

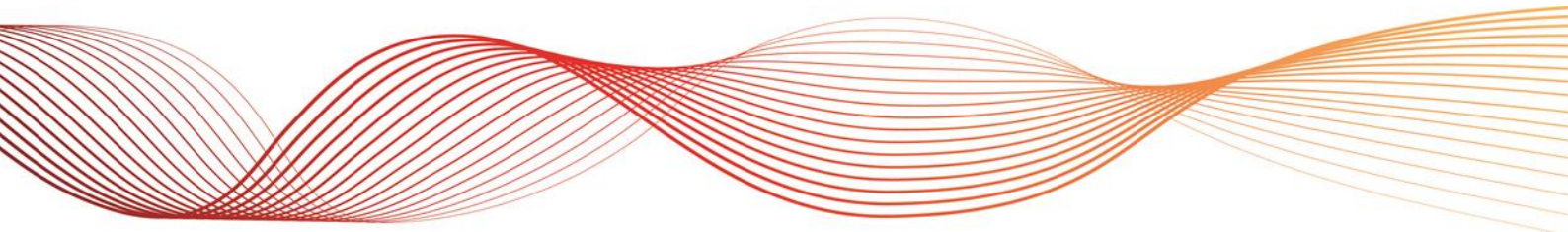


# Trip of Liddell-Tamworth 330 kV transmission line and Bayswater Unit 3 on 23 Oct 2014

AN AEMO POWER SYSTEM OPERATING INCIDENT REPORT FOR THE NATIONAL ELECTRICITY MARKET

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## VERSION RELEASE HISTORY

VERSION	DATE	BY	CHANGES	CHECKED BY	AUTHORISED BY
1	18 Feb 2015	S Darnell	FINAL	P Biddle	P Biddle

## INCIDENT CLASSIFICATIONS

Time and date and of incident	1711 hrs 23 Oct 2014
Region of incident	NSW
Affected regions	NSW
Event type	Loss of transmission element and generating unit
Primary cause	Environment and lightning
Generation Impact	580 MW tripped as a result of the incident
Customer Load Impact	No customer load lost as a result of this incident
Associated reports	Nil

## ABBREVIATIONS

Abbreviation	Term
AEMO	Australian Energy Market Operator
BW03	Bayswater Power Station Generating Unit 3
CB	Circuit Breaker
kV	Kilovolt
Line 84	Liddell-Tamworth 330 kV 84 transmission line
MW	Megawatt
NER	National Electricity Rules

## IMPORTANT NOTICE

### Purpose

AEMO has prepared this document to provide information about this particular Power System Operating Incident.

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## 1. OVERVIEW

This report reviews a power system operating incident that occurred on Thursday 23 October in New South Wales. This incident involved the simultaneous trip of a transmission line and a generating unit.

AEMO is required to assess power system security over the course of this incident as the incident is classified as a non-credible contingency that under the National Electricity Rules (NER).<sup>1</sup> Specifically, AEMO is required 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>

AEMO concluded that:

- The transmission line tripped appropriately most likely due to lightning.
- The generating unit tripped due to a transmission protection relay maloperation.
- Power system security was maintained over the course of the incident.

This report is based on information provided by TransGrid<sup>3</sup> and AEMO. National Electricity Market time (Australian Eastern Standard Time) is used in this report.

## 2. THE INCIDENT

On Thursday 23 October, at 1711 hrs, the Liddell-Tamworth 330 kV 84 transmission line (Line 84) tripped and reclosed. At the same time Bayswater Power Station Generating Unit 3 (BW03) was disconnected from the transmission system and thereby tripped.

Line 84 was immediately returned to service via the auto reclose, whilst BW03 tripped from 580MW and remained off-line for almost three days. No customer load was lost as a result of this incident.

See Appendix 1 for a power system diagram illustrating the incident and Appendix 2 for a chronological log of the incident.

The reason for investigating this incident that transmission plant disconnected BW03 as a result of a transmission fault elsewhere on the transmission system. Generally, only transmission plant directly affected by a fault should operate.

## 3. TRANSGRID INVESTIGATION

TransGrid investigated this incident and found that Line 84 tripped due to a transient fault on Line 84 and then auto reclosed. Line trip and reclose operations are expected for a transient fault. TransGrid could not definitively identify the cause of the fault, but, as there was storm activity in the area at that time, the fault was most likely caused by a lightning strike on Line 84.

At the same time as the trip of Line 84, transmission circuit breakers (CBs) 6232 and 6032 opened at Bayswater substation. This resulted in BW03 being disconnected from the transmission system. CBs 6232 and 6032 opened due to the maloperation of the No.3 Generator Transformer Group No.2 Differential Protection Relay.

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

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

<sup>3</sup> TransGrid is the transmission network service provider in NSW

TransGrid subsequently found that a faulty analogue input card had generated an erroneous current signal into the No.2 protection relay. The card was replaced and No.2 Protection was returned to service at 1900 hrs Saturday 25 Oct 2015.

## 4. POWER SYSTEM SECURITY

This section assesses how power system security was managed over the course of the incident<sup>4</sup>.

Immediately following the incident the power system was in a secure state so AEMO did not need to take action to restore power system security<sup>5</sup>.

AEMO issued Market Notice 46691 at 1726 hrs, 15 minutes after the incident, to notify the market of the non-credible contingency event<sup>6</sup>.

AEMO then assessed whether or not to reclassify the event as a credible contingency<sup>7</sup>. AEMO did not reclassify this incident as a credible contingency because the cause of the BW03 disconnection had been identified and resolved before BW03 returned to service. AEMO did not consider that the incident was likely to reoccur.

AEMO issued Market Notice 46702 at 1223 hrs on Sun 26 Oct 2014, shortly after BW03 had returned to service, to notify the market that the incident had not been reclassified as a credible contingency.

## 5. CONCLUSIONS

AEMO concluded that:

1. Line 84 correctly tripped due to a transient fault most likely caused by lightning.
2. BW03 tripped as a result of being disconnected from the transmission system. The disconnection was caused by a protection relay maloperation.
3. Power system security was maintained over the course of the incident.
4. There are no outstanding issues to resolve as a result of this incident.

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<sup>4</sup> 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.

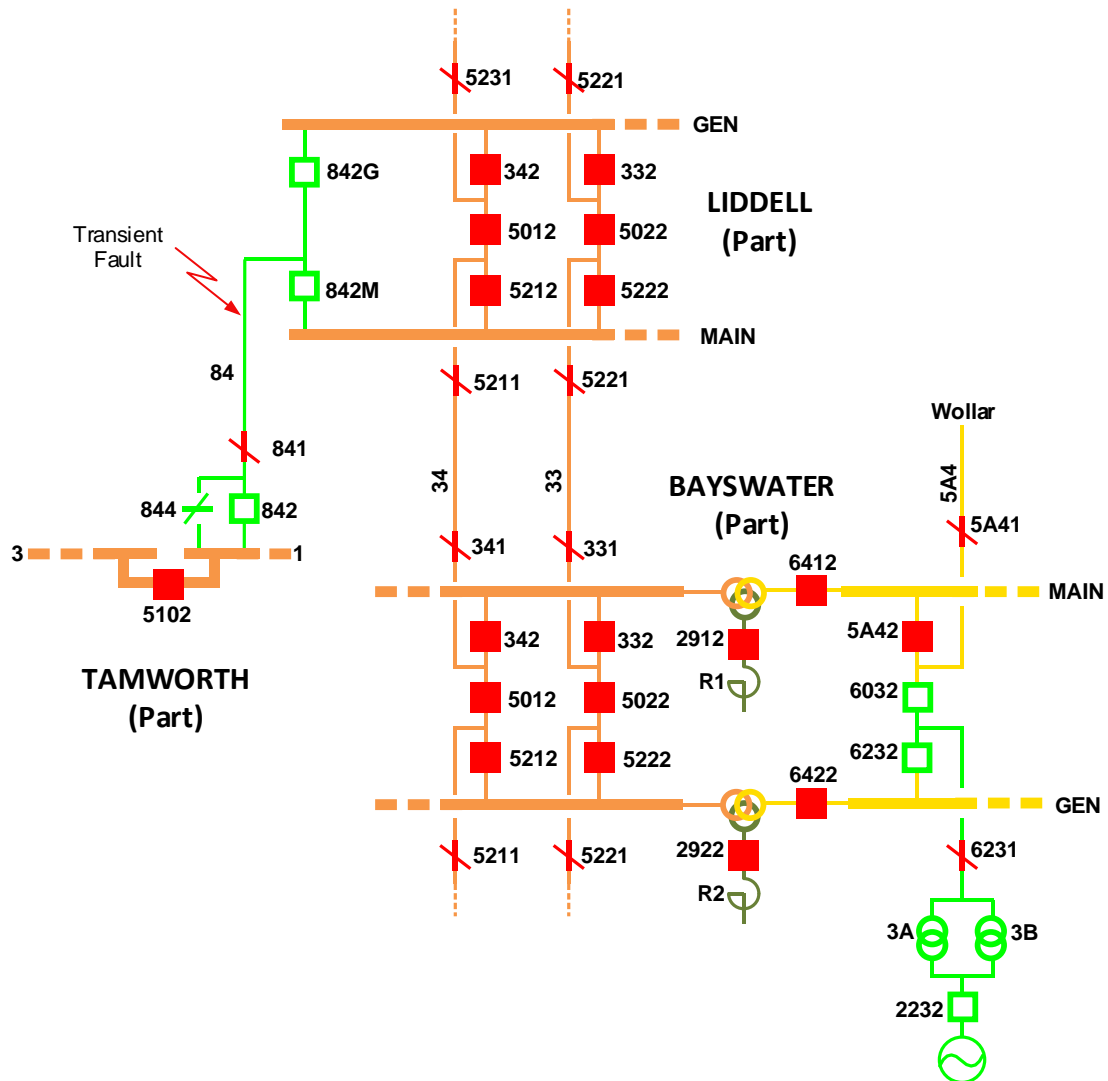
<sup>5</sup> AEMO is required to return the power system to a secure state within thirty minutes following a contingency event - NER Clause 4.2.6 (b)

<sup>6</sup> AEMO is required to notify the Market of a non-credible contingency event within two hours of the event - AEMO, *Power System Security Guidelines*, Section 10.3

<sup>7</sup> 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 re-classification criteria were applied - NER Clause 4.8.15 (ca). AEMO has to determine if the condition that caused the non-credible contingency event has been resolved.

## APPENDIX 1 – POWER SYSTEM DIAGRAM

The power system after the fault (before the circuit breakers on Line 84 auto reclosed)



500 kV Busbar, line	500 / 22 kV Transformer	Closed CB	Closed Isolator
330 kV Busbar, line	500 / 330 / 33 kV Transformer	Open CB	Open Isolator
33 kV Busbar, line	Generator		
22 kV Busbar, line			
Out of service Busbar, line			



## APPENDIX 2 – INCIDENT EVENT LOG

### Incident Log

Time and Date	Event
1711 hrs Thurs 23 Oct 2014	Liddell-Tamworth (84) 330 kV transmission line tripped and auto reclosed at both ends
1711 hrs Thurs 23 Oct 2014	At Bayswater substation transmission CBs 6032 and 6232 opened. As a result Bayswater generating unit 3 was disconnected
1726 hrs Thurs 23 Oct 2014	AEMO issued Market Notice 46691. Notification of non-credible contingency event
2349 hrs Thurs 23 Oct 2015	At Bayswater substation, TransGrid completed tests and returned to service No.3 Generator Transformer Group No.1 Protection (No. 2 Protection remained out of service for tests)
1900 hrs Sat 25 Oct 2015	At Bayswater substation, TransGrid completed tests on No.3 Generator Transformer Group No.2 Protection. Fault found to be a faulty analogue input card which TranGrid replaced.
0920 hrs Sun 26 Oct 2014	Bayswater generating unit 3 returned to service
1223 hrs Sun 26 Oct 2014	AEMO issued Market Notice 46702. Notification that AEMO has not reclassified the incident as a credible contingency