# TRIP OF KEILOR NO. 3 220 KV BUSBAR ON 18 MAY 2017

REVIEWABLE OPERATING INCIDENT REPORT UNDER THE NATIONAL ELECTRICITY RULES

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AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

# INCIDENT CLASSIFICATIONS

| Classification | Detail |
|---|---|
| Time and date of incident | 1347 hrs Thursday 18 May 2017 |
| Region of incident | Victoria |
| Affected regions | Victoria |
| Event type | Busbar trip (BB) |
| Generation Impact | No generator was disconnected or limited as a result of this incident |
| Customer Load Impact | No customer load was disconnected as a result of this incident |
| Associated reports | Nil |

# 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.

## Disclaimer

AEMO has made every effort to ensure the quality of the information in this report but cannot guarantee its accuracy or completeness. Any views expressed in this report are those of AEMO unless otherwise stated, and may be based on information given to AEMO by other persons.

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# 1. OVERVIEW

This report relates to a reviewable operating incident[1] that occurred on Thursday 18 May 2017 at Keilor Terminal Station (KTS) in Victoria. This incident involved the trip of the No.3 220 kV busbar, a non-credible contingency.

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

As a reviewable operating incident, AEMO is required to assess power system security over the course of this incident, and 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]

AEMO has concluded that:

- The trip of the No.3 220 kV busbar at KTS was caused by human error during project work.
- There was no fault on the busbar.
- The power system remained in a secure operating state during this incident.
- AEMO was not immediately notified by AusNet Services of the non-credible contingency event.
- AEMO did not inform the market of the non-credible event within two hours.
- The cause of this incident was identified and AEMO was satisfied that the reoccurrence of this incident was unlikely, so it was not reclassified as a credible contingency.

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 AEMO and AusNet Services (AusNet)[3].

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

# 2. THE INCIDENT

On Thursday 18 May 2017 at 1347 hrs the No.3 220 kV busbar at KTS tripped due to human error during secondary systems work. See Appendix A for a power system diagram of KTS immediately after the incident.

No load or generation was lost as a result of this incident.

The No.3 busbar was returned to service at 1609 hrs on 18 May 2017.

The reason for investigating this incident is 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 event[4].

# 3. AUSNET INVESTIGATION

AusNet investigated this incident a found that the No.3 busbar tripped due to inadvertent operation of the No.3 “Y” bus zone protection relay.

Project work associated with a disturbance recorder was being undertaken at the time of this incident. While reinstating the isolation links to return the disturbance recorder to service, a screwdriver made contact with an adjacent link which was associated with the No.3 “Y” bus zone protection relay. The short circuit resulted in operation of the relay and trip of the No.3 busbar.

[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).
[3] 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).
[4] NER Clause 4.2.3 - Credible and non-credible contingency events; *AEMO Power System Security Guidelines,* Section 10 - Definition of a non-credible contingency events

AusNet identified that the screwdriver inadvertently made contact with the busbar relay link due to a broken plastic shroud, which is designed to provide a physical barrier between the two links. AusNet replaced the broken shroud prior to returning the busbar to service to prevent reoccurrence of this incident.

# 4. 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 NER.[5]

This section assesses how AEMO managed power system security over the course of this incident.

AEMO was not immediately notified by the Transmission Network Service Provider (TNSP), AusNet, of the unplanned outage of the No.3 busbar as required by clause 4.3.3(e) of the National Electricity Rules and clause 7.3 of AEMOs Outage Assessment procedure[6]. AusNet advised AEMO of the outage at 1605 hrs on 18 May.

AusNet initially thought the busbar would be restored in short time as the incident was caused by human error. However, the cause of the busbar trip was not easily identifiable due to three separate work groups on site at the time. While AusNet was busy managing planned outages, it did not notify AEMO of the unplanned outage of the No.3 busbar. AusNet's requirement as TNSP to immediately notify AEMO of the non-credible contingency event has been reinforced to ensure it doesn't reoccur.

Although AEMO received a number of alarms indicating the busbar had tripped, AEMO believed these were related to a separate planned outage of the B3 220/66 kV transformer at KTS and so did not investigate the alarms. In order to improve control room situational awareness and the timely reporting of non-credible contingency events, AEMO has included non-credible contingency scenarios as part of the control room training program for the second half of 2017.

At 1605 hrs, AusNet informed AEMO of the busbar outage. AusNet advised that the cause of the outage had been identified and was unlikely to reoccur. AEMO gave permission to restore the No.3 busbar at 1609 hrs.

The power system remained in a secure operating state during this incident and no action was required by AEMO in relation to power system security.

## 4.1 Reclassification

After the No.3 220 kV busbar at KTS had been returned to service, AEMO assessed whether or not to reclassify the event as a credible contingency[7]. For this incident, AEMO was satisfied that the cause had been identified and that the incident was unlikely to reoccur. AEMO then issued Market Notice 58595 at 1621 hrs to notify the market that the incident would not be reclassified as a credible contingency.

The power system remained in a secure operating state over the course of the incident. Power system frequency[8], and voltage[9] remained within limits. AEMO correctly assessed the incident and did not reclassify it as a credible contingency.

[5] 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
[6] Section 7.3 of AEMO Outage Assessment guidelines SO_OP_3718 and NER clause 4.3.3(e).
[7] 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.
[8] Operating Frequency Tolerance Band specified in AEMC Reliability Panel Frequency Operating Standards
[9] NER Schedule 5.1a System Standards Clause S5.1a.4 - Power frequency voltage

# 5. 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 market[10] over the course of this incident.

For this incident, AEMO was required to inform the market on the following matters:

1. The occurrence of a non-credible contingency event - notify within two hours of the event.[11]

   AEMO issued Market Notice 58595 at 1621 hrs – 2.5 hours after the event

AEMO did not notify the market of the non-credible contingency event within two hours.

No other notifications were required.

# 6. 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:

- The trip of the No.3 220 kV busbar at KTS was caused by human error during project work.
- There was no fault on the busbar.
- The power system remained in a secure operating state during this incident.
- AEMO was not immediately notified by AusNet Services of the non-credible contingency event.
- AEMO did not inform the market of the non-credible event within two hours.
- The cause of this incident was identified and AEMO was satisfied that the reoccurrence of this incident was unlikely, so it was not reclassified as a credible contingency.

[10] AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see AEMO website

[11] 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

# APPENDIX A. – POWER SYSTEM DIAGRAM

The diagram below shows the status of KTS immediately after the event. Note that the line to Deer Park and the B3 220/66 kV transformer were out of service prior to the event.