Power system operating incident report – Trip of two 500 kV circuit breakers at Hazelwood Terminal Station on 25 April 2014

PREPARED BY: Systems Performance and Commercial

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STATUS: FINAL

Version Release History

VERSION	DATE	BY	CHANGES	CHECKED BY	AUTHORISED BY
1	18 June 2014	Alanah Makin	FINAL	S Darnell	P Biddle

Incident Classifications

Time and date and of incident	1922 hrs Friday 25 April 2014
Region of incident	Victoria
Affected regions	Victoria
Event type	TT – loss of multiple transmission elements
Primary cause	PTN & CTR – Protection and Control
Impact	Nil (No Impact)
Associated reports	Power System Operating Incident Report – Trip of Three 500kV Circuit Breakers at Hazelwood Terminal Station on 7 February 2014

Abbreviations

Abbreviation	Term
AEMO	Australian Energy Market Operator
CB	Circuit Breaker
HWTS	Hazelwood Terminal Station
kV	Kilovolt
NER	National Electricity Rules
No. 3 Busbar	No. 3 500 kV Busbar at Hazelwood Terminal Station

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Purpose

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1 Introduction

This report reviews a power system operating incident that occurred on Friday 25 April 2014 at Hazelwood Terminal Station in Victoria.

AEMO is required to review this incident as it is classified as a non-credible contingency that satisfies the requirements of a reviewable operating incident under the National Electricity Rules (NER)[1].

The purpose of this incident review is to assess power system security over the course of the incident. The NER requires AEMO to assess the adequacy of the provision and response of facilities and services and the appropriateness of actions taken to restore or maintain power system security. [2]

This report is based upon information provided by SP AusNet[3] and AEMO. National Electricity Market time (Australian Eastern Standard Time) is used in this report.

2 The Incident

On Friday 25 April 2014, at 1922 hrs, two circuit breakers (CBs) connected to the No. 3 500 kV busbar (No. 3 busbar) at Hazelwood Terminal Station (HWTS) tripped. The circuit breakers were connected to the Hazelwood to Rowville and Hazelwood to Cranbourne 500 kV lines. The CB trips did not affect power flow on the lines due to the system configuration at Hazelwood 500 kV Terminal Station (see Figure 1). During this power system incident there was no loss of generation or load. See Appendix 1 for a chronological log of the incident.

The reason for investigating this incident is that two 500 kV CBs connected to a 500kV Busbar tripped in the absence of a fault. Also, a similar incident, on 7 February 2014, resulted in the trip of the three 500kV CBs connected to the No. 1 500kV Busbar at Hazelwood in the absence of a fault.

3 SP AusNet Investigation

SP AusNet investigated this incident and found that the blue phase of No. 3 busbar Y protection operated. The No. 3 busbar X Protection, and both X and Y protection on No. 1 500kV Busbar did not operate. In the presence of a busbar fault both protection schemes (X and Y) would operate on both busbars (No. 1 and No.3). SP AusNet concluded that a fault did not initiate this incident.

SP AusNet extensively tested No. 3 busbar protection scheme and found that all the relays operated correctly. SP AusNet concluded that the cause of the trip of No. 3 busbar could not be identified and that there was no identifiable link to a similar incident on 7 February 2014.

4 System Diagram

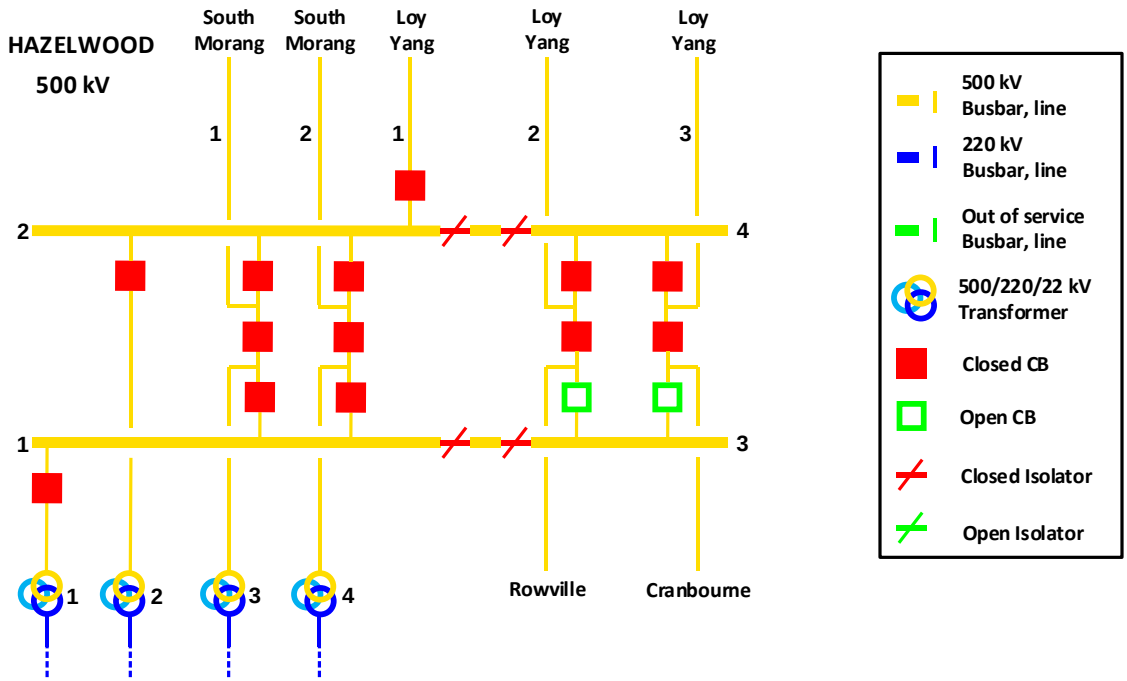
The status of power system elements at Hazelwood Terminal Station as a result of the incident is shown Figure 1. The diagram shows the two open circuit breakers connected to No. 3 500 kV busbar.

[1] NER Clause 4.8.15(a)(1)(i) and AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

[2] NER Clause 4.8.15 (b)

[3] SP AusNet is the Transmission Network Service Provider in Victoria. Information provided by SP AusNet has been provided on a without prejudice basis and nothing in this report is intended to constitute, or may be taken by any person as constituting, an admission of fault, liability, wrongdoing, negligence, bad faith or the like on behalf of SP AusNet (or its respective associated companies, businesses, partners, directors, officers or employees).

Figure 1 - Status of power system elements after the incident



5 Power System Security

This section assess power system security over the course of the incident.

AEMO issued Market Notice 45620 at 2007 hrs to notify the market of the incident.

SP AusNet reclosed the circuit breakers at 2045 hrs with the Y busbar protection scheme in service. SP AusNet intended to test the Y protection scheme at a later date.

AEMO issued Market Notice 45621 at 2107 hrs to notify the market that AEMO had reclassified the incident as a credible contingency. AEMO reclassified the incident because the cause had not been identified and resolved. AEMO considered the incident could potentially re-occur.

AEMO then issued Market Notice 45831 on 3 June 2014 to cancel the reclassification. SP AusNet had notified AEMO that the Y protection scheme had been extensively tested and that no cause for the trip could be identified. Based on this information AEMO considered that the incident was unlikely to reoccur.

The power system remained secure over the course of the incident.

6 Conclusions

1. The reason for the trip of the two circuit breakers could not be identified.
2. No link between this incident and a similar incident on 7 February 2014 could be identified.
3. AEMO correctly assessed the incident and appropriate notifications were issued.
4. Power system security was maintained over the course of the incident.

7 Recommendations

There are no recommendations as a result of this incident.

Appendix 1 - Incident Event Log

The sequence of events comprising the incident are itemised in Table 1. The incident spanned approximately 83 minutes from the two CBs opening to the CBs being reclosed.

Table 1 – Event Log

Time and Date	Event
1922 hrs 25 April 2014	Rowville No.3 Line No.3 500kV Bus CB and the Cranbourne No.4 Line No.3 500kV Bus CB tripped.
2007 hrs 25 April 2014	AEMO issued Market Notice 45620 as notification of the incident.
2045 hrs 25 April 2014	SP AusNet closed the Rowville No.3 Line No.3 500kV Bus CB and the Cranbourne No.4 Line No.3 500kV Bus CB.
2107 hrs 25 April 2014	AEMO issued Market Notice 45621 to reclassify the incident as a credible contingency.
0921 hrs 3 June 2014	AEMO issued Market Notice 45831 to cancel the reclassification