IN THE MATTER OF
The Hazelwood Coal Mine Fire Inquiry

STATEMENT OF JAYMIE NORRIS

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Attention: Peter Stewart

I, Jaymie Norris, of 8 Nicholson Street, East Melbourne, Acting Manager Strategic Bushfire Risk Assessment Unit, Department of Environment and Primary Industries, can say as follows:

A. Introduction

1. My full name is Jaymie Norris. My date of birth is 12 August 1974.

2. I am the Acting Manager Strategic Bushfire Risk Assessment Unit, in the Fire & Emergency Management Division, at the Department of Environment and Primary Industries (**DEPI**) based at 8 Nicholson Street, East Melbourne, Victoria.

3. I have been in this role since 2013. My primary responsibility involves managing the development of bushfire risk tools and methods for the purposes of strategic bushfire risk planning. During the Hazelwood Coal Mine Fire, I also held a position at the State Control Centre (**SCC**), where I undertook the role of Fire Behaviour Analyst (**Officer**).

4. I have a role as a Fire Behaviour Analyst, hold a Bachelor of Science and am currently completing a PhD in bushfire science.

5. I have been an employee of DEPI since 2008 and have been involved in the role of fire science for approximately 5 years. Prior to commencing my current role, I was a senior technical officer in fire risk and climate change and prior to that I was employed as a research assistant at the University of Western Australia.

6. This Statement has been prepared to assist the Hazelwood Coal Mine Fire Board of Inquiry.

7. This Statement comprises information predominantly from my personal experience and knowledge of fire behaviour simulation and analysis.

B. Phoenix

8. I have prepared a presentation using Phoenix Rapidfire software (**Phoenix**) to model the Hazelwood mine fire at 9 February 2014. It predicts the fire behaviour and spread of the fire. I was assisted by my colleagues in the preparation of the Phoenix fire simulation Liam Fogarty, Andy Ackland and Nicholas Bauer. It was prepared on the week starting 19 May 2014.

9. Phoenix is used to simulate the potential spread of a fire, including the possible assets and values that might be affected. The software is pre-emptive software, usually used as part of a tool for fire-fighting. It assists to predict where a fire may go, and where spotting may occur, for the purpose of the protection of life and property. Modelling in the fire-fighting context inputs predictive weather data as part of risk management and preparation for what might occur.

10. Phoenix is based upon general models of fire behaviour. The simulation predicts, based on assumptions including those set out below, the spread from two fires that potentially impacted the Hazelwood Coal Mine on 9 February 2014.

11. The simulations are not fire reconstructions. There are a range of embedded assumptions including fuel load as at 9 February 2014 (refer **Part C**). There are also a range of limitations to the interpretation of the outputs from Phoenix (refer **Part D**).

12. The simulation predicts where the fire would have gone, however at this point in time we now know where it did go. The simulation does not input suppression efforts. In light of what is now known, the simulation indicates that the suppression efforts must have been very effective by process of deduction, as the simulation predicts a greater fire extent on 9 February 2014 than what actually occurred. Applied to the task of reconstruction rather than prediction, the inputs used in this simulation includes actual weather data.

13. The distinction between using Phoenix out of its ordinary and usual context, applying a core fire predictive modelling tool for use by fire behaviour analysts, instead for an Inquiry as part of a fire reconstruction task after the fact, is important to understand before viewing the simulation. The data inputs are from a historical weather feed which describes what actually happened whereas usually Phoenix would rely on future weather estimates.

14. Phoenix RapidFire (Beta) Version 4.0.0.7 was used in the simulation of Hernes Oak extension and Driffield fires. Phoenix software was created by the University of Melbourne, in collaboration with the Bushfire Cooperative Research Centre, and DEPI and is current as at 22 May 2014.

C. Assumptions behind Phoenix

15. The following assumptions apply and must be considered before Phoenix is relied upon:

    15.1 Simulations represent general models of fire behaviour and spread from two fires that potentially impacted the Hazelwood Coal Mine on 9 February 2014. The final fire extents (brown-red) and Phoenix outputs (colour gradient from yellow to orange is indicative of flame height a measure of fire intensity) including potential spotting as derived from the model (red squares). The resolution of the model output is 90 x 90m.

15.2 The simulations are not fire reconstructions and assume fuels as modelled and used operationally on 9 February 2014.

15.3 We assume fuel types in Phoenix are accurate in the area, including grass load is 5t/ha and 100% cured. Curing refers to the degree of dryness in grass fuels, with 100% cured indicating all grass fuels are available.

15.4 No suppression effort is modelled in any simulation presented.

15.5 No modification of any fuel factors has been undertaken in this simulation and this is a constraint. Fuels in forested areas are predicted only.

Hernes Oak

15.6 Point of origin information was not available for the Hernes Oak fire. Accordingly, in the absence of information on actual point of escape and point of origin, an estimated point of escape for Hernes Oak was used. The approximation for the Hernes Oak escape point is located at the northern perimeter of the fire (as mapped prior to the 9 February 2014), directly to the south of the Princes Freeway.

15.7 The ignition sites are indicative only as specific points of origin are not known or are not available as a consequence of an ongoing inquiry by Victoria Police. It is expected that the two simulation start points are correct to within +/- 100 metres.

15.8 The break out time of the fire for Hernes Oak run is assumed to be 1315 on 9 February 2014.

Driffield

15.9 The point of origin for the Driffield fire was simulated to be in the south-west of the mapped extent (as mapped on the 9 February 2014). The assumed ignition time for Driffield was 1330 on 9 February 2014.

15.10 The ignition sites are indicative only as specific points of origin are not known or are not available as a consequence of an ongoing inquiry by Victoria Police. It is expected that the two simulation start points are correct to within +/- 100 metres.

D. Limitations

16. Phoenix is less realistic when areas of significant assets, such as cities, power stations, water treatment plants and the like, are located in certain sections of a fire landscape. Where there is very uneven distribution of rugged terrain or dense forest and grassland, the simple fire suppression algorithm used in Phoenix is less realistic. An algorithm that takes into account the types of suppression resources available, the terrain, fuels, assets and values in the potential fire area is needed.

17. This simulation involved the application of predictive techniques and models with the benefit of hindsight.

18. Phoenix is limited by the accuracy of the information inputs:

18.1 fuel types;

18.2 wind reduction factors;

18.3 fire history;

18.4 topography;

18.5 assets and values;

18.6 road proximity;

18.7 fuel disruptions;

18.8 weather;

18.9 suppression resources; and

18.10 grassland curing.

19. Assumptions are also input into Phoenix and a further limitation is the accuracy of those assumptions in light of best available information at the time:

19.1 selection of fire behaviour model;

19.2 spotting/embers (indraught, ember transport, ignition);

19.3 slope correlation (wind-slope interaction);

19.4 wind field models;

19.5 road/river/break impact (fuel free linear features);

19.6 solar radiation model (fuel moisture in space and time);

19.7 fuel accumulation (vegetation type);

19.8 fuel moisture (cloud cover); and

19.9 convection, convergence, influence of junction zones, heat centres.

Dated

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JAYMIE NORRIS