Power System Operating Incident Report – Trip of B1 330 kV Busbar at Newcastle on 1 May 2014

PREPARED BY: AEMO System Capability

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STATUS: FINAL

Version Release History

VERSION	DATE	BY	CHANGES	CHECKED BY	AUTHORISED BY
1	23 June 2014	R Burge	FINAL	S Darnell	P Biddle

Incident Classifications

Time and date and of incident	1529 hrs Thursday 1 May 2014
Region of incident	New South Wales
Affected regions	New South Wales
Event type	BB – Busbar trip
Primary cause	PTN & CTR – Protection and Control
Impact	NIL
Associated reports	NIL

Abbreviations

Abbreviation	Term
AEMO	Australian Energy Market Operator
Busbar B1	B1 330 kV Busbar at Newcastle
CB	Circuit Breaker
kV	Kilovolt
Line 93	Newcastle – Eraring 93 330 kV Transmission Line
MW	Megawatt
NER	National Electricity Rules
Protection Relay	No.2 330/132 kV transformer No.1 protection relay
No. 2 Transformer	No.2 330/132 kV transformer

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Purpose

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1 Introduction

This report reviews a power system operating incident[1] that occurred on Thursday 1 May 2014 at Newcastle Substation in New South Wales.

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].

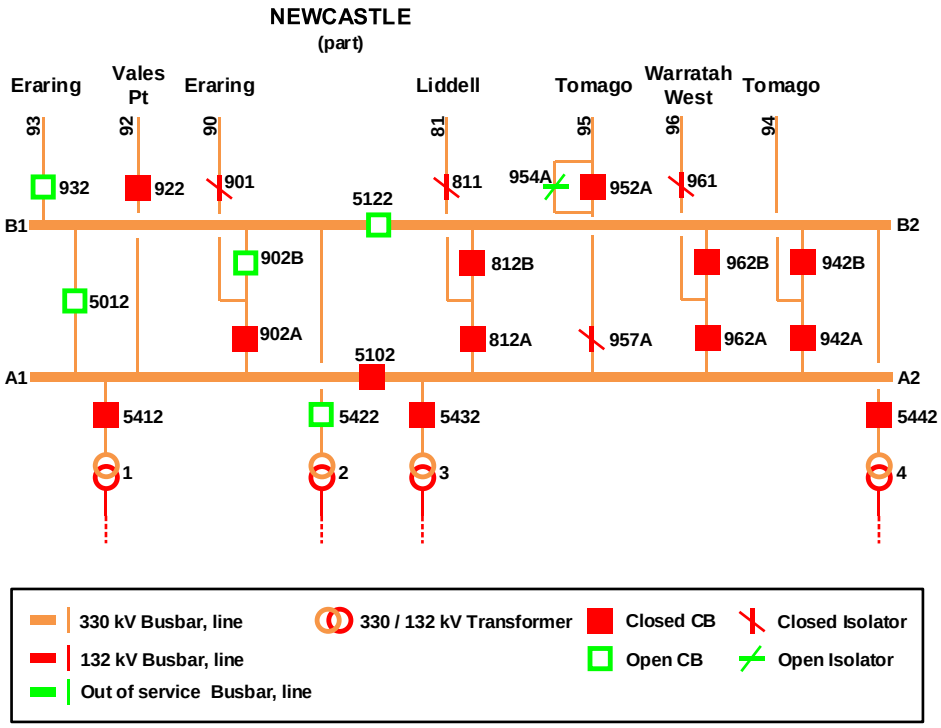
This report is based upon information provided by AEMO and TransGrid[3]. National Electricity Market time (Australian Eastern Standard Time) is used in this report.

2 The Incident

On Thursday 1 May 2014 at 1529 hrs the B1 330 kV Busbar at Newcastle (Busbar B1) tripped when a circuit breaker (CB) 5422 was closed to energise a new 330 / 132 kV No. 2 transformer (No. 2 Transformer). As a result of the busbar trip the Newcastle – Eraring 93 330 kV Transmission Line (Line 93) was offloaded. There was no loss of load or generation and the power system remained secure. See Appendix A for chronological log of the incident.

The reason for investigating this incident is that a 330kV busbar tripped. The probability of a busbar fault is very low and is thereby an unexpected event known in power system security terms as a non-credible contingency[4].

The status of the power system after the incident is shown below. The diagram shows Busbar B1 de-energised and Line 93 off-loaded. Circuit Breaker 5422 was open prior to the incident as part of the planned outage to replace No. 2 Transformer.



[1] 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) - 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] TransGrid is the Transmission Network Service Provider in New South Wales.

[4] NER v60 4.2.3 - Credible and non-credible contingency events; AEMO Power System Security Guidelines, Section 10 - Definition of a non-credible contingency events

3 Participant Investigation

TransGrid investigated this incident and determined that the trip was caused by design error that resulted in an incorrect wiring configuration.

When TransGrid closed CB5422, to energise No. 2 Transformer, the No.2 330/132 kV transformer No.1 protection relay (Protection Relay) incorrectly operated and tripped Busbar B1. The busbar tripped as a result of the incorrect wiring and was not expected on energisation of No. 2 Transformer.

TransGrid identified the cause of the trip, corrected the wiring and returned Busbar B1 to service on the same day.

4 Power System Security

This section assesses how AEMO managed power system security over the course of the incident[5].

AEMO invoked Constraint Set N-ERNC_93[6] at 1535 hrs because Line 93 was offloaded. This constraint set limits power flows to maintain power system security in the event of a further transmission contingency.

AEMO issued Market Notice 45647 at 1613 hrs[7] to notify the market:

- Of the non-credible contingency event
- That AEMO had not reclassified the incident as a credible contingency event

AEMO did not reclassify the incident as the cause had been identified and AEMO considered the incident unlikely to reoccur[8].

TransGrid returned Busbar B1 and Line 93 to service at 1643 hrs. AEMO revoked the constraint at 1650 hrs after Line 93 had returned to service.

No.2 Transformer was successfully energised at 1741 hrs.

Power system security was maintained over the course of the incident.

5 Conclusions

1. The B1 330 kV Busbar at Newcastle tripped due to incorrect wiring to a protection relay
2. Power system security was maintained over the course of the incident.

6 Recommendations

There are no recommendations arising from this incident.

[5] AEMO is responsible for power system security in the NEM and is required to operate the power system in a secure operating state (NER Clause 4.2.4 (a)). AEMO must thereby ensure that the power system is maintained in, or returned to, a secure operating state following a contingency event.

[6] Constraint Set N-ERNC_93 is required for the outage of Line 93. This constraint set limits power flows on nearby lines to maintain power system security in the event of a further contingency

[7] This is was within two hours of the event in which AEMO is required to notify the market of a non-credible contingency event AEMO - Power System Security Guidelines, Section 10.3

[8] For a non-credible contingency AEMO is required to assess whether or not to reclassify a non-credible contingency event as a credible contingency (NER Clause 4.2.3A (c)) and to report how reclassification criteria were applied (NER Clause 4.8.15 (ca)). AEMO must determine if the condition that caused the non-credible contingency event has been resolved

Appendix 1 – Incident Event Log

The sequence of events compromising the incident are itemised in Table 1. The incident spanned approximately 74 minutes until Busbar B1 and Line 93 were restored.

Table 1 – Event log

Time and Date	Event
1529 hrs 1 May 2014	Busbar B1 tripped resulting in the offloading of Line 93
1535 hrs 1 May 2014	AEMO invoked Constraint Set N-ERNC_93
1613 hrs 1 May 2014	Market Notice 45647 issued informing the Market of the non-credible contingency event
1643 hrs 1 May 2014	Cause identified as incorrect wiring to input of Protection Relay Busbar B1 and Line 93 restored
1650 hrs 1 May 2014	AEMO revoked Constraint Set N-ERNC_93
1741 hrs 1 May 2014	No. 2 Transformer successfully energised