
Trip of the Kemps Creek A 330 kV Busbar on 27 January 2020

June 2020

Reviewable Operating Incident Report under the
National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of Incident	17:38:10 hrs on 27 January 2020
Region of incident	New South Wales
Affected regions	New South Wales
Event type	Equipment failure
Generation impact	No generation loss occurred as a result of this incident
Customer load impact	No customer load was disconnected as a result of this incident.
Associated reports	Nil

ABBREVIATIONS

Abbreviation	Term
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AEST	Australian Eastern Standard Time
NEM	National Electricity Market
NER	National Electricity Rules
TNSP	Transmission Network Service Provider

Important notice

PURPOSE

AEMO has prepared this report in accordance with clause 4.8.15(c) of the National Electricity Rules, using information available as at the date of publication, unless otherwise specified.

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1. Overview

This report relates to a reviewable operating incident¹ that occurred on 27 January 2020 in New South Wales. The incident involved the tripping of the 330 kilovolt (kV) A busbar at the Kemps Creek substation.

There was no loss of generation or customer load as a result of this incident.

As this was a reviewable operating incident, 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 security².

AEMO has concluded that:

1. The A busbar at Kemps Creek substation tripped due to a phase to earth fault within the busbar protection zone.
2. The root cause was an internal flashover of the Red Phase Current Transformer on No. 2 330 kV Capacitor Bank (No. 2 Capacitor) at Kemps Creek.
3. All protection systems operated correctly for this fault.
4. The power system remained in a secure operating state.

This report is prepared in accordance with clause 4.8.15(c) of the National Electricity Rules (NER). It is based on information provided by TransGrid and AEMO.

National Electricity Market time (Australian Eastern Standard Time [AEST]) is used in this report.

2. The incident

2.1 Pre-incident conditions

Immediately prior to this incident, No. 2 capacitor had been switched out of service at the Kemps Creek substation. No. 1 capacitor and all reactors at the substation were out of service prior to the incident. All other major transmission elements such as busbars and transmission lines were in service.

2.2 The incident

At 17:38:10 hrs on 27 January 2020, the A Busbar tripped, approximately seven seconds after the No. 2 Capacitor at Kemps Creek was switched out of service resulting in Circuit Breakers (CBs) 132, 142, and 372A opening. The busbar protection system indicated a red phase to earth fault within the busbar zone.

The A Busbar was returned to service at 19:55:44 hrs on 27 January 2020. The No. 2 Capacitor was returned to service at 17:53 hrs on 30 January 2020.

2.3 Analysis

The following is based on information provided by TransGrid.

¹ See NER clause 4.8.15(a)(1)(i), as the event relates to a non-credible contingency event; and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.

² See NER clause 4.8.15(b).

At 17:38:10 on 27 January 2020, the A Busbar tripped approximately seven seconds after the No. 2 Capacitor was switched out of service.

The busbar protection system indicated a red phase to earth fault within the busbar zone. TransGrid inspected the busbar and associated equipment but did not find any obvious signs of failure or evidence of flashover.

Further analysis of protection information by TransGrid determined the fault was likely within the No. 2 Capacitor. The No. 2 Capacitor was isolated, and the A busbar returned to service at 19:55 hrs on 27 January 2020.

TransGrid tested the Disconnect/Earth Switch and CB but did not find any evidence of failure. Initial testing of the No. 2 Capacitor current transformer (CT) showed high levels of decomposition products in the red phase indicating an internal flashover within the CT. Detailed analysis of the faulted CT has not been completed, due to Covid-19.

TransGrid confirmed that the real-time gas pressure monitoring system of the CT had not indicated any problems with the CT. TransGrid has also confirmed that there is no history of similar CT failure.

The CT was replaced, and the No. 2 Capacitor returned to service at 17:53 hrs on 30 January 2020.

3. Power system security

AEMO is responsible for power system security in the National Electricity Market (NEM). This means AEMO is required to operate the power system in a secure operating state to the extent practicable and take all reasonable actions to return the power system to a secure state following a contingency event in accordance with the NER³.

The power system was in a secure operating state prior to and during this incident and AEMO was not required to take any action in relation to power system security.

3.1 Reclassification

AEMO assessed whether to reclassify this incident as a credible contingency event⁴.

AEMO was advised by TransGrid that the cause of the incident had been identified and the failed equipment had been isolated prior to restoration of the busbar. As such, AEMO responded correctly and did not classify this non-credible contingency as a credible contingency event.

4. Market information

AEMO is required by the NER and operating procedures to inform the market about incidents as they progress. This section assesses how AEMO informed the market⁵ over the course of this incident.

³ Refer to AEMO's functions in section 49 of the National Electricity Law and the power system security principles in clause 4.2.6 of the NER.

⁴ AEMO is required to assess whether or not to reclassify a non-credible contingency event as a credible contingency event – NER clause 4.2.3A(c) – and to report how the reclassification criteria were applied – NER clause 4.8.15(ca).

⁵ AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see <https://www.aemo.com.au/Market-Notices>.

For this incident, AEMO informed the market on the following matters:

1. A non-credible contingency event – notify within two hours of the event⁶.
 - AEMO issued Market Notice 73057 at 17:49 hrs on 27 January 2020, 11 minutes after the event, to advise of the non-credible contingency event.
2. Reclassification, details, and cancellation of a non-credible contingency – notify as soon as practical⁷.
 - AEMO issued Market Notice 73059 at 20:04 hrs on 27 January 2020 to advise that AEMO would not reclassify this event as a credible contingency event.

5. Conclusions

AEMO has assessed this incident in accordance with clause 4.8.15(b) of the NER. In particular, AEMO has assessed the adequacy of the provision and response of facilities or services, and the appropriateness of actions taken to restore or maintain power system security.

AEMO has concluded that:

1. The root cause of the trip of 330 kV A busbar at Kemps Creek substation was an internal flashover of the Red Phase Current Transformer on No. 2 330 kV Capacitor Bank.
2. The CT was replaced, and the No. 2 Capacitor returned to service at 17:53 hrs on 30 January 2020.
3. All protection systems operated correctly for this fault.
4. The power system remained in a secure operating state during this incident.

⁶ 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 7.3.

⁷ AEMO is required to notify the market of a reclassification – NER clause 4.2.3(g), details of the reclassification – 4.2.3(c), and when AEMO cancels the reclassification – 4.2.3(h).

A1. System diagram

The diagram below provides an overview of part of the power system immediately after the incident.

Figure 1 Simplified single line diagram of 500/330 kV Kemps Creek Substation

