



Department of **Consumer
and Employment Protection**
Government of **Western Australia**

Energy Safety

ELECTRICAL INCIDENT REPORT

POWER LINE FAULT & BUSH FIRE
AT GINGIN BROOK ROAD, GINGIN
WESTERN AUSTRALIA
ON 20 DECEMBER 2002

Report prepared by:

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16 April 2004

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1. INTRODUCTION

Mr Andrew Nibbs, Station Officer, Fire Investigation Branch, Fire and Emergency Services Authority of Western Australia (FESA) suspected that a ground fire had started in a grass paddock on the south side of GinGin Brook Road approximately 300 metres east of Brand Highway and the cause of the fire was a fault or failure of some kind on a Western Power low voltage overhead power line between poles WN 299 and WN 300. Both lines had bare (uninsulated aluminium) conductors erected in horizontal formation.

An investigation was carried out and this report summarises the findings. The cooperation and assistance of officers of Western Power (WPC) and Fire and Emergency Service (FESA) is acknowledged.

1.1 Time and Date of Occurrence

The incident occurred on Friday 20 December 2002. The actual time of the initiating event is unknown.

1.2 Notification of Incident

Mr Doug Ayre, Principal Engineer Electricity Supply, of the Energy Safety Division, Department of Consumer & Employment Protection, was notified of the incident by Mr Andrew Nibbs of FESA on 20 December 2002.

1.3 Investigating Inspector

The investigation was carried out by Mr Doug Ayre, a designated Inspector (Electricity), of the Energy Safety Division, Department of Consumer & Employment Protection.

Mr Ayre initially inspected the fire scene at 6pm on 28 December 2002 and on a number of occasions subsequent to that.

2. SUMMARY

Considering all the information gathered and the circumstances of wind and weather on Friday 20 December 2002, it was concluded that a fault occurred due to clashing of Western Power low voltage overhead power line conductors between poles WN 299 and WN 300 on the southern verge of Gingin Brook Road, Gingin, about 300 metres west of Brand Highway.

The investigation found that the clashing of the conductors was caused by strong and gusting winds from the north and east. The clashing provided a momentary short-circuit that resulted in hot metal particles falling to the ground in the paddock to the south and this provided a source of ignition for dry debris on the ground.

The contact between the live conductors can be categorised as a power line construction and/or maintenance shortcoming since the clearance between the conductors should have been maintained in such a way as to avoid such clashing.

3. ORIGIN OF THE GROUND FIRE

The FESA fire investigators had identified the point of ignition of the fire as being on the ground within the paddock to the south of Gingin Brook Road about 300 metres west of Brand Highway.

4. CONTRIBUTING FACTORS

There were no suspicious circumstances and no evidence of lightning in the area.

The day had been hot and the ambient air temperature is estimated to have been of the order of 38 °C. There was a cleared firebreak inside the property fence line to the south of the overhead line.

The owner of the property (Mr Robert Lloyd) advised Mr Ayre that a neighbour had seen sparks flying from the overhead mains during the strong northerly winds earlier in the day.

The investigation showed that the ignition point of the fire was on the ground between 5 and 8 metres to the south of the overhead line. This is consistent with the wind coming from the north and east, such that any hot metal material from clashing conductors would fall away from the line and be carried by the wind to the south and west until it hit the ground. The fire then travelled in this direction from the ignition point on the ground.

The site was visited on three separate occasions to examine the conductors in different light conditions from the ground using binoculars and a telescope. This revealed what appeared to be fresh burn marks on the two central conductors of the low voltage mains at approximately the mid span point between the poles. Subsequent to this a close inspection of the low voltage conductors at their level from an elevating platform vehicle showed evidence of both new and old electric arc burns on two of the conductors along a 10-metre length at approximately mid span.

There was no evidence of damage on the 22,000 volt conductors above.

The low voltage mains were in reasonable condition with the roadside conductor sagging slightly lower than the others. They appeared to be of 7/4.5mm stranded aluminium conductor with a span length of approximately 53 metres between poles WN 299 and WN 300. This is not an unusual span length for low voltage mains, however the conductors were mounted on short cross arms as typically used in the metropolitan area (where shorter spans are the norm) that resulted in a relatively narrow spacing between the conductors.

There was clear evidence of damage to the overhead low voltage conductors at the point where they had clashed. The damage consisted of various burn marks where two of the conductors had made contact with each other, between poles WN 299 and WN 300. This is consistent with bare conductors clashing in high wind, causing a momentary short circuit (or "fault") with the consequence that an electric current would flow between the conductors and cause an electric arc at the point of contact. The conductors did not break and remained intact except for the burning at the point of contact.

In such a case substantial electric current would have passed between the two conductors with a sufficient quantity of heat being produced in the metal such that metal particles were formed which then fell away from the point of contact. This is a well-

established mechanism (based on research following the 1983 Ash Wednesday fires in Victoria and South Australia).

It is evident that the fire was initiated because the overhead low voltage conductors clashed.

5. CONCLUSIONS

There are a number of inter-related events, circumstances and factors that coincided on the day of the bushfire. These are summarised as follows:

- There were no suspicious circumstances relating to the origin of the fire.
- Taking account of the burn pattern on the ground, and the prevailing wind at the time, it is concluded that the fire originated in the dry debris on the ground in the paddock adjacent to the low voltage overhead line between poles WN 299 and WN 300.
- The weather conditions at the time of the fire were hot and dry with strong gusting winds from the north and east.

Taking all of the above into account it is concluded that:

- Electric arcing was caused by clashing between low voltage overhead conductors in the southern road verge in Gingin Brook Road about 300 metres west of Brand Highway in strong gusting winds and resulted in hot metal debris falling to the ground.
- The ground fire was caused by the hot metal debris falling from the low voltage power line and this provided a source of ignition for a ground fire to commence in the grass paddock between 8 and 10 metres to the south.
- The contact between the conductors can be categorised as a power line construction shortcoming since spacing of the conductors should have been such to ensure that it was adequate to avoid clashing between conductors and the risk of a wild-fire. These types of events are well known to the electricity supply industry and Western Power.

6. OUTCOME

Given what is known today as a result of the experience of the Ash Wednesday fires and the remedial actions taken by supply utilities across the electricity industry to prevent wildfires, the fire can be concluded to have resulted from a deficiency in the power line conductor spacing. A deficiency which should have been identified by Western Power and overcome by the installation of longer crossarms, or the fitting of conductor spacers (a simple retro-fitting exercise).

Energy Safety raised the need for the installation of low voltage spacers in such circumstances with Western Power, which subsequently commenced a programme of identifying the locations where it is appropriate to install them, and is progressing with the necessary work. Conductor spacers have now been installed at the location where the fire occurred.