



Trip of the No. 2 330 kV busbar at Wodonga Terminal Station on 1 October 2019

February 2020

Reviewable Operating Incident Report under the
National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	1234 hrs on 1 October 2019
Region of incident	Victoria
Affected regions	Victoria
Event type	Unexpected protection operation
Generation impact	No generation was disconnected 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
CB	Circuit Breaker
HV	High voltage
kV	Kilovolt
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 1 October 2019 in Victoria. The incident involved the trip of the Wodonga No. 2 330 kilovolt (kV) busbar (No. 2 busbar).

No generation or customer load was disconnected 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 No. 2 busbar tripped due to the unexpected operation of protection system during planned work on the No.2 330/66/22 kV Transformer.
2. The protection operation resulted from a fault on the 22 kV distribution system and insufficient isolation of secondary systems.
3. 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 AusNet³ and AEMO.

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

2. The incident

2.1 Pre-incident conditions

At the time of this incident, the No. 2 330/66/22 kV Transformer (No. 2 Transformer) at Wodonga Terminal Station (WOTS) was out of service for planned work.

2.2 The incident

At 1234 hrs on 1 October 2019, the No. 2 busbar tripped during planned project work to replace 22 kV cabling on the No. 2 Transformer. The trip was not an expected outcome of the planned work.

The No. 2 busbar was returned to service at 1256 hrs on 1 October 2019.

2.3 Investigation

The following is based on information provided by AusNet.

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

² See NER clause 4.8.15(b).

³ AusNet Services is the transmission network service provider (TNSP) in the Victoria region. Note that "Information provided by AusNet Services 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 AusNet Services (or its respective associated companies, businesses, partners, directors, officers or employees)."

At 1234 hrs on 1 October 2019, the No. 2 busbar tripped as a result of the operation of the No. 2 Transformer 'X' Restricted Earth Fault (REF) protection system. Although this protection operated correctly, this was not an expected outcome of the planned project work.

The protection operation resulted due to earth current from a fault on the 22 kV distribution system flowing into the current transformers of the 'X' REF protection zone via the earthing that was in place at both ends of the No. 2 Transformer 22 kV high voltage underground cables during the planned work.

The No. 2 Transformer is hard-connected to its 330 kV bus, that is, there is no circuit breaker (CB) on the 330 kV side of the transformer. Therefore, by design, the 330 kV bus will trip in the event of a transformer protection operation.

A review of the protection operation by AusNet determined the No. 2 Transformer 'X' Restricted Earth Fault (REF) protection operated when Transformer No. 2 was out of service and earthed and co-incident with a phase to earth fault on a distribution feeder fed from Wodonga Zone Substation.

As the No. 2 Transformer was out of service, the transformer protection would not have operated for this type of fault. For safety reasons, during the planned work, the No. 2 Transformer and associated connections were earthed in a number of places. Due to this earthing arrangement, the external phase to earth fault resulted in a current flow through the No. 2 Transformer 22 kV cable of sufficient magnitude to initiate the 'X' REF protection.

It is not Ausnet's common practice or procedure to isolate the transformer protection for this type of work.

To prevent a recurrence of unwanted tripping due to similar conditions, the No. 2 Transformer protection was isolated for the remaining outage duration. Subsequently, during similar works undertaken on the No. 1 Transformer, its protection was isolated for the duration of the outage.

Ausnet advised AEMO that this type of work is unlikely to be undertaken again.

3. Power system security

AEMO is responsible for power system security in the 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 NER⁴.

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 event⁵.

Prior to restoring the No. 2 busbar to service, AusNet advised AEMO that the cause of the incident had been identified and precautions had been put in place to prevent a recurrence. Based on this advice, AEMO determined the incident was unlikely to reoccur and therefore correctly determined that reclassification as a credible contingency event was not required.

⁴ 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.

⁵ AEMO is required to assess whether 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).

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 market⁶ over the course of this incident.

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

1. A non-credible contingency event – notify within two hours of the event⁷.
 - AEMO issued Market Notice 70306 at 1322 hrs on 1 October 2019, 48 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 practical⁸.
 - AEMO issued Market Notice 70306 at 1322 hrs on 1 October 2019 to advise that the No. 2 busbar had been returned to service and that AEMO would not reclassify the loss of the No. 2 busbar 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 No. 2 busbar tripped due to the unexpected operation of protection system during planned work on the No.2 330/66/22 kV Transformer.
2. The protection operation resulted from a fault on the 22 kV distribution system and insufficient isolation of secondary systems.
3. The power system remained in a secure operating state.

⁶ AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see <https://www.aemo.com.au/Market-Notices>.

⁷ 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.

⁸ 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).