
Trip of the No. 1 220 kV Busbar at Jeeralang on 30 December 2019

May 2020

Reviewable Operating Incident Report under the
National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	2023 hrs on 30 December 2019
Region of incident	Victoria
Affected regions	Victoria
Event type	Equipment Failure
Generation impact	40 MW of 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
JLGS	Jeeralang Gas Station
JLTS	Jeeralang Terminal Station
kV	Kilovolt
MW	Megawatts
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.

DISCLAIMER

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

Accordingly, to the maximum extent permitted by law, AEMO and its officers, employees and consultants involved in the preparation of this document:

- make no representation or warranty, express or implied, as to the currency, accuracy, reliability or completeness of the information in this document; and
- are not liable (whether by reason of negligence or otherwise) for any statements or representations in this document, or any omissions from it, or for any use or reliance on the information in it.

Contents

1.	Overview	5
2.	The incident	5
2.1	Pre-incident conditions	5
2.2	The incident	5
2.3	Analysis	6
3.	Power system security	8
3.1	Reclassification	8
4.	Market information	9
5.	Conclusions	9

Figures

Figure 1	JLTS and JLGS status post-incident	7
----------	------------------------------------	---

1. Overview

This report relates to a reviewable operating incident¹ that occurred on 30 December 2019 in Victoria. The incident involved the trip of the Jeeralang Terminal Station No. 1 220 kV busbar (JLTS Busbar 1) in Victoria.

This incident resulted in the disconnection of 40 MW of generation.

As this is 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 JLTS Busbar 1 tripped due to an inter trip signal received from Jeeralang Gas Station Unit B (JLGS B).
2. The inter trip was triggered due to a failure of the JLGS B3 unit circuit breaker (CB) to open.
3. Operators for the Transmission Network Service Provider (TNSP), AusNet Services, correctly isolated the JLGS B3 unit transformer and restored the busbar to service.
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 AusNet Services³, EnergyAustralia Ecogen and AEMO

National Electricity Market (NEM) time (Australian Eastern Standard Time [AEST]) is used in this report. Local time in Victoria at the time of this incident was AEST plus one hour.

2. The incident

2.1 Pre-incident conditions

Immediately prior to this incident, all major transmission equipment elements such as busbars and transmission lines were in service. The JLGS B generating authorities (EnergyAustralia Ecogen) were ramping down generation after the peak hour load had subsided, with units B1 and B2 online and generating at 20 MW each and the B3 unit ramping down in preparation for shutdown.

2.2 The incident

At 2023 hours on 30 December 2019, the JLTS Busbar 1 was tripped via protection operation. The JLTS-Hazelwood Power Station (HWPS) No. 1 220 kV line was offloaded at the same time and remained unavailable during the JLTS Busbar 1 outage.

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 disclaimer – *AusNet Services is the Transmission Network Service Provider in the Victoria region. 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).*

The JLGS B3 unit transformer was isolated by the AusNet Services operator at the request of the EnergyAustralia Ecogen operator, opening the JLGS B3 unit transformer's 220 kV disconnect switch at JLTS.

At 2131 hours on 30 December 2019, the JLTS Busbar 1 was restored to service, with the 220 kV CBs on the JLTS Busbar 1 progressively restored to service. JLGS B1 and B2 units were restored to normal service at 2107 hours.

2.3 Analysis

The following is based on information provided by AusNet Services and EnergyAustralia Ecogen.

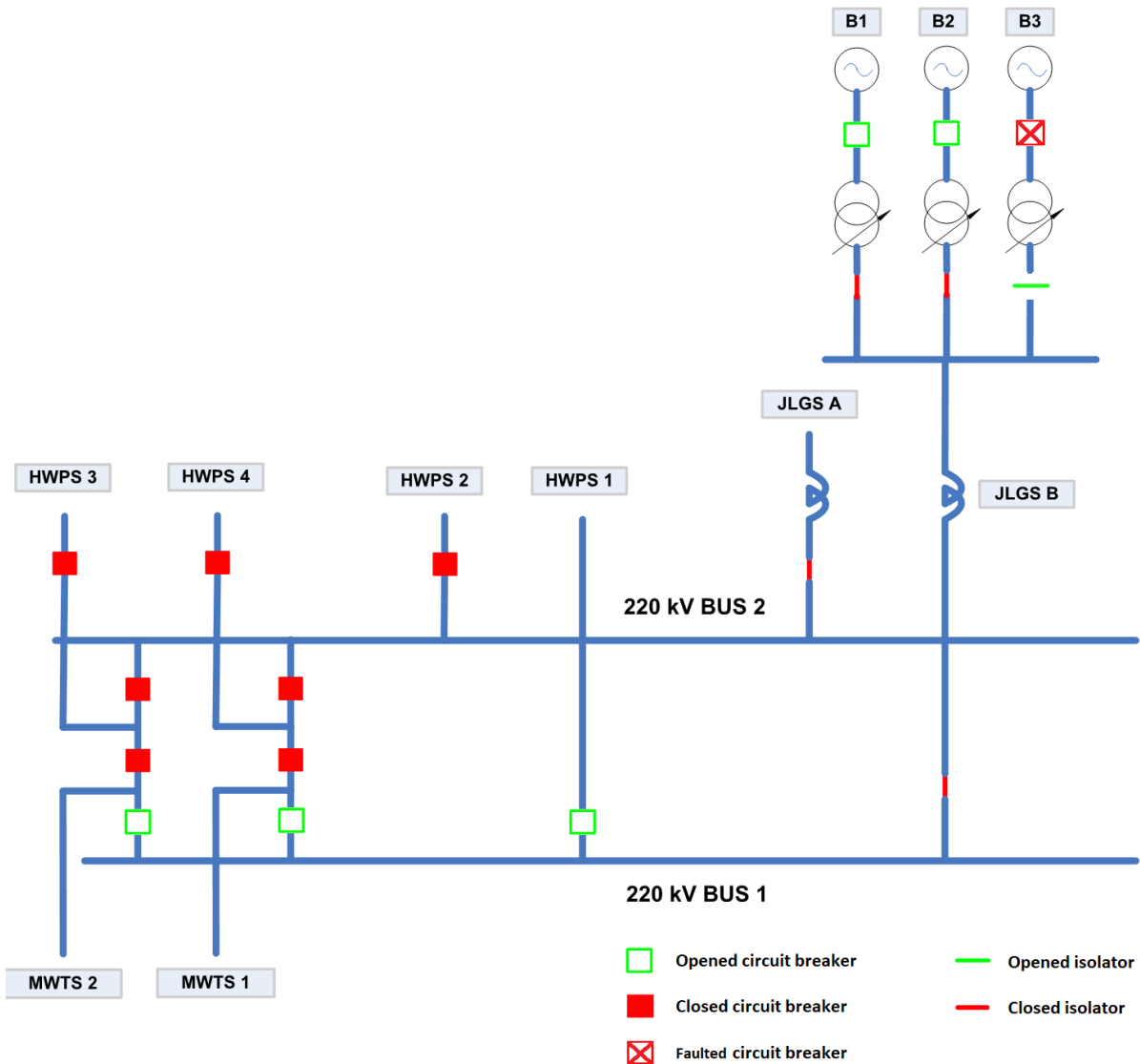
The JLTS Busbar 1 was tripped via inter trip from JLGS B3 at 2023 hours on 30 December 2019. EnergyAustralia Ecogen reported this as a Generator Y protection inter trip following more than two trip attempts of the generator CB.

The JLGS B generators and auxiliary transformers (owned by EnergyAustralia Ecogen) are connected directly to the JLTS Busbar 1. The JLGS B3 CB failed to open when the unit was coming out of service, initiating a trip of the B3 Unit transformer from JLTS, which tripped the JLTS Busbar 1 and the B1 and B2 Units, interrupting 40 MW of generation at JLGS B.

The AusNet Services first responder attended JLTS by 2042 hours of the same day and confirmed that all 220 kV CBs connected to the JLTS Busbar 1 were open, whilst the JLGS B3 generator's 10.5 kV CB was still closed. All relevant plant at JLTS was inspected and found to be satisfactory, with protection targets then reset. A subsequent review by AusNet Services determined that their assets operated as they should for this fault condition at JLGS B.

Generation authorities at JLGS advised AusNet Services first responder that JLGS B3 generator's 10.5 kV CB failed to open. The B3 unit transformer, including its CB, was isolated at 2117 hours by AusNet Services for the generator authorities by opening the B3 unit transformer's 220 kV disconnect switch at JLTS. After confirming the JLGS B3 generator's 10.5 kV CB isolator was open, the B3 unit transformer's 220 kV disconnect switch was opened and the JLGS B3 generating unit was left isolated for EnergyAustralia Ecogen to identify the cause and repair. Refer Figure 1 for the status of the impacted equipment following the manual isolation of JLGS B3.

Figure 1 JLTS and JLGS status post-incident



EnergyAustralia Ecogen investigated the CB failure over the course of the following day and determined it was caused by the securing screw for the CB secondary trip coil mounting plate working loose and allowing the trip lever pivot to move out of alignment and prevent the operation of the CB. The CB had been inspected in August 2019 and all screws were found to be secure and components in place.

With JLGS B3 unit isolated, AusNet restored the JLTS No. 1 220 kV Busbar to service at 2131 hours on 30 December 2019. The 220 kV CBs on the JLTS Busbar 1 (excluding B3 transformer CB) were progressively restored to service thereafter. The secondary trip coil on the B3 CB was replaced, the linkage pin holding the trip lever pivot re-inserted, and the secondary trip coil mounting plate re-secured by re-threading in the securing screw with Loctite used on the securing screw holding nut. The CB was tested multiple times by electrically operating its trip coils, and unit B3 was restored to service at 1500 hours on 31 December 2020. The B1 and B2 CBs were also inspected on 5 March 2020, with one of the two holding screws on the B2 CB secondary trip coil mounting plate found to be missing. The secondary coil and trip lever pivot were at the time still in alignment and functional and were re-secured with both holding screws using Loctite.

In a previous incident, the JLTS Busbar 1 was tripped on 7 April 2016 as a result of a Transformer Y protection inter trip from JLGS B2. The operator at the time, EcoGen Energy, determined that CB failed to open on 7 April due to loose trip coils as a result of holding screws working loose (a scenario similar in nature to the 30 December 2020 event). After additional maintenance following a second trip event on 10 April 2016 (not

caused by loose holding screws), annual inspection and timing checks were put in place to prevent future incidents. The associated incident report is available on AEMO's website⁴.

EnergyAustralia Ecogen has advised AEMO that it is reviewing additional preventative maintenance activities to reduce the risk of similar events reoccurring. Access restrictions due to asbestos content currently hinder regular inspection, although implementation of a permanent solution to the asbestos content is planned by the end of 2020. EnergyAustralia Ecogen is working to implement a monthly inspection process by the end of April 2020, with integration into the asset management system for preventative maintenance notifications. In advance of this system, the CBs were inspected in mid-March 2020 and no issues were identified.

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 NER⁵.

The power system was in a secure operating state prior to this incident and remained in a secure operating state for the duration of the incident. No action was required by AEMO in relation to power system security.

3.1 Reclassification

AEMO assessed whether to reclassify this incident as a credible contingency event⁶.

AusNet advised that the incident was due to the failure of the JLGS B3 transformer CB to open and that the unit was isolated until the cause was identified. The backup protection operated as expected to trip the busbar.

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.

EnergyAustralia Ecogen has since provided details on the specific cause for the failure to open of the JLGS B3 CB as detailed in this report, and has indicated that a trip of the 220 kV bus as a result of unit CB failure should not be considered likely. As such, no change to the AEMO classification is considered necessary.

⁴ AEMO, *Trip of Jeeralang No. 1 220 kV busbar on 7 April and 10 April 2016*, September 2019, at <https://www.aemo.com.au/energy-systems/electricity/national-electricity-market-nem/nem-events-and-reports/power-system-operating-incident-reports>.

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 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 market⁷ 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 event⁸.
 - AEMO issued Market Notice 72204 at 2117 hrs on 30 December 2019, 54 minutes after the event, to advise of the non-credible contingency event and 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:

2. The JLTS Busbar 1 tripped due to an inter trip signal received from JLGS Unit B.
3. The inter trip was triggered due to a failure to open of the JLGS B3 unit CB.
4. Operators for the TNSP, AusNet Services, correctly isolated the JLGS B3 unit transformer and restored the busbar to service.
5. The power system remained in a secure operating state.

⁷ AEMO generally informs the market about operating incidents as they progress by issuing Market Notices – see <https://www.aemo.com.au/Market-Notices>.

⁸ 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.