire grounds?

35 A. On the 13th there was a bulldozer operating at Bendora, and I only saw one. I understand there may have been two at that time.

40 Q. Do you have any information about the number of bulldozers at the McIntyre fire?

A. No, I can't recall. I have seen the list, but I can't recall the numbers.

45 Q. So there were bulldozers on location but not involved elsewhere on the first stage of

the fire; is that correct?

5 A. Yes, there are bulldozers available, but it is a problem for fire authorities to have arrangements to get these bulldozers and put them in place and, more particularly these days, to get trained operators that can work in the forests.

10 Q. So the availability, if all those are satisfactory, is the manner of the arrangement of having access to them; that is something we should perhaps look at?

15 A. Well, I think that land management agencies and people dealing with the fire in the forests must appreciate that once a fire is beyond a very small stage, and probably something like five hectares, control will only be achieved if you can get a bulldozer to work on the site in conjunction with other forms of
20 attack.

25 Q. One of the things you said earlier in evidence was that the safest time to attack a fire is as early as possible to the time of ignition, and there's been some concern expressed that perhaps that might be too dangerous. Would it be true that, if you look at the size of the fire over a period of time, that each time it doubles the circumference of that fire, which I think you've given evidence
30 to is the active part of the fire, it would increase very simply by geometric relationship to circumferences. If you go from a radius of one to a radius of two, your circumference has gone up by a factor of about three?
35

A. That's a simple way of looking at it, but anybody approaching a fire has to make an assessment at the time and determine the strategy of attack that they're going to use.
40 For example, on the McIntyre's fire, I believe on that slope and the rate that it developed in the first hour or so - by the time even the firefighters had gone directly to it, I doubt whether they could have brought the head of it
45 under control before it got to the top of the

ridge.

5 Q. So in terms of the safety of firefighters
at the McIntyre's Hut, that first night which
was on the 18th of January, I think the
evidence that you put in your report suggests
at that point that the relative humidity was
62% with calm winds. Could you perhaps give
some explanation of what the situation at the
10 fire edge would have been like? I notice that
the videos don't actually show the edge of the
fire itself, but the edge of the spot fires.
At a relative humidity of 62%, what would be
happening to the fine fuels and the source of
15 fuel for that fire?

A. To take that question first, the final
fuels are taking up moisture, and it's normal
that in forest fuels there's about a two-hour
lag between the humidity changing and the leaf
20 litter responding to take up moisture. So fires
tend to continue burning a little warmer beyond
the change of humidity. That two-hour lag time
is common for eucalypt leaf litter. Grasses
respond generally within 20 minutes.

25 Very often you get the situation where the fire
is going out in grass and still burning quite
brightly in the eucalypt litter because the
moisture content is lower. Eventually they will
30 come to the same moisture content, but it takes
some time for the eucalypt to take up moisture.

Q. So are you suggesting that the fire front
of the McIntyre's Hut in that evening of
35 8 January very much would be expressing those
sort of conditions?

A. Well, the fire front of the main fire
would have looked very similar to the section
of the spot fire that was on the video, except
40 the spot fire would be burning up towards it
and there was only a couple of hundred metres
separating the two fires, and in that situation
you wouldn't go between them and try to stop
the main front of the fire. You would go to
45 take a line around the spot fires and tie that

back into what roads or tracks were available at the time.

5 Q. In terms of safety of firefighters on the ground at that time, there have been a number of firefighters killed in the suppression of wildfires of this type. This is something you've done some work on, from what I understand from your CV, in relation to dealing with the fire at that point. Could you just explain what work you've done on that? If the firefighters had been committed, is there a way in which they could have been saved from that fire? And, in relation to using the rake hoe technique, are there means by which you could avoid some of the problems that have arisen in previous fires where firefighters have been trapped?

10
15
20 A. The paper that I wrote was to deal with both initial attack and indirect attack, and the warning was that people are most likely to be trapped and burnt, not so much when - certainly not when they're fighting directly on the fire edge, if they adopt a safe work practice of coming in at the lower intensity portion of the fire and suppressing that first and holding it and then working systematically around the edge. But the danger comes when the fire line moves away from the edge of the fire and a more indirect attack is taken which, if there is a change in weather condition, allows the fire to build up between its location and the location of the control line.

25
30
35 The work that that came from was recent work we did in the last decade where if a fire is already established in a long line and the wind changes, it reaches its potential rate of spread for those conditions almost immediately. So the time available for people to withdraw and go back to a safe area, which as a general rule is the burnt out area, an area that has already been burnt, can be too long to escape the onset of the fire rushing up towards the line.

45

Q. So this is now part of a practical approach to implementing rake hoe clear lines in forest areas; that's what you're talking about, isn't it?

5
A. It's a principle that applies to any method of fire attack, whether it's done by rake hoes or bulldozers, that if you get too far away from the line, then you put yourself in greater danger than if you're working close to the fire.

10
As a general rule, we say for inexperienced people that it is safer for them to work right on the edge of the fire where they can immediately assess the difficulty of suppression and problems that they're going to have rather than to fall back some distance and light a burning out fire and hope that they'll be able to control it. The latter seems easier because it's not hot and they're not working close to the fire edge, but in fact it is more dangerous practice.

15
20
Q. In being able to make judgments on the ground, then whoever's controlling the activities of the firefighters needs to have information on that fire; is that what you're saying?

25
30
A. Yes. We were always taught as a rule of thumb that fires look worse at night and look worser from a distance than they are. The only time you can really make that judgment is to get up to the fire edge and evaluate how it's burning and what your options are because just in the topography alone there's as much variation which will assist the firefighter which it's difficult to assess - well, you can't assess remotely; you have to be on the spot and see what the fire is doing.

35
40
Q. So on 8 January, in relation to each of the fires, was there satisfactory access to be able to inspect the fire ground on that evening, and this, on your evidence, is the

safest time to be approaching the fire?

5 A. On the McIntyre's fire there is access to
the western edge of the fire where the fire
started, that is steep access and probably
10 available to light units. I believe they could
have made access up to the back of that fire.
They would have reached the flank where it
crossed the road, and that's where they would
make their assessment. Because the wind was
15 westerly, the likely change was southerly and
it was blowing rapidly uphill, then probably
the only option to them was to control the back
of the fire. But even that action would have
been a useful action on the first night, as I
20 explained, that that made that fire trail
accessible for later control. On the top of the
fire, the video showed the staff that went in
there were in no danger from the fire at that
point.

20 Q. So in --

A. I'll just continue because there's four
fires. On the Bendora fire, there was access to
25 the base of the fire and on the Stockyard fire
the access was difficult because trails had
been overgrown and the time delay meant that
for walking to the area the crews were running
out of daylight to navigate their way through.

30 Q. And on the Gingera fire?

A. The same applied. It was closer to Mount
Franklin Road and a reconnaissance of what the
Stockyard fire was doing could have assured the
35 crews that it would be safe to go through to
the Gingera fire.

Q. And your various slides have shown the
progress of the fires, including each day the
40 fires spread and late at night, and in later
days were there crews at the fires overnight?

A. After the first couple of days, there was
crews at both McIntyre's and Bendora overnight.
On one night they stayed overnight on the
Gingera fire. To my knowledge, I don't think
45 overnight crews were put on Stockyard or

Gingera fire, apart from one night.

Q. Could it be true to say that in those
subsequent days the risk to the firefighters
5 would be greater than the first nights, given
the size of the fires?

A. In general terms, yes.

Q. Thank you. In terms of the western side of
10 the McIntyre's Hut fire, are you aware of the
condition of the Goodradigbee River in terms of
possible trash or fuel build-up?

A. At the time I only had a general
impression. I knew that there were sections of
15 the river that ran through quite inaccessible
gorges because I had fished there in years gone
by, and I knew that in parts there was no
access directly along the river.

20 In terms of the fuels, again, that was only a
general impression. I didn't know exactly what
they were like. But I suspected like most river
banks there were probably blackberries that had
spread in those areas, and they're a hindrance
25 to fishermen too, and the fuels were probably
what you'd expect for an area that hadn't been
burnt for, I'd say, 10 years.

Q. In relation to those blackberries, would
30 you define those as a fine fuel in terms of
their burning habit in relation to the evidence
you've given earlier?

A. They're a fine fuel and you put them in
the same category as a shrub.

35

Q. The condition of the fine forests that
were in Uriarra area and also in Mount Stromlo
- and I note that you've done some work for the
Western Australian Government in relation to
40 the management of their pine forests. How do
does the management of pine forests in relation
to the dealing with the litter or the trash or
weeds affect the ratio of fine fuels to larger
fuels?

45 A. It depends on the management regime that's

being undertaken in the pine forest. In most commercial operations, there are several thinnings which are taking out a number of the trees, often the poorer quality trees.

5 The debris that's left behind from that operation usually includes branches and the tops of the trees which are above or smaller than the marketable limit for the logs that they take out. So you do get an increase in
10 the ratio of heavy fuel to litter fuel compared to a forest which is not managed at all. So pine litter builds up and, more importantly, it's supported on the trash material from thinning operations, so it becomes a more
15 flashier fuel in that circumstance.

Q. So over time, after the harvesting, as the trees mature it's possible that the flammability of the forest increases with the
20 access to readily flammable materials?

A. It goes through peaks, depending on the time of the harvesting operation. After a while, the pine rots fairly quickly compared to, say, eucalypt material. So after five years
25 that tends to pack down again and the pine needles tend to pack.

So in terms of straight flammability, there's a peak shortly after the harvesting operation
30 which then decreases and then will increase when the next operation - what becomes difficult is the total biomass or total mass of fuel that builds up on the ground, plus an increased proportion of log material that makes
35 the suppression action more difficult as the forest materials...

Q. So for commercial forestry operations, would a normal management program have a
40 specific policy in relation to this?

A. Normally they wear the increased risk and the access into the plantations and they focus on direct attack as quickly as possible. There have been some efforts to look at the
45 possibility of fuel reduction by burning within

pine plantations. Pines are more sensitive and the bark is thinner, particularly in the crevices. It's difficult to burn in forests which have piles of thinning slash close to the trees as you'll damage the butt of the tree and leave a scar on it, and that's the most valuable part of the tree for the timber industry. It is possible but it's a fairly delicate operation and requires very close control over the intensity of the fire.

Q. So, in a normal commercial forest, the technique would be to increase direct suppression as the pine plantation matured?

A. That's correct. In previous days the pruning was considered as part of the fire control measure to break that gap between the surface fuels and the canopy, but the economics of pruning for timber production are not very good, so that tends to be put aside these days in most areas.

Q. Could I now ask you just to comment on the fires that burnt into Chapman. The earlier slide we saw which shows the time of the fires at about 1545, could we perhaps have that up, please? I think it's the next one. The tongue of the fire that's coming down from the bottom is the tongue of the fire that burnt to the southern part of Weston Creek, would that be a reasonable sort of comment? I don't think you've got another one that goes to 1600?

A. I don't have a 1600 one, only in general terms. But, by 1600, most of that area south of Duffy as far as Mount Arawang and Namatjira Drive, which is the first road sort of projecting down the bottom of the screen below Chapman, the fire had got to about that point and also in a number of locations further south to Gordon where there were very rapid fill-in between the three fires that were approaching.

Q. This is an offshoot of the fire from the McIntyre's Hut?

A. The lower part was a part of the fire that

had broken away in the Goodradigbee River.

Q. In your evidence, is it correct that you attribute the behaviour of this fire to its
5 interaction with the Bendora fire?

A. That's correct.

Q. Could I ask you a question going back a bit of time - and you perhaps can seek guidance
10 on this. There was a period when the ACT Bushfire Council had some management responsibility for the bushfire area known as the Brindabella National Park, or the ACT Bushfire Council?

15 A. Not strictly speaking. ACT Forests had responsibility for the whole of the catchment as well as the pine plantation areas.

Q. What was the interest to the ACT Bushfire
20 Council that you remember through 1995 in that area?

A. It was an advisory body and it was made up of a number of people, including the heads of the various government departments and rural
25 landholder associations and people like myself interested in fire science.

Q. It is correct the Bushfire Council was interested in the area now generally referring
30 to as Brindabella National Park?

A. After 1939, the ACT Government or the ACT, through the Department of Interior of the Commonwealth Government, took out a lease on
35 that area for fire protection purposes.

Q. So there was an awareness in 1939, or after the 1939 fires, that the management of that area posed a threat to the ACT?

A. Well, that area was where the fires that
40 threatened - that could threaten the ACT in a dramatic way were likely to come from because that was the behaviour of the fires in '39 and that, for the ACT to carry out efficient protection of its plantations and the urban
45 areas beyond, they would have to have the right

to go in and fight fires and later manage the fuels. Initially it was a right to construct fire trails and gain access and go in and fight fires.

5

Q. So there was an acknowledgment, certainly through that time, that even though this area was part of the state of New South Wales the management of that area was a bit of self-interest in the sense that we had a responsibility to make sure the ACT wasn't burnt by taking more than a passing interest in what happened in that neighbouring area?

10

A. Yes, at that stage ACT Forests were probably the largest firefighting force in the ACT region. And so they, through the Bushfire Council, they took an active interest in establishing trails in that area and being able to undertake fire suppression.

15

20

Q. Are you aware at what time that active interest diminished, or did it?

A. I'm not precisely but I think it was around 1995.

25

Q. And what happened in that period?

A. The lease was, I believe, handed back to New South Wales and then it was passed into - or it became national park as a result.

30

Q. And what happened in relation to the management of the bushfire suppression in the ACT at that time?

A. At about the same time - I think the Emergency Services Bureau had already been formed, and I think I have to proceed a bit further.

35

Q. At that time your relationship with Bushfire Council, according to your CV, stopped. What was the reason for that?

40

A. The primary reason - during the 1994 Sydney fires, I had been away during the summer months for long periods and I knew that in the subsequent periods I would be in Western

45

Australia for the next three years over summer. And the by-rule of the council at that time was, if you were away for more than three consecutive meetings, you were not allowed to
5 be on the council, you were rejected from council. As I had previously moved against a member who hadn't attended for three consecutive meetings, I felt obliged to resign myself.

10

Q. Are you aware that in 1970 a number of suburbs of the ACT were gazetted as fire prone?
A. Not specifically, no.

15

Q. Your Worship, there is documentation in the evidence already before the inquiry to that effect and these can be looked at. They include the suburbs abutting the edge of the urban area around Weston Creek.

20

I'd like to ask you a question relating to this southern front of the fire which you said was the faster area spreading in that fire. In your view, did that exceed the speed of the
25 prevailing winds at that time?

25

A. I doubt it. It spread, I believe, rapidly because the winds between the two fires were enhanced by their convection. So the winds pushing in that area were probably higher than
30 what was recorded at Canberra Airport. There's some indication from Tidbinbilla tracking station, which has an anemometer which shows periods of the winds which at the time the fire was running were higher than what was recorded
35 at Canberra Airport.

35

Q. The factors that were affecting this fire, for clarification, would you say they were outside the parameters of normal wildfire
40 expectations?

40

A. We'd never observed it more specifically, or identified it as a particular feature of fire behaviour. We've known for quite some time that fires that are merging do increase as they
45 merged. And, at about this time, I'd been

45

working over some data that we'd had from
experimental fires in Western Australia which
showed exactly the same phenomena happening at
a lower intensity and at lower, less severe
5 weather conditions and the fire burning between
two lines of fire travelled at something like
26 times the mean rate of spread of the
individual fires before they linked up. So it
probably has occurred before, it just hasn't
10 been observed before.

Q. So your observations in relation to this
particular fire in Chapman was it gave you a
bit of empirical evidence to support the
15 experimental fire data?

A. Yes.

Q. So, with that comment then in relation to
the rest of the fires that came from Bendora
20 and McIntyre's Hut, was there any factor in
their behaviour which would put them outside
what you would expect of a wildfire occurrence
in an extreme period in the south-eastern part
of New South Wales?

A. Although our data on wildfires is
25 understandably quite limited but, from what
I've got to compare with, these fires were
travelling through the pine forest at about the
same rate that was observed in 1983 in Ash
30 Wednesday down in South Australia, the fires
that burnt towards Mount Gambier. The rates of
spread across the grassland were in fact less
than the rates of spread if the grass had not
been eaten out.

35 We have a category which describes rate of
spread and eaten out of grassland which is
about a third of the rate in tall natural
grass, and these fires in eaten out pastures
40 were performing as I'd expect them, and it did
have an effect in slowing the fires, the
possible rate of progress across. So I don't
really think - what's unusual is we don't get
these conditions very often, but there wasn't
45 anything that was very different from what we

would observe on other fires under the fire danger index of about 80 or 90 - it peaked at 102 but most of the time it was around 80. And we have had smaller fires on a small scale -
5 the Majura fire exhibited similar behaviour for a very short period to these fires, and that was in 1983, I think, from memory.

10 Q. Mr Cheney, you mentioned about the infrequency of these types of fires. I'd just perhaps like to refer your Worship to this book, which Mr Cheney was associated with certainly insofar as writing the forward for it.

15

THE CORONER: Just for the record, identify that book.

20 MR LOWE: This book is called 'The complete fire safety book'. It's author is Jane Webster. It was first published in 1986, and its acknowledgments include notable input from each of the bushfire councils from every of the States and Territories, and I presume the ACT
25 was involved in some way, although there is no mention of them. I think the valuable part of this, and I'd just like to ask Mr Cheney a few questions, your Worship, in trying to get my mind around what we're dealing with here.

30

The bushfire cycles are mentioned to occur very regularly with major complications - 1851, 1898, 1939, 1983, and that's a sequence of some 40-odd years. There's a secondary cycle talking
35 of exceptionally bad fires every 20 years. The book records a number of factors which Mr Cheney has mentioned here, talking about the effect of the grass and drying out of fire fuels, which you've mentioned in your evidence.
40 It is also relevant that on page 25 of this book - and, if you like, your Worship, I'll just read a couple of sentences out. This is preceded by a discussion about bushfire weather and the likely instance, noting that the
45 south-east of Australia is very highly prone to

these types of incidents:

5 Each weather cycle of a high pressure
 area and the following low pressure
 area lasts about a week (**reading to
 the words**) and some of the weather
 patterns of the south-east part of
 Australia always brings alternative
 hot and cold weather.

10 So the circumstances of this means the evidence
 given by Mr Cheney is corroborated by
 information which is well known and established
 within Australia. In terms of identifying the
15 potential blow-up days for each state, in the
 ACT, it notes the to and north-west winds,
 temperatures above 37 degrees, December to
 March, and the worst period is January to
 February. It would suggest, Mr Cheney, would it
20 not, that, in the situation being formed and
 management of this activity, there is
 information here which would alert you to the
 need of an extreme period?

25 A. Yes.

 Q. The worst bushfire weather is noted in
 this document as being an extended drought, or
 after six to eight weeks of dryness in southern
 Australia or following three years of good
30 rains in the north and north-west. We've
 certainly had periods of that, and Mr Cheney's
 evidence pointed to an extended period of that.
 Plenty of close-growing vegetation, and we've
 seen evidence to that effect. Unstable
35 atmospheric conditions, and we've seen evidence
 of that developing.

 I think the Bureau of Meteorology first put out
 a worst day for the Saturday somewhere in the
40 early part of the week in the morning, and
 certainly Mr Cheney started being alerted to
 that. Air temperature of 30 degrees temperature
 or higher, they there was a few days warning of
 that, and average wind of 55 kilometers an hour
45 in the open, or faster, which was forecast, and

I think on the 8th it's 48 kilometres in the open and relative humidity of 38% or less.

5 In terms of the knowledge that was available to generally manage this fire and in the preparation for the circumstances of the fire, would you agree that this book has been around for a while and has been well and truly refereed and would provide a guidance to
10 anybody that there would be a big problem facing Canberra at that time?

A. Yes, and there were other texts that preceded that one.

15 Q. Could I also refer you to another point that was raised by Mr Stitt earlier in relation to the ember showers, and I'd like to ask a subsequent question to this. This is on page 75 of this book and it talks about burning embers:
20

These burning sparks are known as embers (**reading to the words**) as early as half an hour before it reaches an area.

25 So the progress of the burning and shower of embers preceding the fire is well known, and we've seen that in Canberra here; is that correct?

30 A. As I tried to explain to Mr Stitt, but I think the word "showers" is an exaggeration in that book.

35 There tend to be the larger ones which are carried forward and blown out. The very small ones are often carried up in the convection column and burnt out before they fall back to ground again. So the numbers are considerably less ahead of the fire, so, if you like, you
40 get a very scattered shower prior to the fire coming and the bulk of the embers following behind the fire front when they're not elevated but they're blown directly along the ground or directly out of the vegetation, so if they've
45 got a burnout time of 10 seconds, they're still

alight when they impact on what's downwind.

5 Q. In relation to the Eucumbene Drive to
Warragamba area, the video footage shows very
large amounts of embers occurring there. In
work you've done elsewhere, you note that with
a fire front meeting a fire break, which is the
equivalent of the Warragamba or Eucumbene
10 Drive, particularly in grass fires - and that
was really predominantly what those borders
were - the fire will stop and the fire pressure
from behind will continue on and the flames
will diminish but the embers will go across the
fire break; is that right?

15 A. That's correct.

20 Q. So what happens then on the other side of
the fire break is the likely ignition of the
house or a structure will depend on the extent
of two things. One will be the radiant heat
from the flames, and there may be sections in
Eucumbene Drive where the radiant heat could
achieve that where some of the trees were
closer to the road, but predominantly the
25 radiant heat from the flames would not have
reached across that fire break to ignite on the
other side. Would that be a reasonable sort
of --

30 A. The radiant heat, as I understand it - and
Mr Ellis would be the person who's studied this
more closely - but the radiant heat at an
intensity that is sufficient to scorch or char
material or set it alight purely by radiant
heat didn't appear to be sufficient to do that.

35
40 The radiant heat from the pine plantation at
houses was probably high enough that it would
exceed the pain threshold of someone standing
outside. That means that if you were standing
outside, you would get radiation burns. But the
pain threshold for radiant heat is only about
four kilowatts per square metre, which is a
different unit to fire intensity, and that
figure is only about four times the radiant
45 energy from sunlight. So you are very sensitive

to radiant heat and you can't stand high levels of it, even though this level is not enough to ignite vegetation and the issue of setting a place back from radiant heat level is to allow
5 firefighters in their normal clothing to be able to work outside and put out the spots that are landing when the flames are high and to be outside immediately that subsides.

10 As it subsides, they also have to contend with the convective heat because now the heat has driven - instead of being carried up in the air, it's now being driven directly on to the
15 firefighters which are trying to do the fire fighting or residents outside.

The protection against radiant heat and sparks is principally good solid clothing that you wear. Almost any sort of clothing that covers
20 you up offers some protection against radiant heat compared to your bare skin, and generally the advice is that people wear solid material which is difficult to ignite, like denim jeans and dare I say woollen jumpers and things
25 because wool is difficult to ignite. We have a lot of difficulty getting people to accept that's important.

Q. Could I ask a question about the width of
30 the fire break. In your experience - and, your Worship, there is another booklet which I unfortunately couldn't find, but it's to do with grass fires and grasslands, which includes the information I wanted to discuss with
35 Mr Cheney, but I didn't bring that into the court and I don't have access to it. It talks about the width of fire breaks and the need to have breaks in material to contain the speed and intensity of fires.

40 In relation to a fire break to stop radiating heat going to the other side to ignite whatever materials are on that side of the fire break, is there a general guide as to how wide that
45 might be or an estimate of what you think

a reasonable distance would be?

5 A. If we are talking about a fire break which
is designed to assist firefighting, I guess
sort of in fire terms the wider the better, but
in practical terms it's usually somewhere
10 between around five and 10 metres in the break,
and this is principally to stop on the point of
collapse the flames being long enough to
prevent the flames coming through across and
igniting the fuel on the other side.

15 Q. So in relation to Warragamba or Eucumbene
Drive, how wide would those roads be, do you
think? 20 metres? Certainly more than five
metres.

A. I expect more than 20 metres, and there
was a considerable area of main verge on the
side of the road which had been maintained for
fire protection purposes which, compared to
20 most cities with an urban interface against the
forest, was considerably wider than you'd find
anywhere else.

25 Q. On the basis of these documents which are
both in the market, they're freely available,
they're not restricted in any way, it would be
reasonable to conclude that the anticipated
effect of a fire broaching on to the areas next
to Warragamba or Eucumbene Drive would be
30 primarily from embers which would be carried
across that?

A. That's correct, yes.

35 Q. So in terms of protecting the urban
interface, the issue would be to deal with the
ember flow?

A. Firstly to provide you with a break from
the tall flames so you could work outside --

40 Q. So in terms of the planning of that area,
the Warragamba and Eucumbene Drive and the mown
areas behind that provided a satisfactory fire
break for that purpose?

45 MR STITT: Satisfactory in what sense?

MR LOWE: The capacity of the range of the flames to cross there.

5 A. It was recognised that the pines were carrying a high load of fuel, and over several years there has been a proposal to reduce the amount of fuels within the pines and also to specifically prune them to a higher level than would be normal for forestry operations. Some
10 actions had been taken to reduce the impact of a fire in the pines creating high flames and intense fire across Eucumbene Drive.

15 Q. So the intent of that management was to change the nature of the fire in Canberra to that being primarily of embers?

A. In that particular location to reduce the amount of flames, yes.

20 Q. So I'd like to say that that is something that has been previously recognised that the ember attack across a fire break is that thing that has to be managed, that's the threat that lies in the place of whatever's there?

25 A. A lot of emphasis in the past has been put on the radiant heat glow, and in my opinion there has been undue emphasis on the radiant heat glow, and not enough focus until recently on the ember load coming across breaks.
30 Generally the calculations of radiant heat load have been artificially inflated so that you get sufficient distance which common sense says you should have a considerable distance between the forest and the houses where you're trying to
35 protect.

MR LOWE: That's all, your Worship.

40 THE CORONER: Thank you. Yes, Mr Lasry?

<RE-EXAMINATION BY MR LASRY

MR LASRY: Only one matter, your Worship,
45 arising from that cross-examination.

Q. Mr Cheney, you've been asked some questions about this. I just want to clarify one aspect of it. My learned friend Mr Johnson asked you some questions which touched on the issue of preplanning. I think he put some propositions to you about the heavy demand on plant in south-eastern Australia as at the outbreak of these fires. I think in the course of your answers on that topic, generally you referred to the need to plan for the worst case. Against that background, can I ask you firstly, in the earlier stages of the fire like the Bendora fire, and perhaps for that matter McIntyre's, how significant is quick accessibility to machines like bulldozers and machinery of that kind?

A. I believe it's very important.

Q. Yes. Is that because the breaks can be constructed quickly, and while the fire is still relatively containable, is that the essence of the importance?

A. It's really because once a fire exceeds a relatively small area and somewhere between five and 10 hectares, the task of putting it out becomes too great for men working with hand tools to do and bulldozers have to be brought in as soon as possible and preferably as soon as conditions abate to be able to construct lines where they can. They can't do the whole job, and on particularly steep sections of terrain, maybe hand line construction is still required. But the basics of fire fighting haven't changed since we started putting out fires. We need to separate the fuel from the fire, and the most efficient way of doing this is with a big tractor machine.

Q. Is there a point in the chronology leading up to these fires - that is, over the previous few months and the developing weather conditions and drought conditions - whereby the time the 2002/2003 fire season had arrived it would have been appropriate to make arrangements to have heavy machinery either on

call or placed in the forest to respond to fires? Is there a date which would be obviously that such a machine would be needed or would likely to be needed?

5 A. I think in the initial circumstances each spring machinery is probably needed to clean up tracks that have been perhaps overgrown or had accumulated material on them. That's either done by graders or in rugged country you may
10 need a tractor machine to do that. That normally precedes prepositions for the fire season.

15 Q. Prepositioning - does that mean having the machinery to respond to the fires?

A. That means having the machinery available.

Q. What would that mean in the context of this area? Where would that prepositioning be?

20 A. I think that would depend on what the fire controller perceived a threat. In advance of the lightning storm, we know they're going to probably occur in the high country and in the ridges, and so a fire controller might take a
25 punt and, say, put it at Piccadilly Circus if he felt he would have fires in the mountains. But that wouldn't happen on every day. Again, that's something that's adjusted to the daily fire danger.

30 Q. The last matter was my learned friend Mr Stitt asked you about the advice given on Friday, 17 January and he asked you whether you thought different advice should have been given
35 to, as he put it, the citizens and providers of utilities on Friday the 17th, and you agreed that different advice should have been given. What advice would that have been, in your view?

40 A. I think it's advice about what to do, which would almost have to be handed out on a personal basis around the perimeter by fire authorities if they were available. It's something which is difficult to get across by
45 public media of what is required. So initially a campaign which would now seem started has

been around, but on preceding the fire, probably direct contact with people who were likely to be in threat.

5 MR LASRY: Yes, thank you, Mr Cheney. That completes Mr Cheney's evidence, your Worship, and at least for the time being, might he be excused?

10 THE CORONER: Yes, I just have one question. You mentioned in response to Mr Lasry the different advice on what was to happen. This is on the 17th at least?

15 A. I think, your Worship, it's very difficult to convey that information in highly meaningful terms to residents in the urban areas because their perception of what's going to happen - having no experience with fire pretty much
20 whatsoever for most of the people, they have a great deal of difficulty understanding what's being said other than that fire is going to burn into the area, and concepts of different intensity that some areas are more dangerous than others is very difficult for people to
25 understand who haven't had any experience with fire.

But I think that advice that the fires could come into Canberra would have done something to
30 prepare more people, certainly not everybody, but probably more people, and perhaps, as has been claimed, some people would have gone to the coast for holidays at that time.

35 Q. And did the fire stop because it entered the suburbs, that it ran out of fuel pretty much despite the fact that there were houses and shrubs and vegetation in the suburbs? Is that what stopped the fire?

40 A. It slowed it down eventually and then the wind abated, and I think Dr Ellis will perhaps describe how long ignition continued within the suburbs. Fires were - it was spreading slowly up until the wind changed to the east.

45

Q. That's later in the afternoon?

A. That's quite late in the afternoon, yes. There was still quite active ignition of houses for some time. Although my map showed it
5 stopping at the perimeter, the progress through the suburb was continuing up until the wind changed, and some houses went after the wind change, but the actual progress in an easterly direction generally stopped at the wind change.

10

THE CORONER: Thank you, Mr Cheney. You're excused.

A. Thank you.

15

<THE WITNESS WITHDREW

MR WOODWARD: Your Worship, I note the time, but if it was convenient, I'll call Dr Ellis and have him sworn and take him through his CV
20 before we adjourn for lunch. I call Dr Ellis.

<DR PETER FRANCIS MARTIN ELLIS, SWORN

<EXAMINATION-IN-CHIEF BY BY MR WOODWARD

25

THE CORONER: Please be seated, Dr Ellis.

MR WOODWARD: Dr Ellis, could you tell her Worship your full name, please?

30

A. My full name is Peter Francis Martin Ellis.

Q. And your business address?

35

A. Number 7, CSIRO Forestry and Forest Products, Yarralumla.

40

Q. Now, Dr Ellis, you've provided a CV dealing in particular with, if I could put it in this broad way, your experience begins by indicating that you are a scientist in the Bushfire Paper and Management Group of the CSIRO Division of Forestry and Forest Products; is that correct?

45

A. That's correct.

Q. And in that capacity, is it fair to say that the bulk of your scientific work has been in measuring a model in fire brand and spotting behaviour and assessing radiant heat?

5 A. That's correct.

MR STITT: Well, read on. Your Worship, I have an application to make in respect of Dr Ellis, and we've been provided with his CV and my
10 learned friend proposes to tender it. I can proceed with my application, otherwise I have to make an application for voir dire.

15 But the application which I make is firstly that this witness is not qualified to express the opinions that he has expressed in this report and, secondly, the report itself in its terms and form is not admissible.

20 Now, I would like to expand that, and I don't know how my learned friend does it, but if we're going to deal with the curriculum vitae I've been given, I suggest we simply have it tendered because I will then make my
25 application.

THE CORONER: Is that what you propose to do, Mr Woodward?

30 MR WOODWARD: Yes, it is, your Worship. I was going to take Dr Ellis to it first, but if it assists, I will tender it now. It doesn't appear as part of the usual brief. So perhaps at this stage it should be given an exhibit
35 number.

THE CORONER: The printed curriculum vitae of Dr Ellis will become exhibit 14.

40 **<EXHIBIT 14 - CURRICULUM VITAE ADMITTED WITHOUT OBJECTION**

MR WOODWARD: Maybe this would be an appropriate time to adjourn for lunch.
45

MR STITT: For the assistance of my learned friend, I have actually prepared some points in written form which I propose to base my applications on. It may be of assistance to
5 him that I deal with that by simply handing them to your Worship and to my learned friend so he will have an opportunity over lunch to consider the submission which I wish to make, if that's of convenience.

10 THE CORONER: That's an appropriate course, Mr Stitt.

MR STITT: Your Worship, the submissions are in
15 two forms. The first one really is a threshold submission which deals with the question of the expertise and the lack of relevant expertise of this witness. If I could hand that to your Worship and if your Worship could mark
20 that as a threshold submission, and we have copies for the others.

Your Worship, the second submission which I
25 have arises only if the first submission fails because it deals with the actual form of report, which in our submission this court would not receive into evidence for the reasons that I will expand later. That second submission is in this form, and it's directed
30 to the form of the report and the co-authorship, and it would not have escaped your Worship's attention that the report which is sought to be tendered as evidence is a joint report from both Dr Ellis and a Mr Andrew
35 Sullivan, and my learned friend obviously thinks so little of Mr Sullivan that we haven't been given a CV from him. But I will expand those submissions at 2 o'clock, if that's a convenient time, your Worship.

40 MR WOODWARD: Your Worship, could I request, in order to assist me over the lunch time, the fallback position?

45 MR STITT: Didn't I give that to you?

MR WOODWARD: I'm sorry, I thought that was another copy.

5 THE CORONER: You can consider those over the luncheon adjournment, and Dr Ellis's report, is that in the folder 11?

10 MR WOODWARD: I think it is, but I did provide your Worship's associate a colour copy of it because there are aspects of the report that are much easier to follow from that copy.

15 THE CORONER: We'll adjourn until 2 o'clock.

ADJOURNED [1.03pm]

RESUMED [2.00pm]

20 MR WOODWARD: Your Worship, before my learned friend makes his submission in support of the documents that have been handed out, can I just say a couple of things by way of preliminary remark. The first is it's disappointing for
25 us, your Worship, that this application had not previously been foreshadowed until the witness went into the witness box. We had hoped that the cooperative way in which the parties had so far conducted themselves in this inquest was
30 such that we might have had some opportunity to discuss this before it was sprung upon us just before lunch.

35 The second thing is this, your Worship: having read the submissions, and I'm not sure whether your Worship has had an opportunity to do the same --

40 THE CORONER: I've read them as well.

MR WOODWARD: In my submission, the appropriate time for this sort of argument is not in advance of the evidence. Your Worship is not in a position to ascertain what value this
45 evidence is to you until you've heard it. In

my submission, your Worship, ultimately what I'll be submitting, if your Worship hears Mr Stitt in support, is that these matters go to weight. In due course, further evidence may or
5 may not be called to deal with those aspects of Mr Ellis's evidence where clearly all he's doing is relating information that he's obtained from others, so it's second-hand, much as some of Mr Cheney's conclusions were based
10 on second-hand information.

Your Worship's not in a position now to draw any conclusions and never suggested that your
15 Worship would draw conclusions based on this material, at this early stage in the inquest. In my submission, your Worship should receive the evidence and, if in due course there is a concern as to the way in which it's supported or not supported, that's a matter for
20 submission ultimately one imagines at the end of the second phase of the inquest.

So it's my primary and preliminary submission that your Worship should hear the evidence and
25 give the evidence what weight your Worship considers appropriate in due course.

THE CORONER: Thank you, Mr Woodward. Yes, do
30 you wish to be heard any further on that, Mr Stitt? I have read the submissions, Mr Stitt, that you have made.

MR STITT: Your Worship, firstly --

35 THE CORONER: I will just indicate to you now that I have not had an opportunity to read the report. So you should be aware of that. I haven't read Dr Ellis's report.

40 MR STITT: Your Worship really can't follow the second batch of submissions without looking at the report, and one of the things I wanted to do briefly was to take you to it. Could I just deal with the two major points that have been
45 made. Firstly, we raised this matter some

considerable time ago and in correspondence.
We asked to be provided with the material upon
which this report was based. That was refused.
The proper time to make this application is
5 when the witness gets into the witness box.
That was when the application was made.

The second point is it simply begs the question
to say, "Oh, well, just let it all go in and
10 we'll give it weight in due course". This is
an important inquiry. This is an inquiry which
has been widely reported, both within the ACT
and outside the ACT. These documents, if they
15 are to be given weight to the extent that they
are accepted by this court, it's a matter which
can then be the subject of further publicity
and further dissemination to a wider public.

This is a report which, if you will let me in
20 due course take you to it, I will show to you
that regarding this report, not only do these
authors not have the relevant expertise but it
is a report which is seriously flawed both in
its approach, in its analysis and the basis
25 upon which it is sought to propound the
opinions which are expressed. There isn't any
doubt as to the opinions which are expressed.

If you go to the first page, executive summary,
30 1, "Causes of House Loss". Now, if my learned
friend seriously suggests that this is a report
that you should receive now and in due course
give what weight to it you see fit, why is he
tendering it at all? Why isn't it done
35 properly? Why is it that we should be subjected
to this, these causes expressed, and, as I say,
will no doubt be made public.

Quite frankly, these conclusions are totally
40 unupportable so far as my client is concerned.
The potential for damage and prejudice, if this
report is made public without the qualification
that my learned friend puts on it, which he
says is, "Well, in due course you give it such
45 weight as you see fit", what damage is that

likely to do to my client by the time three,
four, five months down the track it's suddenly
latterly emerging that the basis upon which
these joint authors express their opinion is
5 wholly erroneous?

Now, there is a question of prejudice and there
is a question of fairness. The inquiry should
not accept evidence which is flawed or which is
10 incapable of supporting ultimately findings.
Now, the report on its face - and if you go to
the first page - purports to be an assessment
of suburban house loss. Now, this is a report
which is said to be directed to the loss,
15 damage and destruction of urban structures.
Neither Dr Ellis nor Mr Sullivan have any
qualifications to express opinions about the
loss of urban structures. Both of them have,
as far as we can tell from Mr Sullivan, because
20 he seems to be largely silent, but both of them
have expertise which is confined to forestry
and bushfires within a forestry environment.

You heard the evidence this morning of Mr
25 Cheney, where he said that the science of urban
structures is quite different. It involved
different skills, different specialisations,
different scientific knowledge. You will
recall that Mr Cheney, on a couple of
30 occasions, declined to answer questions because
it related to urban structures and it was
outside his expertise, and he was, in our
submission, being entirely fair and proper in
that approach.

35 Now, it is really simply not good enough for my
learned friend to say, "Well, you should accept
this and in due course we might be able to get
some other evidence, or in due course it will
40 have no probative weight and you should sit
here and receive it into evidence". That is an
approach which, in an inquiry as important as
this one, would not find favour. This inquiry
ultimately is going to make findings as to
45 truth, veracity and actual relevant matters

5 that bear upon your terms of reference. If this kind of half-baked evidence is allowed in, it subverts those findings and it casts serious doubt upon the value of the inquiry if it's going to act on this sort of evidence.

10 Now, can I turn to make good that submission. If you look at the second submission, turn to page 4, "The form of the report". The conclusions which affect my client are purported to be drawn from anecdotal evidence. Now, your Worship, we received a document from my learned friend yesterday which is said to be the basis for that anecdotal evidence approach.
15 If I could hand your Worship the document which was handed to us and said to be the basis to support the views expressed by this witness --

20 THE CORONER: When you say "four", you mean page 4 of the executive summary?

MR STITT: No, page 4 of my submission.

25 THE CORONER: Oh, I beg your pardon.

MR STITT: Where I deal with the form of the report.

30 THE CORONER: Yes, thank you.

MR STITT: If you look at paragraph 5.2:

35 Many of the conclusions sought to be drawn by the authors rely on hearsay or anecdotal information from third parties.

40 If you look at the document that I've just handed you, this is said to be the source material for the conclusions expressed by the authors. If you look at that document, it purports to be an Australian Federal Police survey. We don't know what the survey was. We don't know what questions were asked. We don't
45 know of whom the questions were asked or

answered. The data was supplied by Constable
Judy Goldsmith. Now, if you look down, there
are 16 examples given - 16 ends on the
penultimate page. Just look at some of them.

5

First of all, this is somebody's assessment of
what was said by somebody else, so that we
don't know who provided the primary fact, we
don't know who provided the primary data, and,
10 more importantly, we don't know what they said.
What we do have is a summary or conclusion
either by Detective Sergeant Barnicoat or by
Constable Judy Goldsmith or by somebody else.

15

If you look at the middle of the first page,
"Questionable - gas main or gas cylinder? 34
Munro Place, Curtin. Destroyed? Yes. Fire
getting into roof, left as no pressure, firies
didn't do due to gas". What are we supposed to
20 make of that? That seems to be somebody
suggesting a conclusion based upon the conduct
of the firefighters, which is said to be due to
gas, whatever that means. So here is somebody
saying that the firefighters didn't do their
25 job properly, apparently. That is a conclusion
drawn by the maker of the statement.

25

That conclusion is then apparently dealt with
by either Therese Barnicoat or Constable Judy
30 Goldsmith as a conclusion and it's then adopted
by Peter Ellis as a conclusion to support the
matters which he's set forth in his report.
You've only got to state it to see the
unfairness of it. And how am I supposed to
35 deal with this? Suppose you allow this report
to go in now. What am I supposed to do with Dr
Ellis? How can I deal with that? Yet this is
said to be the factual basis upon which his
conclusions as to causes of house loss are
40 based.

40

Now, that kind of unfairness is not cured by
simply at some later date saying, "Oh, well,
give it what weight you see fit". This is
45 either evidence which is of value to this

45

inquiry or it is not. If it is not evidence
valuable to this inquiry, it should not be led,
and particularly conclusions should not be
expressed on this kind of material when I am in
5 no way able to deal with it.

Now, let it be tested this way: an opinion by
an expert is no different from any other piece
of evidence. The value of that evidence and
10 the weight of that evidence depends upon
whether or not it can be subjected to critical
analysis, whether or not it can be examined,
whether or not it can be tested.

15 Now, you as the Coroner would want that to
happen. You would want the evidence to be
tested, you would want to know what weight to
give it and what value to give it. Here you
are being given a report, being asked to
20 consider it and, presumably, asked to make
findings based on it - otherwise, why is it
being led at all? And yet, so far as my client
is concerned, none of that evidence can be
tested. None of that opinion can be subjected
25 to critical analysis. None of it am I able to
deal with.

Now, the unfairness is manifest, and the
prejudicial effect is palpable. To try to run
30 such an important inquiry as this one about
such an important and emotive subject matter as
the cause of house loss, the one thing that
generates more emotion in the people of
Canberra than anything else, and yet this is
35 the basis of the report. This report is wholly
unsatisfactory so far as my client is concerned
and it's wholly erroneous so far as my client
is concerned. If my learned friend says,
"Well, in due course I'll cobble it up together
40 in three months time or six months time", it's
too late. It should not be received and we
should not be put in this position.

45 THE CORONER: Thank you, Mr Stitt. I'll just
make one comment, Mr Stitt. You obviously know

more about the way the report came into being
and more about the experience and
qualifications and expertise of Dr Ellis and Mr
Sullivan than I do at this stage.

5

MR STITT: We know the CV.

THE CORONER: Well, I have that as well, if
that's that one page that was tendered. That's
10 all I have. I don't know at this stage whether
or not that report is based largely on this
document that you gave me, that says the
Australian Federal Police AFP Survey, or
whether it's based on other information. I
15 don't know what further expertise Dr Ellis and
Mr Sullivan have. So on that basis, and you
say that the report is flawed and half-baked,
why should I accept what you say any more so
than I should accept what is at this stage of
20 the proceedings in the report, because I don't
know that the report at this stage of the
proceedings - I can't make a judgment that the
report is flawed and half-baked? So I'm
accepting largely, if you want me to, your
25 submission that it is.

MR STITT: There are two stages to it, your
Worship, and that's why I've put the submission
in two steps. There are two stages to it.
30 Your Worship, at this stage you do not know
that the report is seriously flawed so far as
my client's interests are concerned. That's a
fair comment. But what you do know is the
qualifications which these people purport to
35 possess. You've only got to look down the CV.

Mr Sullivan, as I say they think so little of
him they haven't even given us a CV for Mr
Sullivan. But Dr Ellis, if you look at his CV,
40 is not qualified to express the opinions which
he purports to do. You've only got to look at
the front page of the report to see the topic
and subject matter to which it's directed. The
evidence of Mr Cheney is that that is a highly
45 specialised scientific area, and this witness

doesn't possess those qualifications. That's the starting point.

5 Now, if you want me to take you to the second
point, which is the substance of the report,
then I will because when you look at it and
start to analyse it what I'm saying is made
good. But your Worship is perfectly correct -
10 the first starting point is the threshold
system and, if it's to be said that he has the
relevant expertise, then it ought to be capable
of being demonstrated on the CV, and it's not.

15 So what you are being asked to do is to receive
this evidence and then, as my learned friend
says, give it such weight as you see fit.
That's not the correct approach, particularly
in an inquiry as important as this one.

20 THE CORONER: Yes, Mr Woodward?

MR WOODWARD: Your Worship, I don't think you're
assisted by hyperbole in relation to the
position of Mr Sullivan. The fact is, your
25 Worship, the submissions that your Worship has
heard are misplaced because they misconceive
the purpose for which or the nature of this
report and the purpose for which it's brought
before your Worship.

30 As has been indicated on many occasions, your
Worship, this phase of the inquest is designed
to provide your Worship with an introduction,
in effect, to the issues that are likely to
35 occupy the second phase of the inquest, and
that's why to a large degree material is before
your Worship in what might be described as a
slightly unorthodox fashion; for example, a few
management plans and so on that are part of the
40 brief have been summarised, and, of course,
it's proposed that evidence will be called in
the second phase in order to amplify and
identify the relevance of those documents.
The same applies to this report.

45

Your Worship, this report was prepared by Dr Ellis not for the purposes of this inquiry. To characterise it in a way that has occurred, in my submission, as I say, misconceives the purpose for which the report was prepared and the purposes for which it's before your Worship.

As is apparent from the covering pages, the report was prepared for the benefit of the ACT Planning and Land Authority to assist that authority with determination of what lessons can be learnt out of what occurred in January about urban planning decisions and building decisions in the short term. That's the purpose for which it was prepared. It never purported to be a detailed scientific analysis of every potential cause of house loss.

Indeed, whilst the executive summary is expressed being in the nature of a summary in a somewhat conclusionary form, if your Worship goes to the relevant passages, it's immediately apparent that the sorts of conclusions that appear to be reflected there are no more than a reflection of some information, facts, both by observation and second-hand information, that have been obtained by Dr Ellis and his team for the purposes of assisting the authority in the sorts of decisions that have been referred to.

To take the specific point that's been referred to by my learned friend - the only one that's really of interest to his client - relates to the issue of gas lines. The other document to which my learned friend took you was provided in order to illustrate that clearly the information that is in very general terms reflected in Mr Ellis's report in relation to gas lines is nothing more than, and doesn't purport to be anything more than, a simple reiteration of information that's been provided to the Australian Federal Police in the form of surveys that they've provided to residents.

45

Your Worship could never form any conclusions based on that material without hearing from those persons who provided that information. That's absolutely accepted. Moreover, your
5 Worship, for the purposes of Mr Ellis's report - and I was proposing to lead this from him - the only reason he deals with these sorts of potential contributing factors is in order to underline some weaknesses in his primary thesis
10 which relates to the impact of garden types.

I've asked that Mr Ellis remain out of the court because I propose to say to your Worship that I apprehend his evidence will be that, "We
15 looked at potential other causes, because in determining whether a particular garden type may have contributed to the loss of houses is a matter of statistical analysis. We needed to think about the possibility of other causes,
20 and in that regard we've obtained some information, admittedly second-hand information, that suggested that there were gas lines that may have been breached and may have led to house loss, but we're not able to form
25 any conclusions about that, nor do we purport to in this document. We don't purport to say that we have conducted an analysis and we can say that the house at this particular location was destroyed by a burst gas line".

30 He does no more than to say, "Look, in determining the contribution of garden type, one has to take into account there have been other factors that may have contributed and
35 we've been told about the fact that people have observed gas lines bursting and going into flame", and that's no more than was reported in the newspapers at the time of the fires, your
40 Worship, albeit in this case it is - there are specific references to information that the AFP has obtained.

45 In terms of my learned friend's capacity to deal with this, he need do no more than get Mr Ellis to confirm, as he would confirm, that he

has not conducted any independent analysis of the structures in order to determine whether gas lines caused house loss and he wouldn't be suggesting for a moment that your Worship should draw conclusions from his report to that effect.

If those assisting you consider that's a matter that your Worship should look at - and in my submission your Worship should - then, clearly, direct evidence will have to be adduced in due course about those matters. The only purpose for which this report is before your Worship is, as with other documents, to assist those assisting you and all the parties and your Worship to identify the range of issues that are relevant, to provide an indication of how those issues are relevant in the context of these fires.

Your Worship, as I indicated before, those are matters of course that your Worship can't form a judgment about until you've heard from Mr Ellis, but certainly these are things I discussed with Mr Ellis. I alluded my learned friends to the fact that, look, there's no suggestion in this report that he's drawing any conclusions about the gas lines. He's merely relating anecdotal information. Here's the sort of information that he's relying on. Of course, it's clearly not evidence upon which conclusions could be drawn. It was never suggested that.

I should say, your Worship, that, whilst reservations were expressed to us about Mr Ellis's expertise, I stand by what I said at the beginning. The application that his evidence be excluded was not foreshadowed to us at any time before five minutes before 1 o'clock today.

I stand by the submission, your Worship, that I made at the beginning. Subject to what I've said to your Worship about the evidence that

Mr Ellis, as I apprehend will give, ultimately what your Worship makes of this report is a matter for weight. The closest thing to a conclusion your Worship could draw, in my submission, from this report as it stands, is it appears that certain garden types may have been a contributing factor to house loss. That's really the substance of what the report is about.

I certainly wouldn't be submitting that your Worship should do any more than draw a tentative conclusion about that, based on this statistical analysis. In those circumstances, your Worship should have the benefit of this evidence, subject to those qualifications and limitations. To the extent that I am unable to or do not go far enough in leading that evidence from Dr Ellis, in order to qualify his so-called conclusions, then of course my learned friend is in a position to cross-examine him in order to make that as abundantly clear as he needs to do.

It's still unclear as to what prejudice is being referred to in that context. It appears it's a concern about media reporting. In my submission, for the purposes of this phase of the inquest, your Worship, that's not a matter your Worship should be having regard to. Your Worship needs to be informed --

THE CORONER: It's not the primary concern of this inquiry.

MR WOODWARD: No. At the end of the day, when the inquest has heard all the relevant evidence, then is the appropriate time for my learned friend to be submitting. If in that case there is no actual evidence before your Worship of these sorts of matters, then of course it would be appropriate for my learned friend to submit that your Worship could draw no conclusions and it would be a very hard submission to resist. But at this early stage,

in my submission, this is useful evidence,
particularly as it relates to garden types and
in the context of the fact that this was a
report prepared not for your Worship but for
5 the ACT Planning and Land Authority to assist
it with its development of planning guidelines.

THE CORONER: Is there no-one else or is there
no-one in the Territory or elsewhere in
10 Australia who is an expert and who does have
the required expertise; that is, if I accept
what Mr Stitt says, that Dr Ellis perhaps does
not have the expertise in house structures? Is
there no-one else in Australia that does have
15 that expertise?

MR WOODWARD: Your Worship, there is. There's a
division of CSIRO, based in Melbourne. I'll
get the full name of it for you in a moment.
20 It's the CSIRO Manufacturing and Infrastructure
Technology, known as CMIT, based in Melbourne.
There are members of that division, and in
particular Mr Justin Leonard, who has for in
excess of 10 years been involved in assessing
25 house loss as a result of bushfire impact on
the urban edge of cities and what's known as
the urban interface.

He has not only considerable expertise in the
30 precise areas that have been referred to. His
background is in engineering, not in bushfire
behaviour so much, although he's picked up
expertise in that area. He does have the
engineering background which qualifies him in
35 that area, in addition to being a person who
has conducted, or been involved in conducting,
detailed surveys of house loss every time there
has been a significant fire impact upon an
urban area since I think 1995 or earlier.

40 Your Worship, he had conducted a survey of the
house loss in Canberra, and that survey
included taking as many as 10 high-resolution
photographs of every house destroyed within a
45 particular part of Duffy and himself

distributing a 14-page survey document to residents and conducting interviews and also mapping, in effect, the extended house loss and, where possible, identifying the cause of house loss. This was a matter I was proposing to refer your Worship to at the conclusion of Mr Dr Ellis's evidence but it seems appropriate to refer to it now.

10 The difficulty with Mr Leonard is that his project is an ongoing project that receives funding on a long-term basis and, at present, whilst he has gathered all the data and has it available to him, it's in a raw form and he
15 hasn't yet been provided with the funding that he would need in order to conduct an analysis of that data in order to produce a useful report to your Worship and generally in relation to the causes of house loss. It would
20 be certainly hoped that - at this stage, your Worship, I should say his indications to us are that, in the ordinary course, that funding would not be available in time for him to complete that work before the second phase
25 of the inquest.

Certainly, it's our hope something can be done to enable that to occur, and perhaps the submissions your Worship has heard today do, if
30 nothing else, certainly highlight the importance of that work in order to clarify the issues relating to house loss. His main focus is on the building regulations and those design features of houses that contribute to house
35 loss - open eaves, the use of decking, the siting of houses relevant to wood fences and other structures in the garden, the siting of houses relative to neighbours and those sorts of factors. His experience and his evidence
40 would be extremely useful, in my submission, to your Worship in getting a much better picture of that aspect of the Canberra bushfires, as distinct from Mr Ellis's work, which is largely focused on garden type, as he says in his
45 report.

I can't do any more at this stage,
your Worship, than indicate that we'll be doing
what we can to encourage those responsible for
5 funding Mr Leonard to ensure that he has that
funding in time to provide a report.

10 THE CORONER: And who is responsible for
funding Mr Leonard, as far as you can tell?

MR WOODWARD: Within his division, obviously the
CSIRO would be providing his funding in due
course. As I understand it, his project is, as
I say, funded in the long term, and over the
15 forthcoming years he would get funding
sufficient to enable him to analyse this data.
But because of the way it's funded within his
own organisation and obviously other funding
priorities, at this stage he apprehends that he
20 would not have sufficient funding from within
his own organisation to complete the work in
the time necessary. So it would be either a
matter of somehow persuading those that fund
him already to prioritise his funding or, if
25 that weren't possible, to perhaps see if there
were alternative sources to enable that work to
be done.

THE CORONER: I suppose we can only hope that
30 those responsible for funding, perhaps some
other organisation, can provide Mr Leonard with
sufficient funds to complete this aspect of his
work, particularly the aspect that relates to
what happened in Canberra, if he indeed has
35 done a study of that, in time for him to
complete his report and present that evidence,
because that would certainly be very useful to
this inquiry.

40 MR WOODWARD: It's particularly relevant, in my
submission, your Worship, because - without
wanting to pre-empt the sort of evidence he
would give - as I understand it, this level of
penetration into an urban area is unusual. The
45 only apparently similar instance where you had

penetration beyond the first row or so of houses was in Hobart, I think, in the 60s, and so it is an area that you can't rely entirely on older research on similar environments
5 because the depth of penetration is something that's a little unusual, as I think Mr Cheney himself said in his evidence.

10 So that expertise brought in to assist, to understand whether there are some special design features of Canberra homes that somehow contributed to that level of penetration, would be of great assistance, certainly to us and ultimately to your Worship.

15 THE CORONER: And perhaps to others in the future as well.

MR WOODWARD: Indeed.

20 THE CORONER: I'm surprised that you say the work has been progressing for a period of 10 years.

25 MR WOODWARD: Well, no, as I understand it, he has a team that basically moves and looks at wherever a house loss occurs as a result of a fire. His team will go and conduct a survey and over the ensuing years will analyse that
30 data. That's been occurring since 1995 and, as I understand, is an ongoing project and they do complete obviously that work over that period. And certainly what's been happening - earlier
35 fires in other parts of Australia, the work has been completed and reports have been prepared, but, so far as the Canberra fires are concerned, as I understand it, it would be several years in the ordinary course before his
40 current data would be analysed and reports prepared and so on, which would be too late for our purposes.

THE CORONER: So Dr Ellis does not have the same expertise as Mr Leonard does?

45

MR WOODWARD: I can indicate his main area of expertise is in relation to fire behaviour, the fire brand and spotting behaviour, and he does have expertise in relation to the effects of
5 radiant heat, including some expertise of the kinds of models that are established for assessing radiant heat, which includes having expertise about what level of radiant heat, for example, is necessary to crack a window, to
10 ignite in effect - combust, say, a timber over a certain distance and so on. So he's very familiar with those models and has an understanding of them, but it is true that most of his work relates to spotting behaviour in
15 forest fuels, which in my submission does qualify him to discuss the primary aim of his report, which is to look at garden types and the effect of different types of gardens on the movement of fires through an urban area.

20 In those circumstances, in my submission, your Worship, his evidence is valuable in terms of identifying the issues and, in that limited respect, to provide some understanding of where
25 garden types may be an influencing factor. In that regard, his evidence is no more than observation and statistical analysis. It doesn't in fact require the sort of expertise that he does have, but certainly bringing that
30 expertise to this work, in my submission, does assist it and provides it with - in relation to garden types, additional - it makes it more useful to your Worship.

35 THE CORONER: Because you do concede that a lot of the information - presumably his conclusions are based on information or based upon hearsay information?

40 MR WOODWARD: In my submission he doesn't draw any - perhaps his language in the executive summary is a little unfortunate in the terms that it does suggest a conclusion but in the
45 body of the document he's not saying, for instance, and certainly it was my intention to

adduce from him in evidence - he's not in a position to say and doesn't say that 18 houses were burnt down because of a gas line. He can't even say that one house, any house, was burnt down because of that reason. It's not within the ambit of his report and I'm sure he would agree it's not within the ambit of his expertise and that's not what the report is fundamentally about.

5

10

MR STITT: Your Worship, could I just respond briefly?

THE CORONER: Yes.

15

MR STITT: I am grateful to my learned friend's frank concession that you would never form any conclusions based on this report. I'm also grateful to him for the fact that he indicates that there is available another properly qualified witness who has apparently done the relevant investigation and has available the relevant data which is far more valuable than this half-baked sort of approach.

20

25

If that is so, the fair thing to do is to withdraw this report and ensure that whoever Mr Leonard is, or whatever his name is, is available so that you can get proper information, proper data, upon which you can act. What is the purpose of having something before you where, before it's even tendered, learned counsel says, "You'll never form any conclusions based on this"? So why bother? Or, alternatively, why doesn't my learned friend excise from it those parts of the report which don't have anything to do with his expertise? That would be a simple matter.

30

35

40

Indeed, I can take you to it now and indicate those parts that ought to be excised. But the fair approach should be that this report should simply be withdrawn. It doesn't assist you. Let's get to the real heart of it --

45

THE CORONER: As I understand it, Mr Leonard's report or his work has not been completed, so it's not available to be presented.

5 MR STITT: It it's only a matter of funding, apparently. The CSIRO in fact prepares reports all the time for clients and external persons. It's only a matter of somebody paying him some money. That wouldn't have been a big problem,
10 I wouldn't have thought, particularly if the work has all been done.

THE CORONER: I suppose it depends on how much money is needed to complete the report.

15 MR STITT: I imagine to get a report from an expert who has already done the work, that's the sort of thing that happens in the courts every day of the week. So, in the light of
20 what my learned friend has now said, the fair thing to do is simply to withdraw his report.

THE CORONER: Thank you, Mr Stitt.

25 MR WOODWARD: Your Worship, we're not withdrawing it and my learned friend seems to have overlooked what I did say to your Worship, that, in relation to garden types, it is of assistance to your Worship, and we stand by
30 that position.

THE CORONER: I'll take the evidence of Dr Ellis with all the qualifications that you have made on the content of his report.

35 MR WOODWARD: If your Worship pleases.

THE CORONER: I'll return this document to you, Mr Stitt. I don't know whether it was your
40 copy. This is the AFP survey.

MR WOODWARD: I had already provided your Worship with a copy of that.

45 THE CORONER: I did see that. I would require

you to just go through some details to the expertise that Dr Ellis has.

MR WOODWARD: I will do that, yes, your Worship.

5

<THE WITNESS RETURNED

MR WOODWARD: Mr Ellis, before the break, I was asking you some questions about your expertise based on the CV that's been provided to the parties. I think you got to the stage of - in fact, I don't know whether you did actually answer my question when I said that most of your work, at least in relation to your area of current work - scientists in bushfire behaviour and management group - has been in measuring and modelling the fire brand and spotting behaviour and radiant heat from bushfire flame; is that correct.

10
15
20 A. That is correct.

Q. I notice in your list of publications the second bullet point refers to a review of radiant heat flux models in bushfire applications. In the fifth bullet point, there's a report that you prepared in relation to fire suppression and ember attack on houses. You've provided a report in relation to the adequacy of Australian standards in construction of buildings and bushfire-prone areas, and there are other reports which I won't go to individually that deal with work that you've done in relation to the relationship between radiant heat, spotting behaviour and structures. Could you perhaps amplify a little bit your areas of expertise, focussing on radiant heat and ember attack?

25
30
35
40 A. Fire brand or ember attack first - part of the Project Vesta experiments were measurements of the density of fire brands and spotting ahead of high intensity experimental fires. Do you want me to go further on that?

Q. Well, perhaps if I could take you specifically to where you've prepared or been a

45

co-author on a report of review of radiant heat flux models in bushfire applications. Could you explain what they are?

5 A. Yes. Setback distances at the urban interface, of the bush urban interface, can be based on models of radiant heat, and setback distances are often prescribed based on the relationship between model radiant heat at the bushfire flame and radiant heat impinging on the structure, with particular respect to the 10 threshold or critical radiant heat levels which components of buildings can withstand - for example, glass or timber.

15 Q. So there are models, are there, that deal with the effects of radiant heat on glass? How does that work? Is that where a model is established so at a certain heat it's expected that glass will shatter, or something of that 20 kind?

A. Yes, Neville McArthur and others at CSIRO Construction Manufacturing, Infrastructure and Technology division have measured the threshold, the critical thresholds, for 25 windows, in aluminium and wooden frames, and various types of timber, treated and untreated. The thresholds have been measured for radiant heat direct and alone --

30 Q. So just stopping you there, when you say "radiant heat direct and alone", you mean the only factor that might influence combustion is pure radiant heat; there's no other intervening factor?

35 A. For example, people generally accept that at about 30 kilowatts per square metre - for most timbers 30 kilowatts per square metre is a reasonable upper threshold at which you would be certain it wouldn't burn. Anything over 40 that you would say it's got a chance of igniting after a certain time.

Q. Yes, I see.

45 A. And for glass, probably about 14.5 for windows - for aluminium or timber frames about

14 or 15 kilowatts per square metre.

Q. Would lead to --

A. Breakage of the glass, yes.

5

Q. I see. And those are models that you have some familiarity with?

A. I'm very familiar with the measurements.

10 I've spent quite a lot of time talking to Neville McArthur, who led those tests. Those measurements are not models; they are laboratory measurements. So they're very accurate and repeatable. The modelling part comes in in calculating the radiant heat from a
15 bushfire flame of certain dimensions at a given distance in front of that flame. That's where the modelling expertise comes in.

Q. So the measurements form, in effect, part
20 of the model?

A. The measurements --

Q. Form the model?

25 A. Given the model of radiant heat, the measurements allow one to prescribe setback distances; for example, if you have a bushfire flame at 50 metres, the radiant heat flux is modelled to be, say, 14 or 15. One would say a certain building construction level is required
30 for that. If it was 30, it would be a different construction level.

Q. I see.

35 A. So those measurements, in combination with the model for radiant heat, allow one to prescribe setback distances appropriate to different building construction levels. Those levels are set down by Australian standard AS 3959.

40

Q. Now, Dr Ellis, you've prepared a report in conjunction with Mr Andrew Sullivan which you provided - prepared at the request of ACT
45 Planning and Land Authority; is that correct?

A. That's correct.

Q. That's a report dated August 2003?

A. That's correct.

5 Q. For the benefit of the transcript and the
operator, your Worship, the document number is
[AUS.AFP.0100.0001]. I want to ask you a
little bit about the background to the report.
What, in broad terms, was the task that you
10 were set by the Planning and Land Authority
which led to the preparation of the report?

A. In very broad terms, the ACT Planning and
Land Authority wanted us to investigate likely
15 pathways of fire attack on and within its
suburbs and look at the implications for land
management at the urban interface, at the bush
urban interface, and this was to slot in, if
you like, with the urban edge review. It was
information which they required.

20

Q. The urban edge review being a review of
guidelines affecting building on the urban
edge?

A. That's correct. And management of bush or
25 whatever at the urban interface.

Q. When you say pathways of attack, can you
be a bit more specific? What sort of pathways
were being anticipated - or were you being
30 asked to particularly focus on, potential
pathways?

A. An important one is radiant heat. Mr
Cheney was questioned earlier about the radiant
heat. If houses had suffered radiant heat
35 direct from forest or woodland at the house,
which, say, broke glass or ignited timber or
whatever, this would show a shortcoming in that
planned distance between the bushland and the
houses. So that was one aspect, a very
40 important aspect.

We expected that fire brands would play a major
role, simply because all previous reports and
expertise suggested that fire brands are the
45 main cause of house losses at the urban

interface by penetration. We expected some influence of fuel within the suburbs.

5 Q. Could you provide what sort of fuel within the suburbs you are referring to?

10 A. I'm referring - especially for gardens, and I might have to explain why we undertook the initial survey and how we had that data initially, if I'm prompted. But at the back of that, there's a reason why we had this data prior to the request from Planning and Land Authority.

15 Q. So you're saying you had actually gathered some data before the project was initiated by PLA?

20 A. Definitely. I think it's quite important that the court knows that. On the 19th, most of our bushfire behaviour management team met at CSIRO and we informally discussed what would be the best way we could help or assist in the fires on the previous day. We decided that information about house survival, as well as house loss, would be of probably most benefit
25 that we could do and perhaps look particularly at gardens because anecdotal evidence on the day and after suggested that gardens had some role.

30 We, therefore, designed a survey sheet and set about immediately - I think on the 20th we were gathering information. The aim was to gather information on damage of houses, loss of houses, details about the garden. Ideally we
35 wanted to do every house that was lost or damaged, as well as a large number of houses adjacent to the houses that that were lost, so ideally we would have data that would enable us to look at the reasons houses survived as well
40 as the reasons for losses of damage.

45 Q. I see. Perhaps we'll come to that in due course in the report, the level or the nature of the survey. But there are just one or two specific matters I wanted to ask you about.

It's a fact, isn't it, that, in relation to some of the information in your report, you relied heavily on anecdotal information?

5 A. Yes, I acknowledge the weakness of that in the report, and I can enlarge on that if required.

10 Q. What sorts of categories of information were essentially anecdotal as distinct from based on observation?

15 A. The evidence we got from residents, including people both whose houses were lost and neighbours, was anecdotal. We assume often it's correct, but the problems during fires or events of this magnitude are that people's perceptions may be very influenced by other emotions and, more than that, their perception of sequence of events may be changed. So people's personal accounts may suffer from
20 problems of scale or magnitude of the event. Their perceptions - I'm repeating myself here - and the sequence in which those events occurred.

25 Q. Yes. And to some extent - well, in fact in several places you actually acknowledge that difficulty in relation to that type of information that you obtained?

30 A. Yes, and for the purposes of this report, we were not able to verify in most cases personal accounts or other information. We didn't have the time to do that, and I acknowledge that.

35 Q. And is an example of what you've just referred to - namely, where you relied on information - anecdotal information from residents which had those potential difficulties and where you were not able to
40 obtain independent verification - the effect of the rupture of gas lines?

A. Yes.

45 Q. In other respects, however, your report, as I understand it, also relies on observation

in areas of what type of garden the house had, the level of destruction of a house and so on.

5 A. The observations of the house damage - we as CSIRO teams collected our own observations, often bolstered by residents' accounts, who would point out certain features of the building that had suffered; the standard notes we took for each property, which included, as I referred to before, trees, shrubs, exotic or
10 natives, burnt, scorched, undamaged, those sorts of categories, damage to fences, detached buildings such as sheds or garages, and attached structures, usually garages.

15 Q. Perhaps just turning more specifically to the categories that you established for the purposes of your report, starting on page 9 of the report, which is 0009 of the exhibit. Do you have a copy of your report?

20 A. I'm sorry, I don't have the report here. I left it at the office this morning.

Q. Perhaps we'll try and find one for you, a spare. But, in the meantime, on that page you
25 identify, in effect, three categories - or you established three levels of damage to houses; is that correct?

A. That's right.

30 Q. And those are there illustrated, the first category being where there was no visible damage to the house, although there may be damage to external structures. So that was, in effect, your category of undamaged house.

35 A. That's correct.

Q. And the second category was where there was damage to the house, and, as I understand it, the basis for that determination was, in
40 effect, was it still liveable as a home.

A. That's correct. We looked at gross damage, but our main interest, if you like, was on superficial damage because we attached
45 importance to that, and that superficial damage might - could have led to the loss of housing

and was therefore significant, as in a cracked window, for example.

5 Q. And a cracked window, for example, is relevant because it can lead to the penetration of embers into the house itself?

10 A. That's right. Cracked windows need not necessarily - the panes in cracked windows need not necessarily break out, but, if they do break out or break in, of course fire brands or, as you say, embers will penetrate rapidly.

15 Q. Yes. Perhaps just before we leave page 4, you say:

20 Teams of CSIRO Forestry and Forest Products bushfire behaviour and management surveyed and photographed a total of 779 suburban houses, including all damaged and destroyed houses as well as adjacent undamaged houses.

25 How many people were involved in that process, Dr Ellis?

30 A. The total number - we often ran four teams of two on a day. Sometimes it was two or three teams. So between eight and 12 separate people.

Q. In relation to that work, what was your role?

A. My role was coordinator.

35 Q. And perhaps I should ask you --

A. Sorry, can I finish?

Q. Yes.

40 A. Although I did go out on several occasions for several days out of that time as a coordinator.

45 Q. And Mr Sullivan, who is the co-author of the report you provided to the authority, what was his role?

A. He was - when he went out, he was usually a team leader. They were very informal teams. One person photographed and maybe spoke and the other person would fill in our forms and there would be questions for clarification during that time and one or other, of course, would interview - interview is the wrong word. Residents often would come out and wish to give us their personal accounts, so we'd record those as best we could.

Q. Perhaps if I could get you now to open up the report at page 11. You are still setting out the approach to the survey. You refer at the top of the page to aerial photographs and you say:

Gas supply appeared to contribute to house losses but we were unable to obtain information relating to supply.

The appearance that you're referring to there, again, is that an appearance based on those anecdotal accounts --

A. Based on anecdotal accounts and some photographs.

Q. And you then say:
...unable to obtain information reporting to the supply.

What information were you seeking?
A. When I became aware of the possibility that gas contributed to spread or losses, I was concerned about the possible effect of these possible losses, say, on my own particular calculations which examined the influence of garden type. So my interest stemmed from the possible influence of losses to gas on the results or the data I was using to look at the influence of garden type.

Q. I see. So, in essence, your interest in gas supply issues was to understand the extent

to which, if at all, that may have impacted upon your statistical analysis of garden type; is that correct?

5 A. That's true. During the survey we were not looking at all for gas. Usually the photographs were taken from across the street and featured the garden alone. It was only if it was particularly obvious in that photograph or residents made reference to gas at all that
10 we recorded it. There was no interest at the time of the survey particularly in gas.

Q. The method you refer to is the method of statistical analysis where you were assessing
15 the main area of your interest, which was garden type; is that correct?

A. That's correct.

Q. And again for that purpose you identified
20 two different what you called garden types?

A. Yes. The garden types were decided subjectively. I went through all the slides myself and I used any notes that came with the records for that particular house and I decided
25 on a type 1 or a type 2. As I've said in the report, this is a subjective judgment and, as I also said in the report, it's based on the garden at the front of the house alone. There is overlap, some overlap, between type 1 and 2,
30 but basically the types were as described in the report.

Q. Which is, in effect, type 1 being a garden where there is little or no separation between
35 flammable fuels, especially shrubs and trees and houses, heavy often continuous surface fuels including mulch and the presence of conifers and unpruned trees, and type 2 gardens were gardens where the plants were more
40 diverse, there was greater separation between plants and the house. There were discontinuous surface fuels, sparse or well-pruned shrubs and the absence of conifers, especially unpruned cypresses. Is that in essence the two types?

45 A. That's in essence. We made - we took care

because there was some sensitivity about watered gardens versus dry gardens and the fact that people want to conserve water as much as possible - it was not based at all on watering.

5 Many of the dry gardens that survived well had the characteristics of type 2, which was sparse fuels, pruned trees, separation. So we were at pains not to put water in there because of the awareness of the sensitivity.

10

Q. Yes. Again you provide a qualification of that identification in these terms:

15

In some of the cases where gardens were totally destroyed, the classification was difficult. In these cases we assumed the garden to be type 2.

20

Which is the more unkempt garden, if I can put it that way.

A. Type 2 was the more kept garden.

25

Q. I beg your pardon. It continues:

This means any association indicated by the statistics will be conservative and will be stronger if the gardens were type 1.

30

A. That's correct.

35

Q. Perhaps if you could just explain how that operated on the statistical analysis.

A. Right. If a type 2 garden, which in our judgment, my judgment, was more prone to produce fire attack from the garden on to the house via radiant heat and fire brands - if I classified - if I had doubt and I classified a garden - I'll have to think that one out. It may be too complicated here, but the whole idea was to take any bias out or to try to remove bias so that I wouldn't automatically assume that a destroyed house had a type 1 garden.

40

So, in effect, it weakened the association

45

between garden type and damage or destruction of the house. So it's a way of taking any likelihood of exaggeration of the results out.

5 Q. So in effect what you did by doing that was reverse the bias.

A. That's right.

10 Q. To the extent that if you'd gone with the assumption that a completely destroyed garden was a type 1 or more unkempt garden, then it may have skewed your results so you let it go the other way?

A. Yes.

15

Q. Ultimately, as I understand it, your survey work comprised a statistical analysis of those different garden types - mapping of the various houses on, in effect, a street map?

20 A. Correct.

Q. And, thirdly, you include in the report a series of particular case studies focussing on particular areas where you were able to obtain information?

25 A. That's correct.

Q. You then go on in your report to deal with the results, and they appear on page 13. This is, in effect, the results of the statistical analysis; is that correct?

30 A. Page 13 is just totals, so there's no real statistical analysis.

35 Q. The statistical analysis comes over the page. You there set out the various components of the total of 779 houses into no damage, damaged and destroyed.

40 A. Correct. And wind damage alone. And I just point out that we did not attempt - we did not cover the wind damage, all the wind-damaged houses, and that was not our intention, so there were more wind damaged houses that occurred than that.

45

Q. Of course an important part of your survey process was also to look at undamaged houses so you could conduct the necessary comparisons.

5 A. That's correct. That was part of the test which tested association or possible association between garden type and loss or damage of house.

10 Q. Just over the page on page 14, you set out the information you've relied on, but down in the third paragraph you say:

15 Observations by residents indicate that house destruction continued throughout the night.

Are you able to say - I think in one of your appendices you give a figure for how long house destruction continued. What was that figure?

20 A. From memory, it went at least 10 hours.

Q. That was 10 hours from what time?

25 A. 10 hours or more from when the fire first hit the corner of Eucumbene and Warragamba, approximately, remembering that the residents who made these comments sometimes didn't have time. A lot of them did. A lot of them were fairly sure that the houses were still burning the next morning.

30 Q. When you say "still burning", do you include in that still starting to burn within that 10-hour period?

35 A. The residents, from memory, did not say they observed houses starting to burn. In a particular case, as I remember, the resident remembered the eruption or rapid burning of the house and the noise was seen to be preceded by some sort of other noise. So she would hear
40 this noise and then there would be another house burning, and that continued for hours and hours.

45 Q. You do summarise the statistical analysis on page 15 in the middle of the page, where you

summarise what's apparent from table 5.
Perhaps in your own words could you indicate
what conclusions you did draw in relation to
the statistical association between garden type
and house loss.

5 A. For a type 1, which I'll be simplistic and
say it was a more unkempt or fuel-heavy garden,
we observed that 106 houses were destroyed in
that category. The statistical analysis, the
10 test, showed that if there were no association
between garden type and house loss, we would
expect that only 76 houses in that category
would have been destroyed. Therefore, we can
say roughly that the departure - about 40% more
15 houses for that garden type were destroyed than
we would have expected, and we can at least
partially attribute this, although there are
possible other factors, to the influence of
garden type on house loss, and the reverse is
20 true for type 2 gardens.

We observed in that category, that type 2
category, 110 destroyed. If there were no
association between garden type and house loss,
25 we would expect 140 in that category, so the
difference is 20% less houses were lost in that
category than would be expected if there were
no association.

30 Q. And as a matter of statistic, that's a
significant variation; is that correct?

A. The significance would be one, by memory,
in less than 1,000, often one in a million.
These are - I don't know that I quoted the
35 actual significance, but usually the
significance of statistical tests relates -
people usually accept a 0.05% chance. If it's
any less than that, it becomes - that result
becomes extremely significant.

40 Q. And it's in that category?

A. It's in the category of considerably less
than one in 1,000, so 0.001, and, from memory,
it ranges right out to one in at least 10,000
45 or 100,000.

Q. And your conclusion, therefore, as appears elsewhere in the report, is there was a statistically significant association between garden type and house loss?

A. Yes, there was.

Q. And you also mentioned some other potential factors in the paragraphs that follow. I will just ask you briefly to summarise what effect, if any, those did have. Firstly, cypress trees and shrubs.

A. So you're looking at the table --

Q. I'm looking at your narrative starting on page 15, where having gone from the table and indicating the statistical analysis, you then provide observations on some more specific features, and you firstly refer to cypress trees and shrubs.

A. Yes, 45% more houses than would be expected if there were no association were destroyed and 60% less houses were undamaged than would be expected if there were no association.

Q. And, so far as those cypress trees, what conclusions were you able to draw from that statistical analysis?

A. Those statistical tests point out that cypress trees in general - and there are - perhaps the factor will come up later - cypress trees in particular, conifers generally, were a factor in house loss and damage.

Q. I think your next heading is "Native versus exotic species", and I suggest to you that, effectively, in your report you say that the results were inconclusive in relation to that issue.

A. Yes, it looks contradictory to the previous point, but it's not. We looked specifically at cypress or conifers. A lot of the gardens had a mix of natives and exotic, say, shrubs, and we couldn't find - and mixed

gardens obviously. We couldn't find on mixed and gardens that appeared to be solely exotics or natives, we couldn't find an association.

5 Q. Finally, you mentioned lawn, and I think you've already dealt with that issue in saying that you - well, what do you say about the effect of a watered lawn in relation to the statistical analysis?

10 A. It's not really conclusive in respect that perhaps the lawn can be burnt by the house. But we didn't find a strong correlation. I mention that point in the second last sentence.

15 Q. Yes, you do.

A. So we did find a correlation but then qualified it.

20 Q. So that, in essence, the areas where you found a significant statistical correlation were the garden type and, in particular, the existence or the presence of conifers?

A. Is that correct.

25 Q. You then in your report go on to deal with specific case studies, which I want to come to briefly, but before then you - I think you've already referred to this in general terms. Part of your analysis involved attempting to
30 identify evidence of impact of radiant heat or direct flame contact from the fire front, and in the executive summary you say, at paragraph 3 on page 4:

35 We did not find evidence that any residential properties were ignited or damaged by direct flame contact or radiant heat from flames in the pine forest bushland or grassland outside
40 the suburb perimeter roads. We do, however, consider it possible that this mode of attack occurred in some instances.

45 You pick up some of those concepts within your

case studies. But can I just ask you to summarise firstly: had there been such evidence, what sort of evidence would you have expected to find, had radiant heat or direct flame contact been a factor?

5 A. For example, along Warragamba or Eucumbene Drive, we would have expected to find front windows of houses cracked as they have generally the lowest - well, it's the lowest
10 threshold used in prescribing house construction levels with respect to radiant heat from bushfire flames. We would have expected to find front windows cracked, with no obvious cause, as in shrubs under the window,
15 for example, or a combination of shrubs under the window or other garden material or in close proximity to a window, sometimes in conjunction with blinds. We found that apparently garden fuels would ignite blinds and a combination of
20 the radiant heat presumably from both the garden fuels and the blinds appeared to break glass.

25 But every time we found a broken window, we were able to attribute that to garden fuels, rather than the very, very small likelihood that it would come from forest fuels. This is because - sorry, this is because the flames would have been right up against the window.

30 Q. The flames from the shrubs below the window?

35 A. The flame from the shrubs or obviously the flames from the burning blind would be right up against the window and, therefore, there would be very high levels of radiant heat and temperature.

40 Q. But where those factors weren't present, there was no apparent cracking?

45 A. No, we did, however, find in that - I recall, I think it was Eucumbene Drive, there were cracked windows which were not facing in this case the pine forest. They faced houses or fences or something which obviously had

burnt alongside the house. So the windows weren't directly facing the pine forest and we were able to attribute the cracking of those windows to suburban rather than forest or bushland fuels.

5

Q. And, in addition to the windows, were there other factors, evidence that you were looking for, that might have suggested radiant heat affecting the houses directly?

10

A. Windows was the main one. Ignition of timber by radiant heat alone happens at a much higher level of radiant heat. Our first one was windows.

15

Q. What about the gardens themselves or the --

A. The gardens, we were not able to show that the gardens were ignited directly by radiant heat from the forest, and one of the observations was that the scorch or lack of scorch to the street trees in Warragamba - say, along Warragamba and Eucumbene Drive - when we did the survey, which happened in about the seven days following, starting on the 20th, there was no obvious scorch on those trees. Obviously they must have suffered elevated temperatures, but noticeable scorch happens to trees or leaves that are exposed to, from memory, 70 degrees Celsius or upwards.

20

25

30

So we were not able to easily identify obviously scorched trees, which led us to believe that the radiant heat impinging on the houses was relatively low in comparison to building components.

35

Q. And you concluded, I think, in there, based on those types of observations, that you were not able to find any direct evidence of there being any either radiant heat or direct flame contact affecting - straight out of the forest, affecting the dwellings and structures along those roads?

40

45

A. That's true. Just bearing in mind the

second point in the executive summary, I was aware of the possibility under particular circumstances where this may occur, but we weren't able to conclude it. The likelihood is there.

Q. And you refer to some of those possibilities in some of the case studies?

A. That's correct.

Q. I just want to ask you about a couple of particular case studies because they do tend to speak for themselves. But on page 24 of your report, you deal with a case study which you describe as opposite pine forests, number 63 to 75 Warragamba Avenue. Excuse me if I read this short section:

Two or three residents remained during the fire and managed to protect all but one of these houses.

If you could just scroll down, John, you'll see what you're referring to there. You're referring there, as I understand it, to number 63 to 75 - sorry, 71 - no, 75 Warragamba Avenue and, in particular, the lots shown there, 7, 8, 9, 10, 11 and those three sitting behind, 25, 24 and 23?

A. That's correct.

THE CORONER: So green is not destroyed, blue is damage, red destroyed? How does that work?

A. Red is destroyed, house destroyed. Orange is partial damage to the house. Green, I think, is fenceless, and blue - offhand I can't remember, but green and blue both refer to damage to the fences and external structures.

MR WOODWARD: Your Worship, the legend is on page 17.

THE CORONER: I can't read that.

MR WOODWARD: I can't read it either.

THE CORONER: I just presumed the red is destroyed.

5 A. The red is destroyed. Orange is partially damaged - sorry, damaged.

MR WOODWARD: Do you recall what yellow is.

A. Offhand, no.

10 MR LAKATOS: Damage to external structure. It's also on page 16.

MR WOODWARD: Yes, thank you. I'm indebted to my learned friend. Red, orange and blue
15 indicate the house damage categories of destroyed, damaged and no damage. So destroyed is red, damaged is orange and no damage is blue. Green indicates damages to fences only and yellow indicates damage to an external
20 structure only. Is that consistent with your recollection?

A. That's correct, yes.

Q. So, going back to that page we were
25 referring to, page 24, you're referring in particular to numbers 73 to 63 in Warragamba Drive being either orange, green or blue, and the four houses behind that in Burrendong Street - 35, 37, 39 and 41?

30 A. Yes.

Q. And your observation in relation to this is that the information you obtained indicated that two or three residents remained during the
35 fire and managed to protect all but one of these houses:

They patrolled constantly, controlling many spot fires. During the first four
40 hours before the wind changed from north-westerly to south-easterly, a great majority of these fire brands must have originated from the Stromlo pines to the west and north-west.

45

They reported the difficulty or practical impossibility of extinguishing ignition points in mulch beds, fences or sleepers. A
5 neighbouring house that was destroyed was ignited in the eaves, probably directly by a fire brand. A timber garage post of one house was ignited by surface fire in mulch. In the
10 absence of residents, this could have led to the destruction of the house. The distribution of destroyed houses in this area suggests that the effect of saving the first row of houses
15 influenced the survival of the second row - numbers 35, 37, 39 and 41.

That was not the only observation of that type that you made?

20 A. No. There was at least one other case, possibly two, where we looked at the influence of residents on spread.

Q. However, there is a case also, perhaps by
25 contrast, at page 29. You relate the case study where all four houses bordering the reserve were destroyed. You had three gardens of type 2 and one type 1. All gardens were apparently dry. Residents of those houses were
30 present during the fire.

Then you go on to indicate whether or not they observed the houses being alight when they left. Were you given any information that
35 would explain the difference between those earlier case studies where the presence of residents appeared to have an influence and this one where the houses were destroyed?

A. The possibility in my mind was that the
40 proximity of fences to houses or attached structures - I'd already - I'll just digress very briefly. I'd already been asked to do a survey of Isaacs, O'Malley, and that was one of the features I pointed out very strongly, that
45 where for planning and siting reasons the house

is within a few metres, often less than two, of a wooden fence, that is a vulnerability, and so even though the fire approaching the fence, and the fire could be running from grassland or woodland outside the suburb, possibly to the fence, this fire would be relatively low intensity and include, as Mr Cheney referred to earlier, fire brands. Once the fence ignited, of course the radiant heat impinging on the house would be quite high and, if there were bushes or garden plantings either side of the fence, this would add to the level of fire attack on the house.

Q. Indeed, I think you make that very observation on page 30, under the heading "Discussions and conclusions", where you say:

We identified the potential of heavy surface fuels or flammable shrubs on public land to contribute to the ignition of fences and where fences were in close proximity to houses or other structures to contribute to the fire attack on these houses or structures.

I just want to draw your attention to that and a few other references in this section of report and ask you what is the significance of those findings in your opinion for the urban land management authorities?

A. The significance is both to future planning, of course it's too late for prior planning, but the significance is relevant both to land managers and to the residents or groups of residents because during bushfires, within practical measures, a land management agency cannot stop fire brands reaching the property. It cannot stop under very severe conditions fire brands, say, igniting any ignitable fuel on that property. Even with very large setback distances and removal of all fuel, there is still a chance of fire brands from remote fuels, so a land management agency, within

practical considerations, can only go so far as to reduce the level of fire attack on a property, a private property.

5 Then there is the responsibility of the residents, if it's recognised. Fuels outside the suburbs can be managed relatively easily for the first 50 metres, say, to reduce fine fuels, particularly surface fuels and shrubs,
10 down to very low levels. The fire will travel very quickly through minimal fuels, reach a property. If the property has heavy fuels and those are continuous and there is little space and if the fuels - if the gardens are crowded
15 and the fuels are continuous, the fire will develop quickly into a relatively high intensity fire and, given that it's only got a short distance to travel, but heavy fuels will produce a relatively intense fire within
20 private property. So I've been very longwinded in saying that there's a responsibility of the land managers to do all that is practical to reduce the levels of radiant heat to some pre-selected criteria at the private property
25 boundary and, after that, there's a responsibility of the residents for fuels within their home.

Q. So far as the land managers are concerned,
30 as I understand your conclusion there, there would be a need to look at the proximity in public land areas of shrubs and trees close to residential fences?

A. Yes.

35

Q. And then you say beyond that, however, it's really a matter for the resident to be responsible in their management of their own gardens?

40 A. Yes. With respect to that and to Mr Cheney's earlier comments on radiant heat, I estimated distances along Eucumbene and Warragamba between the pine forest and the front of houses. From memory, it was a minimum
45 of 30 metres, mostly 40 metres to 50 metres,

and, according to my models of radiant heat, which have been adopted by the New South Wales Rural Fire Service, those levels of radiant heat should not have broken windows.

5

Q. That degree of setback should have been sufficient to prevent --

A. Yes.

10 Q. You include some general statistics in the second last paragraph on that page - some general statistics about percentages of those houses that may have been impacted by ember attack directly out of the forest and those
15 affected by fires in adjacent surface fuels. I think you say 50/50 split. Firstly, in relation to that, does your reference to adjacent surface fuels include structures and neighbouring houses and the like?

20 A. That's correct. It includes fuel within the suburbs.

Q. Yes. So, in essence, subject to a qualification that I'll come to, you say that
25 there's a suggestion at least that 50% of the houses destroyed were destroyed by embers coming straight out of the forest and impacts on those houses and another 50% were likely to have been caused by fire spread within the
30 urban area, either ember attack from the fuels within other houses or direct house-to-house flames; is that correct?

A. Yes, that's correct. That remains my
35 conclusion, about 50/50 - 50% or more due to fire spread within suburban fuels and about 50% due to primarily, say, fire brand attack.

Q. Yes.

A. From outside the suburbs.

40

Q. But that was based on a relatively limited --

A. That's correct. And it's backed up by, I suppose, the case studies, people's
45 observations of what they were faced by.

5 Q. You draw the obvious conclusion based on what you said before that garden design and maintenance are important factors in house survival. You then go on to say:

We observed that given garden types tended to occur in groups rather than randomly

10

Could you explain that observation?

15 A. It was particularly evident in aerial photographs, and I think it's the fact that neighbours talked to each other. They maybe swapped plants or ideas, and so it's common to get five or even 10 or more houses with, if not similar species, similar styles of garden, which off the top of my head might be a lot of paving, short mowed green grass, well-pruned trees, just as an example.

20

Another example - obviously it appears that people have swapped ideas on planting native gardens and using a lot of mulch.

25

Q. And you did find, admittedly a generalisation, they did attempt to form groups?

30 A. That is a generalisation, but that's true.

30

Q. You referred earlier to some of the flaws in relation to your garden type analysis. One of those you refer to in the last sentence of that paragraph where you say there may have been some correlation between someone who had a type 2 garden, namely a tidier and sparser garden, and also to the extent to which they maintained guttering and so on?

35

A. That's true.

40

Q. And you weren't able to eliminate that as a potential?

A. No.

45 Q. A factor affecting your results.

A. Yes.

Q. I think this picks up a point you made earlier. On page 33 you say:

5
10 Combustible mulches are surface fuels which carry fire, are a source of in-borne fire brands and, if thick, have a potential to burn for an extended period.

15 You talked before about the tension between the water restrictions on the one hand and maintenance on the other. What sort of options in times of water restrictions do residents have to deal with that problem, based on your observation of house loss?

20 A. Firstly, from a personal viewpoint, I have heavy mulch fuels right around my house and I accept the risk. There is no such thing as a zero probability at the bush urban interfaces of not suffering loss or damage. People, when they're aware, can manage their fuels and accept a given probability that the garden will
25 ignite.

The options that residents have are several. They can in key areas, perhaps close to the house, put non-combustible mulch like gravel.
30 They could break up the areas of mulch so that you don't have 100 or 200 square metres of mulch on the likely upwind side coming right up to the house. In my view, that not only would present a high level of fire attack on the
35 house, which could include windows, say, but, if those mulch fuels were burning, it would deny access to the outside of the house by the residents following the passage of the bushfire front. So I can consider that significant.
40 But residents do have options.

45 Q. So there is a role for public education in people understanding that on the one hand the use of mulch is important in times of water restrictions, or at any time, but on the other

there does need to be some thought given to what effect that might have in a fire?

5 A. That's correct. ACT Planning and Land Authority approached us and wanted us to do a study on mulches, different types of mulches, perhaps at different ages, and loadings, as in thickness on the ground, and the radiant - the levels of radiant heat that they could expect from given areas of different types of mulch at
10 given distances.

Q. Is that something you're doing at present?

15 A. We are - from memory - I was responsible for part of the dealings with Planning and Land Authority over this. From memory, our price was - for the level of detail that the Planning and Land Authority requested, we could not deliver that within the budget that they could.

20 Q. So do you know what's happened about that since?

A. I know that - as I recall, one of the - the company that won the contract to do a lot of the urban edge review was making a
25 literature review of mulches and surface fuels to try to get some preliminary figures. I don't know of any other study concurrently. We have also had an informal request - from memory, it was to characterise fire in mulch
30 fuels, and that's for a university, and that particular request might come up.

Q. There was just one final matter. There was one aspect of your report which I
35 understand you wanted to correct. In paragraph 5 of the executive summary, you refer to "apparent failure of commercial gas lines at or below the gas meter contributed to damage". Now, I think we've already covered this but
40 that was based on simply the anecdotal information you referred to earlier; is that correct - that is, the contribution to damage and loss of some houses? But you did want to correct the reference to gas lines at or below
45 the gas meter; is that so?

5 A. Yes, I've since had information. I was supplied information about the threshold of the actual gas meter to heat and its possible failure, and that informal request, as I remember, for fire characteristics from mulch garden fuels came from that source.

10 Q. So it may be that there was some other aspect of the gas meter that created a rupture, rather than always below the meter itself?

A. I think so. That's my opinion.

Q. That's your understanding of the information that you found?

15 A. That's my understanding of that information.

THE CORONER: I don't follow that.

20 MR STITT: I don't understand that.

MR WOODWARD: Mr Ellis was concerned that the identification of the rupture - the failure being at or below the gas meter. And if I may summarise what he's just indicated, your Worship, he's since obtained information that the meter itself may have failed in some cases because of radiant heat, so the suggestion that it was always below the gas meter may lead to a misunderstanding of the information that he has.

35 Q. But, as I understand it, that's not an area where you've conducted any independent research?

A. No. We have some anecdotes and some photographs, one of which will show something, but it's open to interpretation.

40 Q. But you're not in a position to draw any conclusions about it?

A. No.

45 MR WOODWARD: I have nothing further, your Worship.

A. Sorry, your Worship, I did sidestep a question. You asked about my request for information concerning gas and I did not answer that.

5

Q. That's the gas supply issue you referred to on 4.2?

A. Yes.

10 Q. Were you unable to obtain information relating to the supply of gas? Was that --

A. I didn't answer that.

Q. I'm not sure you did.

15 A. I think I rabbitied on.

Q. What was the information that you were seeking, that you were unable to obtain?

20 A. I was dealing with a representative from ACTEW and I wanted - the number of houses in the suburbs that were actually connected to gas and possibly numbers of those where the meters or lines had been replaced, and --

25 Q. Was that information you were unable to obtain?

A. I was unable to obtain that. I also requested the positions of stopcocks within the suburbs. My aim was to work out the
30 significance - I've already referred to my interest in gas - the significance of how long perhaps, if it was possible to calculate, it was likely that gas could continue running given a rupture. Now, as it turned out, I
35 requested the information. The information wasn't given. I no longer pursued that line because I realised the complexity of it. It was an extremely difficult study.

40 MR WOODWARD: All right. Thank you, Dr Ellis. I have nothing further.

THE CORONER: Yes, do you have any questions, Mr Begbie?

45

MR BEGBIE: No, your Worship.

THE CORONER: Mr Johnson, any questions?

5 MR JOHNSON: No, thank you, your Worship.

THE CORONER: Mr Stitt, any questions?

MR STITT: Yes.

10

<CROSS-EXAMINATION BY MR STITT

MR STITT: Mr Cheney in his evidence has talked
a lot about embers and ember attacks and embers
15 both preceding and following fire fronts. Do
you draw any distinction between a fire brand,
which you've referred to in your evidence, and
an ember.

A. I have pointed out in one report - I don't
20 think the report is published --

Q. No, please, do you draw any distinction
between an ember on the one hand and a fire
brand on the other?

25 A. By definition, an ember is near
extinction. What you get in the suburbs is
fire brands, some of which are near extinction.
A fire brand encompasses a piece of burning
material which could be flaming or which could
30 be glowing in a very potent state, whereas by
definition, to my knowledge, an ember is closer
to extinction and, therefore, less likely to
ignite something.

35 Q. Well, I'm sorry to ask you again, but is
there a distinction which you draw between an
ember and a fire brand?

A. In the report, I have accepted that, when
people talk about embers, they use a term which
40 is not quite correct, but includes all forms of
fire brands, from very potent flaming ones to
ones that are in the dying stages.

45 Q. Your expertise actually is in the study of
the behaviour of fire brand samples,

particularly bark; is that so?

A. That's correct.

5 Q. And is it a fact that the bark of
different trees performs as a fire brand or
ember in different ways?

A. To a certain point. The different bark
types have different structures. Some are
plaity, some are chunky.

10

Q. But does the nature of the tree have a
bearing on whether or not the fire brand, as
you call it, is likely to carry considerable
distances?

15

A. It's a large question. Certain species
are notorious for occasional, very long
distance spotting and restricted numbers of
short distance spotting, say, within 50 or 100
metres or more. Other species are notorious
20 for very, very heavy short distance spotting
and little or no longer distance spotting. So
I'm finding it an extremely large question.

20

Q. Well, do you agree that within the
25 eucalyptus genus there is a difference in the
fire brand performance?

A. Between species, very much so.

25

Q. And is the manna-gum one that throws fire
30 brands for a long distance?

A. That's correct. It also throws fire
brands short distances but its notoriety arises
from often extremely long-distance spotting.

30

35 Q. Does the same comment apply to different
species of pinus?

A. I have only examined one pine in any
detail. From memory it's pinus pinaster. I
studied both flakes of actual bark and sections
40 from roots, believe it or not. Now, the --

40

Q. I'm sorry, I really don't want you to give
a speech. I'd like you to answer my questions
if you would be so kind. The forest that was
45 immediately opposite Eucumbene Drive, what

species of pine was that?

A. Pinus Radiata.

5 Q. Are you aware of the characteristics of
fire brands from that tree?

A. I'm aware of the characteristics which
makes fire brands successful. I have studied
another species, but I can draw some
conclusions.

10

Q. Are you familiar, though, with the
characteristics --

15 A. I am not familiar with the characteristics
- the fire brand characteristics of Pinus
Radiata.

Q. Have you seen the Channel 9 video which
was shown here to her Worship yesterday?

20

A. I have.

Q. Have you seen the nature and performance
of what was called yesterday embers and what I
understand you to call fire brands as depicted
in that video?

25

A. I have.

Q. Would you agree that the ember attack or
fire brand attack both preceded and followed
the fire front?

30

A. Yes.

Q. And would you agree that the fire brand
attack was extremely heavy?

35

A. Yes, I agree so.

Q. And were the nature of the fire brands
being thrown by the wind consistent with your
understanding of the type of performance that
such fire brands exhibit in those conditions?

40

A. Yes, although I have not looked at fire
brands under those conditions.

Q. But did you look at the video before you
commenced your study of the damage to the
45 houses after the fire?

A. Yes.

Q. Did you -

A. To my recall.

5

Q. Did you look at the video to see the nature and path of the winds where the fires had entered the various suburbs?

10 A. I observed fire brands both being blown upon the ground and the trajectories, albeit taken from a vehicle of airborne fire brands blown across the road and on to suburban properties.

15 Q. And, as I understand your evidence today, it's your judgment that the fire brands, as you call them, were the major cause of the fires in the urban structures?

A. That's correct.

20

Q. As I also understand your evidence, you are saying today that it's not possible to isolate the sequence of events to determine when and how an urban structure caught fire?

25 A. Often no. But can I --

Q. And, further, it was not possible for you to identify the timing when such urban structures may have caught fire?

30 A. Individually sometimes, but generally no.

Q. And does that difficulty increase when you have a tidal wave of fire brands which were apparently descending on these suburbs on the afternoon of 18 January?

35 A. I don't know that the actual tidal wave of fire brands makes it more difficult. Certainly the conditions are certainly more difficult for residents to make collective observations,
40 certainly.

MR STITT: Is that a convenient time, your Worship?

45 MR WOODWARD: Your Worship, I hope I'm not

pre-empting my learned friend, but, given that,
as indicated to your Worship, the death inquest
will commence tomorrow regardless and could
take at least the day and perhaps a little
5 longer and that Dr Ellis is the last witness
and the last evidence to be called for that
part of the first phase apart from those
matters, both for his convenience and for the
convenience of the parties, generally,
10 your Worship, depending on how much longer my
friend is likely to be, if your Worship were
willing to sit on for a time, I imagine
everyone would be grateful.

15 THE CORONER: I was going to make an inquiry,
not that I wish to rush you by any means, Mr
Stitt, but, if you are going to be some
considerable time, then we'll adjourn, but, if
you won't be, then I would be more than happy
20 to sit on this afternoon.

MR STITT: I won't be another hour, but I won't
be five minutes either. I can't be better than
that.

25 MR LASRY: Your Worship, could I just add to
what my learned friend Mr Woodward said. We'd
be fairly anxious to complete Mr Ellis and not
bring him back. I suspect my learned friend is
30 the only one with any significant questioning
of the witness and, unless it inconveniences
you, it would mean that none of us will have to
be here on Friday.

35 THE CORONER: I suppose that's the result of
it, otherwise Dr Ellis will have to come back
on the Friday. So I'd be prepared to sit on if
that's convenient with the parties. Is that
convenient to you, Dr Ellis, to stay?

40 A. That's convenient. On a personal note,
your Worship, I have someone's car that she
requires.

THE CORONER: Thank you, Mr Stitt.
45

MR STITT: In attempting to make an assessment of the causes of burning, do you agree that, in the circumstances of this fire on the 18th in these suburbs, it was an extremely difficult, if not impossible, task to undertake?

5 A. It is, was, a difficult task. It always is post-fire.

Q. And was your task made more difficult by the fact that you were not present obviously when these events occurred?

10 A. When these events occurred, I was protecting a property, a rural property, down at Tharwa.

15 Q. Well, the answer to my question is?

A. It's no.

Q. The sequence of burning, as I understand your evidence, is that, if a fire brand, as you call it, penetrates any part of the structure, depending upon the heat and intensity of the fire brand, the structure will be likely to burn?

20 A. Mostly a fire brand has to ignite fuel within or on that structure. It has to be - it has to be a successful ignition that will continue.

Q. But is that successful ignition likely to be achieved more easily if the external fabric of the structure is damaged by either such as a broken window or tiles coming off or whatever?

25 A. That's true. I have stated that in the report.

Q. And you've also stated in the report that it's not possible for you to determine when the integrity of structures was in fact damaged or when in fact the fire brands entered that structure?

40 A. That is true. Sometimes house ignitions can be very prolonged.

45 Q. The results of your investigation, as I

understand the way your report is now being put forward, is directed to the role played by gardens and associated vegetation; is that correct?

5 A. The role played by gardens, yes, and the implications of losses to land management agencies.

10 Q. And you do not seek to go beyond that area in your report or in your evidence; is that so?

A. Certainly not in the report. It wasn't within the bounds of the report, nor within our possible - our time constraints. I am of course open to particular questions which I will answer to the best of my knowledge on a range of aspects outside the report.

20 Q. To what extent, if any, did you place reliance upon the information which has now been provided to us as the Australian Federal Police Survey?

A. If that was the only evidence - I acknowledge that was the only evidence. From recollection, I made a point about the vulnerability of relying on anecdotal or personal accounts given of circumstances.

30 Q. Well, is this the position, that you would not wish your report to be based upon that sort of anecdotal evidence?

A. We based the report on the best evidence we had at that time.

35 Q. But you've made it plain that that was for a different purpose, rather than for a coronial inquiry.

A. Of course that was not for a coronial inquiry.

40 Q. So is this the position, that you would not wish, for the purpose of the coronial inquiry, for there to be any evidence based upon the anecdotal report on the Australian Federal Police document?

45 A. Sorry, can you rephrase that?

Q. Is the position now that you would not wish your evidence, which is being used as part of the coronial inquiry, to be based in any way upon the anecdotal material contained in the Australian Federal Police Survey, which we've been provided with?

A. In retrospect, the evidence was not, as you said, or the report, aimed at a coronial inquiry. However, I accept that the evidence is as sound as I could produce in the report and, of course, that it has come up now.

Q. But you still haven't answered my question.

A. I misread your question obviously.

Q. You would not now wish your report to be in any way, so far as the Coroner is concerned, based upon this Australian Federal Police material?

MR WOODWARD: Your Worship, in my submission that's a very difficult question. For a start, your Worship, it's really a matter for you.

MR STITT: It's a matter for the witness.

MR WOODWARD: Secondly, your Worship, I think the question may need to be asked in two parts. It's very difficult for this witness when his report was prepared for a purpose - he's explained that the sort of material my learned friend is referring to was only relevant to him in the sense that he needed to have regard to that as a possible alternative explanation. I think my learned friend needs to better define what he means by this witness relying on that evidence. It's part of his report. He's referred to the extent to which it's relevant in his report. I don't know that the matter can really be useful and taken any further.

MR STITT: Except this, that the position has been left somewhat ambiguously where the report

was being put forward and we were expected to deal with it. Then my learned friend said, "Well, we don't really ask you to form any conclusions based upon it." Then it is said
5 that the anecdotal material doesn't really carry the matter any further. What I'm seeking to do is to explore and confirm with this witness that, in fact, the evidence which he's giving to you is not in fact supported by the
10 Australian Federal Police survey material that we've been provided with. To clear up that ambiguity.

THE CORONER: I don't know that that is exactly
15 the question that you asked. I understood you to be asking Dr Ellis - and this is the difficulty - whether or not I suppose the report is true and acceptable to one client but he would say something different and write
20 something different to another client, being perhaps the coronial investigation. That's the difficulty that I see in the question. Otherwise you are really asking Dr Ellis to withdraw his report in relation to its use in
25 this inquiry.

MR STITT: That may be what he wants to do.

THE CORONER: Whereas it's legitimate for use,
30 I suppose, by the people who commissioned the report. You do accept that the information that was provided to you by the AFP Survey was largely anecdotal information?

A. Yes, your Worship.

35 Q. And those aspects of your report, they are based on that?

A. Aspects of the report are based on this and often other information, your Worship. In
40 one respect my professional integrity rests on this report. I am happy with the report in its accuracy. At the same time, I acknowledge my vulnerability or, if you like, the nature of some of the evidence which I have used, so I
45 stand on the report. I accept that it will

appear at any level of investigation, although its original intent was not so.

5 MR STITT: I think I'm content with that. Thank you.

THE CORONER: Yes, thank you. You don't have any questions, do you, Mr Woodward?

10 MR WOODWARD: I have nothing.

THE CORONER: Mr Lowe, any questions?

15 MR LOWE: No.

THE CORONER: And no re-examination, Mr Woodward?

20 MR WOODWARD: No, thank you, your Worship.

THE CORONER: Thank you, Dr Ellis. Thank you for your assistance. You're excused.

25 THE WITNESS: Thank you, your Worship.

THE CORONER: So we'll adjourn until tomorrow at 10 o'clock and, as indicated, the proceedings tomorrow will be the inquest into the deaths of persons.

30 MR LASRY: That is so, your Worship. My learned friend Ms Cronin will be leading that evidence and, at the conclusion of that evidence, we'll be inviting your Worship to read some, as it were, provisional findings in relation to those individual cases, provisional in the sense that of course they're provisional so far as the totality of the inquest is concerned, but sufficiently final to enable finality to be brought for the families of those who are interested in the process. Your Worship of course will either do that at the conclusion of the evidence or in a few days.

45 THE CORONER: Very shortly afterwards. I would

think if the evidence is concluded tomorrow I
can make those preliminary findings tomorrow.

MR LASRY: If your Worship pleases.

5

MR JOHNSON: Your Worship, could I just raise
for clarification --

THE CORONER: You can step down now, Dr Ellis.

10

<THE WITNESS WITHDREW

MR JOHNSON: Concerning tomorrow's evidence,
will it only be the officers in charge who give
evidence? There are a large number of
statements and interviews, and I'm certainly
not urging a large number of people to be
called, but just to understand who was going to
be called to give evidence in relation to the
four deaths, it would certainly assist us if we
knew that today.

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20

THE CORONER: My understanding is, and I can be
corrected, that it will be the informants, just
the police officers providing the information
and the statements. I think there's a rather
lengthy statement by the informant. That will
be provided. And also Dr Hallam will be
called, the pathologist will be called, and
questions will be asked of her by counsel
assisting and by any parties who have an
interest to ask and clarify any information
that needs to be clarified. But that is the
extent of the evidence to be called, as I
understand it.

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MR JOHNSON: Thank you, your Worship. That's
certainly helpful to us. Thank you.

40

MR LASRY: That's correct, your Worship.
Your Worship might recall that I have earlier
forecast that we might have a debate about the
issues which might govern conduct of phase 2 of
the inquest at the end of that evidence. On
reflection - I've mentioned this to some of my

45

learned friends, but not all of them - it does seem to us that that debate would be better informed if it was postponed for a period of time, and our proposal at the moment broadly is
5 that by a date which perhaps we can agree on with your Worship some time in December, some time before that we would provide to the represented parties a list of the issues that we thought were appropriate for phase 2, with
10 some written reasoning as to why we thought they were appropriate, and possibly with some attempt to prioritise them, invite our learned friends to, in effect, respond to us on those issues within, say, a further week and then, in
15 so far as that would then facilitate a debate, we could have that debate or discussion, even if it was quite consensually, before your Worship at some date in December.

20 I should make it clear that the intention is to develop a list of issues which will become in effect the terms of reference for the balance of the inquest. What we would be asking our learned friends to do in assisting us to
25 formulate that list of issues would be to accept that list of issues would then be the list beyond which we would not go.

30 THE CORONER: Unless there were compelling circumstances to do so.

MR LASRY: Yes. It would govern the evidence and it would be intended to govern
35 cross-examination, and it may be that a prioritisation of those issues may mean that some issues ultimately were deleted or diminished in their importance, or at least diminished in their priority.

40 As I've said before, we're anxious to ensure that this hearing occurs as expeditiously as possible, and we think that process will assist. So we offer the process to our learned friends and we do ask for their assistance, and
45 we think that perhaps on a date, say, in the

middle of December, after we've all had time to reflect on the evidence that's been given, and after we've had some more time to make progress in the assembly of the phase 2 brief, that that
5 debate might be better informed and your Worship might be more assisted. So, although I had originally intended that at the immediate conclusion of the evidence we'd have that discussion, I think it's probably better
10 to have it in a month or two's time to obtain a better result.

THE CORONER: So as I understand your proposal, you, Mr Lasry, will come up with a list of
15 issues, circulate it to all parties, ask them to respond and then perhaps again have a directions hearing or another hearing in December to finalise and to settle the issues and hear what counsel has to say on those and
20 then adjourn until the new year.

MR LASRY: Until the new year. It may be that at that directions hearing in December we can bring some finality to the date of the
25 resumption. As your Worship will recall, in the previous directions hearings, issues have been raised about the fire season. There may be some pressures on people attending, and perhaps we can finalise that, subject to
30 unexpected events occurring - we can finalise that date also in December. That's broadly the program that we envisage. So, your Worship, at the end of the evidence in relation to the four deaths tomorrow, we simply would be asking
35 your Worship to adjourn the further hearing of this inquest to a date to be fixed.

THE CORONER: On a date to be fixed which is suitable to all parties.
40

MR LASRY: Yes.

THE CORONER: Is that suitable to counsel, if we take that course?
45

MR JOHNSON: Yes, it is, your Worship, to us.

MR BEGBIE: Sounds very sensible to us,
your Worship.

5

MR STITT: Yes, your Worship.

THE CORONER: Mr Lowe, you understand what is
proposed and that is suitable to you?

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MR LOWE: Yes, thank you.

THE CORONER: All right. We'll proceed in that
fashion.

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MR LASRY: If your Worship pleases.

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

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**MATTER ADJOURNED AT 4.20PM UNTIL THURSDAY,
16 OCTOBER 2003.**

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