



Department of Consumer
and Employment Protection
Government of Western Australia

EnergySafety

ELECTRICAL INCIDENT REPORT

POWER LINE FAULT AND BUSH FIRE NEAR BRINDLE ROAD, PARKERVILLE WESTERN AUSTRALIA ON 3 JANUARY 2008

11 January 2008

Report prepared by:

EnergySafety WA

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Parkerville Fire Report Final.doc

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1 INTRODUCTION

A bush fire occurred near Brindle Road, Parkerville on 3 January 2008 and the Fire and Emergency Service Authority (FESA) advised EnergySafety at approximately 1700 hours on the same day. The bush fire appeared to have originated near a Western Power (WP) three phase 22,000 volt (22 kV) overhead power line. After inspecting the site an investigation was conducted and this report summarises EnergySafety's findings.

This investigation was carried out and completed with the cooperation and assistance of FESA and WP in line with established protocols.

1.1 Time and Date of Occurrence

The bush fire was first reported to FESA at approximately 1322 hours on Thursday 3 January 2008 (recorded as FESA incident number 2007093025).

1.2 Notification of Incident

EnergySafety was notified of the incident by Mr Phil Cribb from FESA at 1700 hours on 3 January 2008. Mr Michael Bunko, EnergySafety's Chief Electrical Inspector advised the Director of Energy Safety, Mr Albert Koenig. He also arranged for an investigation to commence in liaison with FESA and WP that evening at Parkerville, WA.

1.3 Investigating Inspectors

The following EnergySafety WA personnel carried out the onsite investigation:

- Mr Rob Thornton, Principal Engineer Electricity Supply;
- Mr John Collins, Senior Electrical Engineer;
- Mr Todd Bell, Senior Electrical Inspector; and
- Mr Stephen Wheatley, Electrical Inspector.

The above investigation personnel on 3 January 2008 inspected the location where the origin of the bush fire was said to have occurred and carried out a further examination on 4 January 2008 in conjunction with the FESA and WP investigators.

2 SUMMARY

The investigation found that the bush fire was initiated at around 1322 hours on 3 January 2008, due to contact between a tree branch and a conductor of a Western Power 22kV (22,000 volt), 3 phase overhead power line between Brindle Road and Roland Road, Parkerville. The contact had resulted in a high resistance earth fault on the 22kV line (i.e. circuit became connected to ground), which led to burning vegetation material falling to the ground, as described in more detail below.

The power line is the Darlington (D501) 22kV feeder and the fault occurred mid span between pole numbers 251749 and 251750.

The span length between these poles is 110 metres. The power line bay is an in-line construction with a 1.35 metre crossarm on pole 251749 and a 2.1 metre width crossarm on pole 251750.

Investigation found that regrowth from previously cut trees, which were located directly below the power line, had grown into the power line and had made direct contact with the outer phase conductor. This was evident from the burns to the tree branch and burn marks on the conductors.

The ensuing high resistance fault to ground resulted in the tree branch burning and hot embers falling and igniting dry grass near the power line.

This contact between the tree branch and high voltage power line would not have occurred if the tree had been adequately pruned to ensure that branches did not encroach within an acceptable safety distance of the power line.

This pruning did not occur despite Western Power being responsible for controlling trees of this type and location, in accordance with the ***Guidelines for the management of vegetation near power lines*** issued by Energy Safety in 2006.

3 ORIGIN OF THE BUSH FIRE

FESA and Police investigators estimated that the bush fire's point of ignition was on the ground in a paddock west of Brindle Road and north of Kilburn Road, Parkerville.

An inspection of the ignition point indicated that an area of grass paddock and bush had burnt out adjacent to the Western Power 22 kV overhead power line. The bush fire had continued in an easterly direction towards Stoneville, which is consistent with the bush fire being driven forward from the point of ignition by wind initially coming from the northwest.

The power line (D501 Feeder) originates at WP's Darlington 132/22kV Zone substation.

4 INVESTIGATION ANALYSIS

4.1 Examination of the 22 kV Overhead Power Line

The Western Power Darlington D501 overhead 22 kV feeder specifications are:

- | | |
|--|--------------------------|
| • Phase conductors (x3): | Copper (7/16 cu strands) |
| • Underslung earth conductor: | Nil |
| • Pole material: | Wood |
| • Pole height (FGL) (#251749 and #251750): | 9.34/9.26 Metres |
| • Span length (poles #251749 and #251750): | 110 Metres |
| • Crossarm material: | Wood |
| • Crossarm length: | 1.35/2.1 Metres |
| • Direction of power line: | east west orientation |

A number of small trees had grown directly below the power line approximately mid span between pole numbers 251749 and 251750. These trees had grown from previously cut tree stumps. The tallest of the trees was 7.2 metres in height. The tallest tree had grown through the power line (the conductors of which were lower than the top of the tree branches) and contacted a phase conductor.

At the point where the tree contacted the phase conductor between pole number 251749 and pole number 251750, burn marks were evident on the conductor.

Examination of the small tree around the phase conductor indicated burning to the branch in the locality of the phase conductor. The tree foliage furthest away from where the tree contacted the phase conductor did not indicate signs of burning but it did exhibit the effects of extreme heat (wilting of the leaves). The small tree also showed signs of burning on its trunk which occurred from the subsequent grass fire.

WP attended the incident scene on the afternoon of the 3 January 2008 and considered that the power line was by then unsafe and therefore isolated the damaged section.

WP's system recorded a fault on the power line on 3 January 2008 at approximately 1424 hours. This fault coincides with the effects of the fire on the power line which caused its eventual failure (poles burning and conductors clashing). It is considered that the contact between the tree and the powerline at approximately 1322 hours was of such a high resistance that it did not allow sufficient current to flow, to operate the 22 kV circuit protection. This is not unusual for faults of this type.

This incident was entirely avoidable and WP should have pruned the tree in accordance with the ***Guidelines for the management of vegetation near power lines*** which WP supports.

It should be noted that as part of the investigation, additional arc burn damage to the conductors of the line was found as follows:

- Between pole numbers 251749 and 251750 on the Darlington 22 kV feeder (D501). The damage consisted of old arc burn marks on the conductors, which are not considered relevant to this incident.
- Between pole numbers 251750 and 251751. This arc damage is consistent with the clashing of conductors, which would have occurred when pole number 251751 failed after being burned by the tree initiated fire described above. That is, it is not considered that this clashing of conductors caused the fire.

4.2 Weather Conditions and Topography

The weather conditions at Bickley for 3 January 2008 were recorded at 1300 and 1400 hours as follows:

1300 hours

North/north easterly wind at 11 kph

Relative humidity 21%

Ambient air temperature 37.8°C

1400 hours

Westerly at 20 kph

Relative humidity 15%

Ambient air temperature 40.3°C

There was no evidence of lightning taking place in the area.

The ground between pole numbers 251749 and 251750 was covered with dry grass and leaf matter.

4.3 Tree Contact with an Overhead High Voltage Power Line

When a live, bare high voltage conductor and tree branch come together they cause an electric current to flow through the tree branch to the ground.

As the tree branch offers resistance to the flow of electric current (the branch is a poor conductor of electricity), heat is generated and this typically causes burning of the branch and surrounding foliage.

This burning of the tree branch and foliage can cause hot embers to fall to the ground.

5 CONCLUSIONS

Taking all evidence into account the conclusion is reached that:

- There are no suspicious circumstances relating to the origin of the bush fire.
- The bush fire incident originated mid span between pole numbers 251749 and 251750 on the Darlington 22kV overhead power line (Feeder D501), west of Brindle Road, east of Roland Road and north of Kilburn Road, Parkerville.
- The bush fire resulted from the ignition of the dry grass and leaves on the ground after a tree branch made direct contact with a high voltage phase conductor of a 22,000 volt overhead power line. This contact between the tree and conductor caused a flow of electric current through the tree branch, heating the branch to ignition point and resulting in hot embers falling to the ground.
- The clearance between the tree branches and high voltage conductors was not adequately maintained by Western Power and as a result was insufficient to avoid such a fault occurring.

As a follow up to this incident, EnergySafety will be taking up with Western Power its failure to carry out the necessary tree pruning and will require Western Power to review and improve its vegetation control practices.

Note:

Western Power endorsed the **Guidelines for the management of vegetation near power lines** issued by EnergySafety in 2006, which set out obligations for various land occupiers and electricity utilities.

The **Guidelines** require Western Power to control naturally growing trees in this type of location (i.e. farm paddocks etc.) near its overhead power lines.

Western Power should therefore have maintained adequate clearances between this tree and the power line.

However as the current legislation does not as yet reflect the obligations set out in the **Guidelines**, Western Power is not considered to have breached any laws.

APPENDIX A: SATELLITE IMAGE SHOWING POLE POSITIONS

Satellite Image: Showing location, Origin of Bush Fire and Pole Positions

Note: Image taken prior to the bush fire



APPENDIX B: PHOTOGRAPHS

Photograph No 1: - Origin of Bush Fire

Photograph taken near Brindle Road, Parkerville on 3 January 2008 by Senior Electrical Inspector Todd Bell, EnergySafety. The trees on the right side of the picture (beneath the right hand side WP conductor) are near the origin of the bush fire.



Photograph No 2: - Burn Marks on Tree Branch

Photograph taken near Brindle Road, Parkerville on 3 January 2008 by Electrical Inspector Stephen Wheatley, EnergySafety. At the time of this photograph the high voltage conductors had sagged due to the failure of a wooden pole caused by the fire.



Photograph No 3: - View of Tree Branches and Power Line

Photograph taken near Brindle Road, Parkerville on 4 January 2008 by FESA. At the time of this photograph the high voltage conductors had sagged due to the failure of a wooden pole (which was caused by the fire). The origin and point of ignition of the fire is circled.

