



Government of **Western Australia**
Department of **Commerce**

EnergySafety WA

ELECTRICAL INCIDENT REPORT

POWER LINE FAULT AND BUSH FIRE NEAR CAPE NATURALISTE LIGHTHOUSE DUNSBOROUGH WESTERN AUSTRALIA 7 FEBRUARY 2009

3 March 2009

Report prepared by:

EnergySafety WA

EIS 2009-559

Dunborough Fire Report.doc

TABLE OF CONTENTS

1	INTRODUCTION	3
1.1	Time and Date of Occurrence	3
1.2	Notification of Incident.....	3
1.3	Investigating Inspectors	3
2	SUMMARY	4
3	ORIGIN OF THE BUSH FIRE	5
4	INVESTIGATION ANALYSIS	6
4.1	Examination of the Incident Scene	6
4.2	Weather Conditions and Topography.....	6
5	THE CAUSE OF POLE TOP FIRES	7
6	CONCLUSIONS	8
	APPENDIX A: SATELLITE LOCATION IMAGE	9
	APPENDIX B: PHOTOGRAPH OF THE TOP OF POLE NUMBER 108	10

1 INTRODUCTION

A bush fire occurred near Cape Naturaliste Lighthouse, Dunsborough on 7 February 2009. The Fire and Emergency Service Authority (FESA) informed EnergySafety on the same day that the bush fire appeared to have originated near a Western Power (WP) 12.7kV overhead power line. An investigation has been conducted and this report summarises EnergySafety's findings.

The fire burnt out approximately 108 hectares of bush.

The investigation was carried out and completed with the cooperation and assistance of FESA, Police and Western Power (WP) under established protocols.

1.1 Time and Date of Occurrence

Approximately 1300 hours on Saturday 7 February 2009.

1.2 Notification of Incident

EnergySafety was notified of the incident by Mr Phil Cribb, FESA's Manager Fire Investigation and Analysis Unit (FIAU), at 1720 hours on 7 February 2009. Mr Michael Bunko, EnergySafety's Chief Electrical Inspector arranged for an investigation to commence with FESA and WP the next day at the fire scene.

1.3 Investigating Inspectors

EnergySafety WA, Senior Electrical Inspector (Regional), Mr Ross Reid carried out the onsite investigation.

Mr Reid inspected the bush fire scene on 8 February 2009 with WP's investigator Mr Peter Pham.

2 SUMMARY

The power line involved consists of a single active conductor at 12,700 volts (12.7kV) and a single return conductor at earth potential. Given the prevailing weather conditions around 1300 hours on 7 February 2009 (strong southerly winds) and the technical evidence available, a pole top fire occurred as a result of leakage current from the active conductor to the underslung return conductor on the Western Power 12.7kV overhead power line east of the Cape Naturaliste Lighthouse, Dunsborough. The power line is a spur line from the Dunsborough Feeder, originating at Busselton substation (BSN 510.0) and extending to the Dunsborough region. The fault occurred on pole number 108 [Appendix A, Satellite Location Image].

Dust or salt spray deposition on the insulator combined with light rain and high humidity, resulted in a high level of leakage current. The leakage current generated enough heat to ignite the wood at the point of contact between the wood and metal surface of the active conductor insulator's support bracket. This type of incident is referred to as a pole top fire.

As a result of the pole burning at the insulator support bracket, the active conductor, with insulator attached, came adrift and was found hanging from the pole top [Appendix B, Photograph].

The ensuing fire resulted in falling hot embers igniting vegetation under the power line.

The investigation also found remnants of three burnt pole tops in the bush, indicating that previous pole top fires had occurred on this power line.

This pole top fire, and evidence of previous ones questions the effectiveness of Western Power's power line inspection and maintenance systems to minimise these events.

Further investigations are required to identify the risks of future pole top fires in the area and the scope of the preventative work required to minimise this risk.

3 ORIGIN OF THE BUSH FIRE

FESA has formed the opinion that the bush fire's point of ignition was on the ground in bush below Western Power pole number 108.

An inspection of the ignition point indicated that an area of grass and bush had burnt out adjacent to the Western Power 12.7 kV overhead power line. The bush fire had continued in a North Westerly direction towards Bunker Bay. This is consistent with the bush fire being driven forward from the point of ignition by wind coming from the South/South West.

4 INVESTIGATION ANALYSIS

4.1 Examination of the Incident Scene

The Western Power 12.7kV high voltage spur line at Cape Naturaliste lighthouse specifications are:

- Phase conductors (x1): Copper
- Pole material: Wood
- Pole length (#108): 11 Metres
- Span length (#107 to #108): 142 Metres
- Span length (#108 to #109): 139 Metres
- Direction of power line: North/West orientation

Inspection found evidence of damage to the top of pole number 108 caused by a pole top fire. The damage consisted of burning near the top of the pole and insulator support bracket. The active conductor with insulator still attached came adrift from the pole and was found hanging (Appendix B, Photograph).

The top of pole number 108 caught fire as a result of leakage current from the active conductor to the underslung return conductor. Dust or salt spray deposition on the insulators, combined with light rain and high humidity, caused a high level of leakage current. The leakage current generated enough heat to ignite the wood at the point of contact between the wood and metal surface of the insulator support bracket.

Other sources of the fire ignition were considered and eliminated such as lightning, clashing conductors, vehicle movements or fuse operation.

Western Power recorded a fault on the power line on 7 February 2009 at 1130 hours.

4.2 Weather Conditions and Topography

The weather conditions at Cape Naturaliste for 7 February 2009 as follows:

1500 hours

South/South West wind at 44 kph

Relative humidity 45%

Ambient air temperature was approximately 25°C

The sky was clear and there was no evidence of lightning in the area.

This spur line is located at Cape Naturaliste. It supplies a lighthouse and is surrounded on three sides by ocean. Light rain was reported at approximately 0300 hours on 7 February 2009 (approx 10 hours prior to the fire starting).

5 THE CAUSE OF POLE TOP FIRES

The combination of deposited dust and salt spray contamination on high voltage overhead power line insulators, with light rain, can allow a high level of leakage current to flow across the insulators and through the wood pole to earth or to the return conductor. Where the metal contact to wood has been reduced by bolt holes expanding or fittings becoming loose, this leakage current becomes sufficiently concentrated to generate enough heat to ignite the wood at the point of contact between wood and metal surfaces.

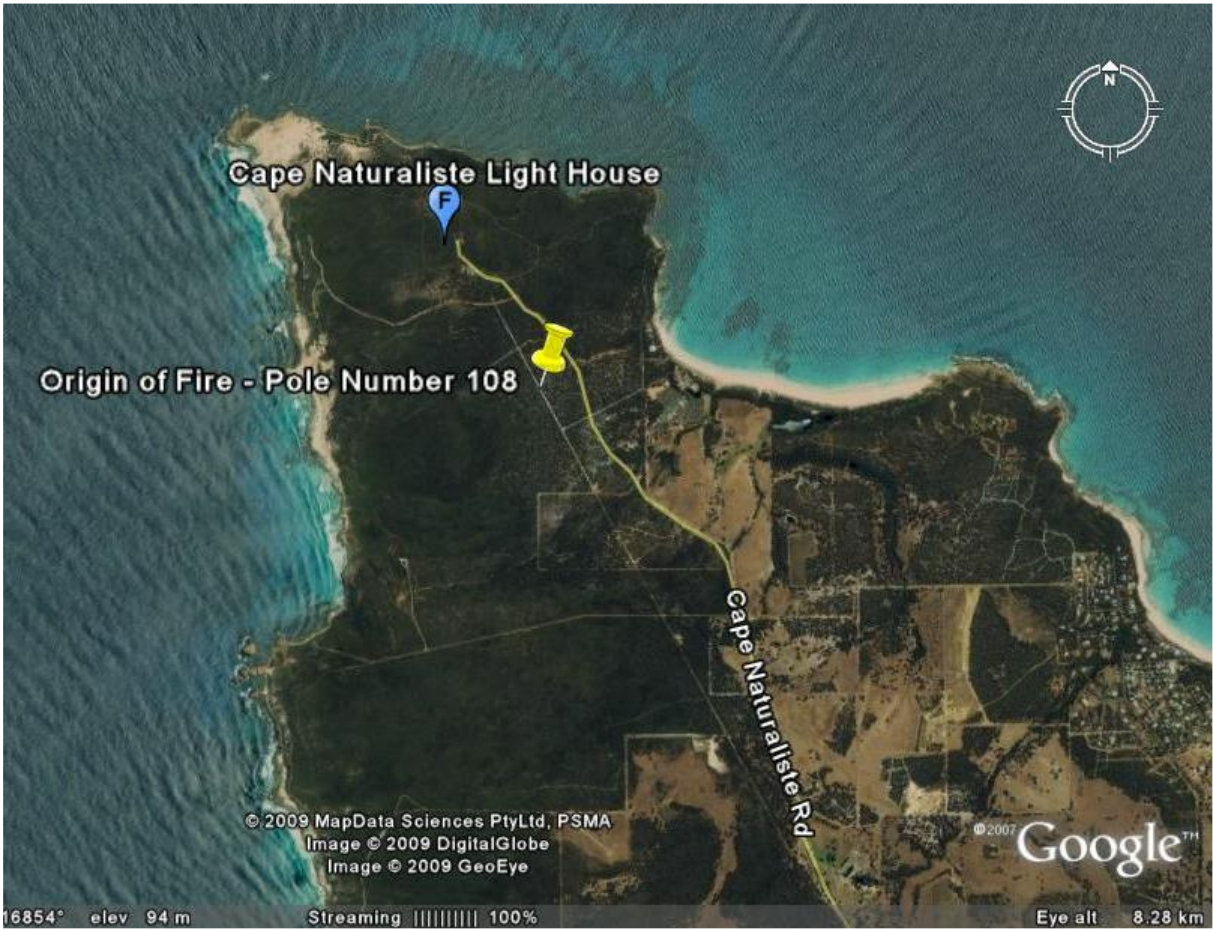
6 CONCLUSIONS

Related events, circumstances and factors coincided on the day of the bush fire. Taking all evidence into account it is reasonable to conclude that:

- There are no suspicious circumstances concerning the bush fire origin.
- The bush fire originated at a Western Power pole number 108 on the single phase 12.7kV high voltage overhead power line which is a spur line off Feeder (BSN 510.0) near Cape Naturaliste Lighthouse, Dunsborough.
- The top of pole number 108 caught fire because of leakage current from the active conductor to the underslung return conductor. Dust or salt spray on the insulators, combined with light rain and high humidity, caused a high level of leakage current. The current generated enough heat at the point of contact between the wood and metal surface of the insulator support bracket to ignite the wood. The ensuing fire resulted in falling hot embers igniting vegetation under the power line.
- No other sources of the fire ignition are credible such as lightning, clashing conductors, vehicle movements or fuse operation.
- The investigation also found remnants of previous pole top fires on this power line. This pole top fire and evidence of previous ones questions the effectiveness of Western Power's power line inspection and maintenance systems to minimise these events.
- Further investigations are required to identify the risks of future pole top fires in the area and the scope of the preventative work required to minimise this risk.

APPENDIX A: SATELLITE LOCATION IMAGE

Showing location of the Origin of the Bush Fire : Image taken prior to the bush fire.



APPENDIX B: PHOTOGRAPH OF THE TOP OF POLE NUMBER 108

Photograph taken on 8 February 2009 by Senior Electrical Inspector Ross Reid, EnergySafety. Photograph shows the burnt pole top.

