

# Power System Operating Incident Report – Trip of Hazelwood Power Station No.4 220 kV Busbar on 10 September 2013

PREPARED BY:                Systems Capability

DATE:                         6 November 2013

## Disclaimer

### Purpose

This report has been prepared by the Australian Energy Market Operator Limited (**AEMO**) for the sole purpose of meeting obligations in accordance with clause 4.8.15 (c) of the National Electricity Rules (NER).

### No reliance or warranty

This report contains data provided by third parties and might contain conclusions or forecasts and the like that rely on that data. This data might not be free from errors or omissions. While AEMO has used due care and skill, AEMO does not warrant or represent that the data, conclusions, forecasts or other information in this report are accurate, reliable, complete or current or that they are suitable for particular purposes. You should verify and check the accuracy, completeness, reliability and suitability of this report for any use to which you intend to put it, and seek independent expert advice before using it, or any information contained in it.

### Limitation of liability

To the extent permitted by law, AEMO and its advisers, consultants and other contributors to this report (or their respective associated companies, businesses, partners, directors, officers or employees) shall not be liable for any errors, omissions, defects or misrepresentations in the information contained in this report, or for any loss or damage suffered by persons who use or rely on such information (including by reason of negligence, negligent misstatement or otherwise). If any law prohibits the exclusion of such liability, AEMO's liability is limited, at AEMO's option, to the re-supply of the information, provided that this limitation is permitted by law and is fair and reasonable.

© 2013 Australian Energy Market Operator Ltd. All rights reserved

## Incident Classifications

Time and date and of incident	1252 hrs Tuesday 10 September 2013
Region of incident	Victoria
Affected regions	Victoria
Event type	BB – Busbar trip
Primary cause	PTN & CTR – Protection and Control
Impact	Nil
Associated reports	Nil

## Abbreviations and Symbols

Abbreviation	Term
AEMO	Australian Energy Market Operator
CB	Circuit Breaker
EMMS	Electricity Market Management System
EMS	Energy Management System
kV	Kilovolt
NER	National Electricity Rules
PS	Power Station
SP AusNet	Transmission Network Service Provider in the Victorian Region
TNSP	Transmission Network Service Provider

## Contents

Disclaimer.....	2
Incident Classifications.....	3
Abbreviations and Symbols.....	3
1 Introduction .....	5
2 The Incident .....	5
3 TNSP Investigation .....	5
4 Power System Pre-Incident.....	5
5 Incident Event Log.....	6
6 Power System post incident .....	7
7 Immediate Actions.....	7
8 Follow-up Actions .....	7
9 Power System Security .....	8
10 Conclusions .....	8
11 Recommendations.....	8

## 1 Introduction

This report reviews a power system operating incident that occurred on 10 September 2013 in the Victorian region at Hazelwood Power Station. 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<sup>1</sup> (NER).

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<sup>2</sup>.

This report is based upon information provided by SP AusNet<sup>3</sup>. Data from AEMO's Energy Management System (EMS) and Electricity Market Management System (EMMS) has also been used in analysing the incident.

All references to time in this report are to National Electricity Market time (Australian Eastern Standard Time).

## 2 The Incident

On Tuesday 10 September 2013 at 1252 hrs, the No.4 220 kV Busbar at Hazelwood Power Station tripped. The trip was caused by an inadvertent trip signal sent during routine protection maintenance.

No load or generation was lost as a result of this incident, and the busbar was returned to service within five minutes of the trip.

## 3 TNSP Investigation

On Tuesday 10 September 2013, SP AusNet was testing No.6 Generator Transformer back-up protection circuits at Hazelwood Power Station. During a functional test, an inadvertent trip signal was sent which in turn tripped the No.4 220 kV Busbar at Hazelwood Power Station via the No.4 Busbar Protection.

This resulted in the opening of five circuit breakers connected to the busbar. The off-loaded circuits connected to the opened circuit breakers did not result in any loss of generation or load.

The inadvertent trip signal (Circuit Breaker Fail) was caused by a failure to remove trip output links on the No.4 220 kV Busbar Y protection prior to a protection test. The busbar protection schemes at Hazelwood Power Station - there are several 220 kV busbars at Hazelwood Power Station - have subtle differences which caused this oversight. Established work procedures were not fully observed and SP AusNet reminded testers to thoroughly check diagrams and isolations prior to commencing work.

## 4 Power System Pre-Incident

The status of the power system prior to the incident is shown in Figure 1. For clarity only equipment relevant to this incident has been included in the diagram. The diagram shows No.4 220 kV Busbar in service.

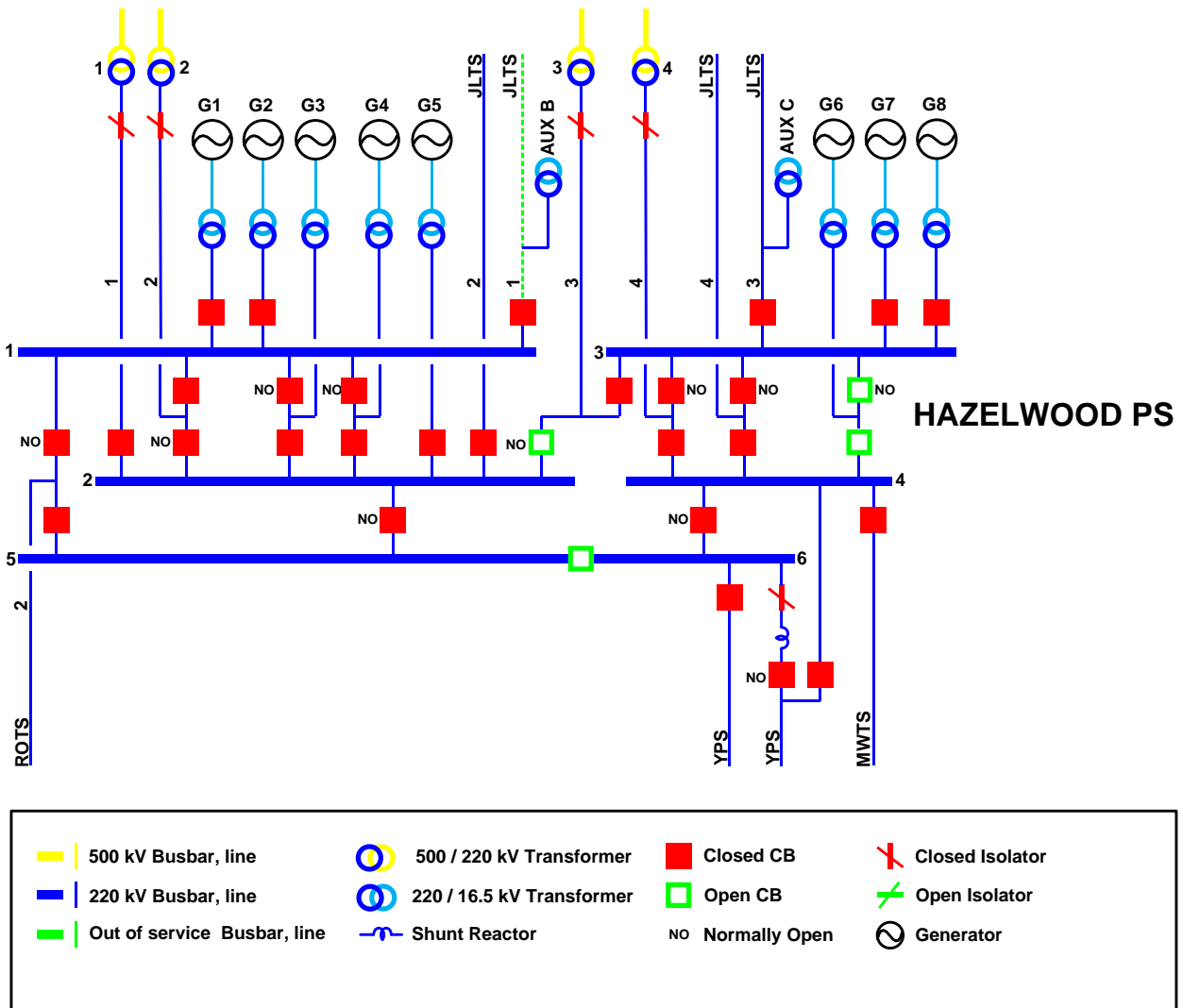
---

<sup>1</sup> NER v57 Clause 4.8.15(a)(1)(i) and AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

<sup>2</sup> NER v57 Clause 4.8.15 (b)

<sup>3</sup> 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 the power system prior to the incident**



## 5 Incident Event Log

The sequence of events comprising the incident are itemised in Table 1. The incident spanned approximately 5 minutes from the busbar trip to busbar re-energisation.

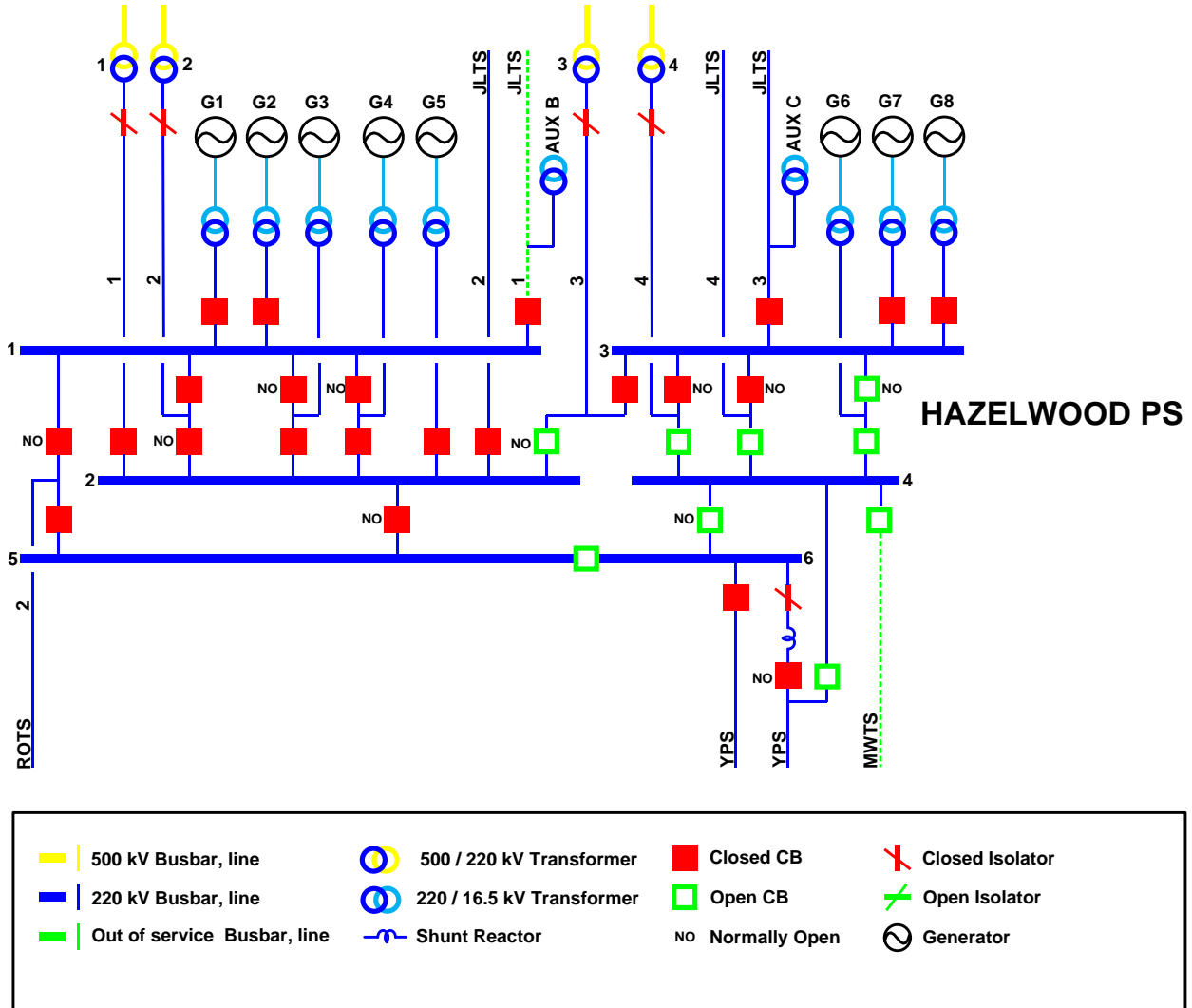
**Table 1 – Event Log**

Date and Time	Event
1252 hrs 10 Sept 2013	Hazelwood Power Station No.4 220 kV Busbar tripped
1255 hrs 10 Sept 2013	The cause of the trip identified
1257 hrs 10 Sept 2013	Hazelwood Power Station No.4 220 kV Busbar returned to service
1316 hrs 10 Sept 2013	Market Notice 43276 issued – key points of the notification: <ul style="list-style-type: none"> <li>• No.4 220 kV Busbar at Hazelwood Power Station tripped at 1252 hrs</li> <li>• The busbar returned to service at 1257 hrs</li> <li>• There was no loss of generation and AEMO did not instruct load shedding</li> <li>• The cause had been identified and a re-occurrence was unlikely</li> <li>• AEMO did not reclassify this event as a credible contingency</li> </ul>

## 6 Power System post incident

The status of the power system immediately after the incident is shown in Figure 2. The diagram shows No.4 220 kV Busbar de-energised via open circuit breakers.

**Figure 2 - Status of the power system immediately after the incident**



## 7 Immediate Actions

SP AusNet identified the cause of the trip and then restored No.4 220 kV Busbar to service. This was completed within five minutes of the initial trip.

This prompt response obviated the need for AEMO to invoke constraints to manage power system security.

## 8 Follow-up Actions

AEMO issued Market Notice 43276 at 13:16 to notify the market of:

- A non-credible contingency event
- AEMO was satisfied that the cause had been identified and a re-occurrence was unlikely
- AEMO did not reclassify this event as a credible contingency

Market Notice 43276 was issued approximately 25 minutes after busbar tripped. This is within two hours of the incident in which AEMO is required to notify the market of a non-credible contingency event.<sup>4</sup>

AEMO is also required to assess whether or not to reclassify a non credible contingency event as a credible contingency<sup>5</sup> and to report how re-classification criteria were applied<sup>6</sup>. AEMO has to determine if the condition that caused the non-credible contingency event has been resolved.

AEMO did not reclassify the busbar trip as a credible contingency because the cause of the trip had been identified and was unlikely to re-occur. AEMO was satisfied that SP AusNet had correctly identified the cause of the trip and had taken remedial measures to minimise the risk of a reoccurrence. AEMO and SP AusNet correctly applied their reclassification obligations.

## 9 Power System Security

AEMO is responsible for power system security in the NEM and is required to operate the power system in a secure operating state<sup>7</sup>. AEMO must thereby ensure that the power system is maintained in, or returned to, a secure operating state following a contingency event. In the case of returning the power system to a secure operating state this must be done as soon as practical and in any event within thirty minutes<sup>8</sup>.

For the trip of No.4 220 kV Busbar at Hazelwood Power Station, AEMO would normally invoke constraints to ensure the power system was maintain in, or returned to, a secure operating state. In this case constraints were not required because SP AusNet restored the busbar to service within five minutes. This prompt action by SP AusNet returned the power system to a secure operating state as soon as practical.

## 10 Conclusions

The trip of No.4 220 kV Busbar at Hazelwood Power Station on 10 September 2013 was caused by an inadvertent trip signal sent during routine protection maintenance.

Over the course of the incident, the response of AEMO and SP AusNet was appropriate and power system security was maintained.

## 11 Recommendations

There are no recommendations arising from this review.

---

<sup>4</sup> AEMO, *Power System Security Guidelines*, v54 Section 10.3

<sup>5</sup> *NER v55* Clause 4.2.3A (c)

<sup>6</sup> *NER v55* Clause 4.8.15 (ca)

<sup>7</sup> *NER v55* Clause 4.2.6 (a) and 4.2.4 (a)

<sup>8</sup> *NER v59* Clause 4.2.6 (b)