

2009 VICTORIAN BUSHFIRES ROYAL COMMISSION
Letters Patent issued 16 February 2009

SUBMISSIONS ON THE CAUSE OF THE KILMORE EAST FIRE

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Introduction

1. These submissions are made on behalf of the State of Victoria (**the State**) in response to parts 7, 8 and 9 and key findings [11.16] to [11.21] of the submissions of Counsel Assisting dated 22 December 2009 in respect of the Kilmore East fire.

Findings as to cause

Proposed Key Findings of Counsel Assisting

- '11.16 The Kilmore East fire was caused by conductor failure between poles 38 and 39 on the Pentadeen Spur Line failing at approximately 11.47am on 7 February.
- 11.17 The live conductor came into contact with a cable stay at pole 38. This contact caused an arcing event, this event emitted plasma which in turn ignited vegetation near the base of pole 38 thus starting the fire. '

Response of the State

The State agrees with the proposed key findings [11.16] and [11.17].

2. The cause of the fire initiation was failure of the conductor at pole 39 which led to arcing and the ejection of plasma after the conductor recoiled all the way to the southern stay wire on pole 38 and the metal hit the thimble. The mechanism of the fire commencing was plasma being ejected from arcs at the location of the thimble and the eyebolt hitting vegetation in the vicinity of the pole.¹ This is consistent with the proposed key findings [11.16] and [11.17] in the submissions of Counsel Assisting.

¹ Sweeting T11360 - T11361.

3. The complete sequence of events which occurred on 7 February 2009 has a very low probability of occurrence.² There was a coincidence of a number of factors which ordinarily would have resulted in a low probability of fire commencing.³ Asked whether a fire could have started in these conditions and without knowledge that there was in fact a fire Dr David Sweeting would have said that he would not have expected a fire to start.⁴ In the absence of actual knowledge of a fire running from pole 38 Dr Sweeting considered that there was a very low probability that plasma ejected from arcing would manage to actually ignite material as it did in this case.

Reasons why the conductor broke

Proposed Key Findings of Counsel Assisting

'11.18 The conductor failure was caused as a consequence of fatigue of the conductor strands where a helical termination was fitted to the conductor at pole 39.

11.19 The fatigue of the conductor stands was due in part to:

- (a) the helical termination being jammed between a thimble in a clevis device at pole 39 thus altering end conditions of the conductor span and causing stress to the conductor;
- (b) the lack of a damper to reduce wind induced vibration;
- (c) wind vibration.'

Response of the State

The State submits that the Commission should not make findings in respect of the reason why the conductor broke – [11.18] and [11.19].

4. The Commission should be cautious about making findings in respect of the reason why the conductor broke or failed given:
- (a) The conflicting evidence of Mr Herman Better and Dr Rhys Jones and the fact that cross examination of witnesses before the Royal Commission was limited due to concerns with what was broadly termed 'manageability'

² Sweeting T11377:14 – T11377:25.

³ Sweeting T11378:25 – T11378:31.

⁴ Sweeting T11385:21.

issues. During the course of the hearing it was made clear that the detailed cross examination of witnesses that might otherwise be expected was unnecessary in the present circumstances.⁵

- (b) The existence of legal proceedings in another forum in relation to the Kilmore fire which are likely to relate to the cause of the conductor failure and whether any party should bear responsibility for the conductor failure.
 - (c) The fact that investigation by Victoria Police in relation to the Kilmore fire is not yet complete.
5. Aspects of the conductor failure which might require further investigation and evidence in a different forum include:
- (a) Whether there is in fact aeolian vibration on this span of conductor between poles 38 and 39 on the Pentadeen Spur Line. No assessment has been made to determine whether there is aeolian vibration on this span of conductor. The presence of aeolian vibration on the line has not been established by the available testing methods and has simply been assumed. Mr. Better undertook a test involving reconstruction of the line. However that test did not measure whether and to what extent the line was subject to aeolian vibration and if so whether such vibration would have caused damage to the conductor. Mr Better regarded such a test as something outside HRL's role in this investigation.⁶ Mr Better agreed that testing or monitoring for aeolian vibration would give more information on the line, how it might behave in the future and how much damage it has already received.⁷
 - (b) Further investigation of HRL's conclusion that the absence of external damping devices fitted to the line to minimise vibration contributed to the cyclic stress from wind-induced vibration at the point of failure⁸ and that a

⁵ For example at T11154:6 – T11154:11 where Commissioner Teague declined Mr Lane's suggestion to demonstrate aeolian vibration stating '.... we have concerns about manageability issues. We don't have to go into the detail in a way that it would be necessary in other circumstances.'

⁶ Better T11348:18 – T11348:24.

⁷ Better T11348:25 – T11348:31; Better T11349:1 – T11349:5.

⁸ Better T11317; *Investigation into the Failure of a 12.7kV SWER Conductor Pentadeen Spur, Kilmore East - Report No: HLC/2009/344*, Ex 525, VPO.001.039.0016 at 0035.

damper would have significantly altered the cyclic stress on the line.⁹ A damper efficiency test on the span of conductor between poles 38 and 39 could have been undertaken to determine whether the fitting of a damper would have reduced any aeolian vibration that may exist. Mr Better was aware that a damper efficiency test could be undertaken and is prescribed in the Australian Standard. A test to determine the effectiveness of a damper on the conductor between poles 38 and 39 could be undertaken but has not been undertaken.¹⁰

- (c) Further investigation of the conclusion by HRL that the misplaced or incorrectly installed helical termination 'would have significantly altered the end condition of the span and is likely to have influenced the vibrational mode.¹¹ Conversely Dr Jones observed the recreation of the line and formed the opinion that the misalignment of the helical termination on the thimble was likely to have a minimal effect on the conductor.¹² No test had been undertaken to determine the role (if any) that the misplaced helical termination played in the conductor failure. Such a test could be undertaken but was not undertaken.¹³ Dr Jones was critical of the absence of tests on the effect of taking the wrap out and locking it into the thimble has upon the stresses at the end of the wrap. In the absence of scientific evidence Dr Jones regarded the conclusions made by HLR as to the effect of the misplaced helical termination as conjecture;¹⁴ No tests were undertaken by HLR with the helical wrap misplaced to ascertain how the misplacement affects stresses on the conductor (if at all). Such a test could be undertaken in half a day.¹⁵
- (d) Further investigation as to the cause of the indentation and the formation of the white layer on the conductor. Even on Mr Better's analysis the misplaced helical termination alone was not sufficient to cause the conductor to break. The depression and the white layer on the conductor

⁹ Better T11317.

¹⁰ Better T11350:22 – T11350:31; Better T11351:1 – T11351:9.

¹¹ Better T11317; *Investigation into the Failure of a 12.7kV SWER Conductor Pentadeen Spur, Kilmore East - Report No: HLC/2009/344*, Ex 525, VPO.001.039.0016 at 0035.

¹² Jones T11845:1 – T11845:7.

¹³ Better T11351:10 – T11351:20.

¹⁴ Jones T11836:31 - T11837:11.

¹⁵ Jones T11844:14 – T11844:26.

contributed significantly to the initiation and the fatigue failure. Mr Better was of the opinion that there were a whole range of variables which need to come together for the line to collapse.¹⁶ Mr Better found the white layer to be 'puzzling' and the white layer and the depression were a critical factor in the conductor fracture.¹⁷ Mr Better agreed that significantly more investigation or testing would need to be performed to determine the cause of the indentation and the formation of the white layer which had contributed to the conductor failure.¹⁸ Such testing would have required long-term testing to determine whether the phenomena were caused by lightning strike or by mechanical means.¹⁹

- (e) Testing to ascertain the fatigue threshold for small flaws typical of the ones seen in the conductors has been undertaken. Such a test will give an indication of the loads or the 'fatigue threshold'.²⁰
- (f) Analysis of other sections of the conductor to ascertain whether the white layer detected in the section of conductor which failed occurs elsewhere.²¹

Inspection

Proposed Key Findings of Counsel Assisting

'11.20 The incorrect fitting should have been obvious upon proper inspection.

11.21 Line inspection carried out in February 2008 was not carried out in accordance with the then existing inspection requirements. The lines person should have, but failed to observe, the incorrect helical fitting.'

Response of the State

The State makes no submission in respect of the proposed key findings relating to inspection – [11.20] and [11.21].

¹⁶ Better T11338:18 - T11338:30.

¹⁷ Better T11339:22 - T11339:27.

¹⁸ Better T11343:9 - T11343:12.

¹⁹ Better T11343:14 - T11343:22.

²⁰ Jones T11843:21 - T11843:28; Jones T11844:2 - T11844:4.

²¹ Jones T11844:9 - T11844:14.

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