AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Trip of the Hazelwood Power Station to Rowville Terminal Station No. 1 and No. 2 220 kV Transmission Lines on 9 December 2018

April 2019

Reviewable Operating Incident Report under the National Electricity Rules

INCIDENT CLASSIFICATIONS

Classification	Detail
Time and date of incident	0207 hours on 9 December 2018
Region of incident	Victoria
Affected regions	Victoria
Event type	Lightning
Generation Impact	No generating unit was disconnected or had its output limited 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
AEMO	Australian Energy Market Operator
CB	Circuit Breaker
kV	Kilovolt
MW	Megawatt
NER	National Electricity Rules

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.

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1. Overview

This report relates to a reviewable operating incident[1] that occurred on 9 December 2018 in Victoria. The incident involved the simultaneous trip of the Hazelwood Power Station to Rowville Terminal Station No. 1 and No. 2 220 kV transmission lines (HWPS-ROTS No. 1 line and HWPS-ROTS No. 2 line) during storm activity in the area.

No generation or customer load was lost 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 security[2].

AEMO has concluded that:

1. The simultaneous trip of the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines was due to lightning.
2. All protection operated as per design and as expected.
3. As a result of this incident the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines are now considered as vulnerable to lighting in the probable category.
4. The power system remained in a secure operating state throughout this incident.

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 Services (AusNet)[3] and AEMO's own information.

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

2. The incident

2.1 Pre-event conditions

Prior to this incident, all transmission equipment was in service and the power system was in a secure operating state.

2.2 The incident

At 0207 hrs on 9 December 2018, the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines tripped simultaneously. Due to the network configuration at HWPS this also resulted in the offloading of the Hazelwood – Yallourn Power Station No. 1 220 kV line (HWPS-YPS No. 1 line).

[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] 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)."

Approximately five seconds later, both HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines automatically reclosed at the ROTS end.

At 0209 hrs on 9 December 2018, AusNet manually reclosed the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines at the HWPS end. This action also restored the HWPS-YPS No. 1 line to service.

2.3 AusNet investigation

The following is based on information provided by AusNet.

A lightning storm with strong winds was occurring in the vicinity of the HWPS-ROTS line at the time of the incident.

For both the HWPS-ROTS No. 1 line and the HWPS-ROTS No. 2 line, the 'X' and 'Y' protection operated correctly at both HWPS and ROTS to trip both lines within 54 milliseconds[4]. Protection records indicate a single phase to ground fault on each line[5].

Approximately five seconds after the lines tripped, both lines successfully auto-reclosed at the ROTS end. In accordance with normal industry practice, auto-reclose is not installed at the HWPS end of the lines due to the proximity to generating units[6]. The HWPS end of each line was manually reclosed by AusNet at 0209 hrs on 9 December 2018.

A patrol of both lines was conducted by AusNet on 11 December 2018 with no fault found.

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 operating state following a contingency event in accordance with the NER[7].

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

3.1 Reclassification

AEMO assessed whether or not to reclassify this incident as a credible contingency[8].

The HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines run on a common set of dual circuit towers. Although AEMO was aware of lightning activity in the region of these lines prior to the incident, AEMO was not required to reclassify the lines, as the lines were not considered vulnerable to lightning in accordance with the Power System Security Guidelines[9].

[4] This meets the requirements of NER Clause S5.1a.8.

[5] Red phase on the HWPS-ROTS No. 1 line and white phase on the HWPS-ROTS No. 2 line.

[6] Although there is no longer generaton at Hazelwood power station ther eis still generation at Yallourn and Jeeralang

[7] Refer to AEMO's functions in section 49 of the National Electricity Law and the power system security principles in clauses 4.2.6 and 4.3.2 of the NER.

[8] 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).

[9] Refer to SO_OP3715 Power System Security Guidelines, section 11.4, available at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3715---Power-System-Security-Guidelines.pdf.

Immediately after the incident, AEMO could not conclusively determine the cause and therefore reclassified the simultaneous loss of the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines as a credible contingency at 0225 hrs on 9 December 2018. Constraint set V-HWRO_R_N-2[10] was invoked as part of the reclassification.

At 0329 hrs on 9 December 2018, AusNet advised AEMO the incident was caused by lightning. On the basis of this information, AEMO determined that the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines were vulnerable to lightning in accordance with the Power System Security Guidelines. The Power System Security Guidelines have been updated to show the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines as vulnerable to lightning in the probable category.

The reclassification was cancelled and constraint set V-HWRO_R_N-2 revoked at 0435 hrs on 9 December 2018 after lightning activity in the area had ceased.

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 market[11] 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 event[12].
   - AEMO issued Market Notice 65854 at 0230 hrs on 9 December – 23 minutes after the event.
2. Reclassification, details, and cancellation of a reclassification – notify as soon as practical[13].
   - AEMO issued Market Notice 65855 at 0253 hrs on 9 December to advise that the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines had been reclassified as a credible contingency.
   - AEMO issued Market Notice 65856 at 0355 hrs on 9 December to advise AEMO now considered the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines to be vulnerable to lightning.
   - AEMO issued Market Notice 65857 at 0451 hrs on 9 December to advise the reclassification of the HWPS-ROTS No. 1 and HWPS-ROTS No. 2 lines had been cancelled.

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:

[10] Out=Nil, loss of HWPS-ROTS No. 1 and No. 2 220kV lines declared credible.

[11] AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see AEMO website at https://www.aemo.com.au/Market-Notices.

[12] 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, available at https://www.aemo.com.au/-/media/Files/Electricity/NEM/Security_and_Reliability/Power_System_Ops/Procedures/SO_OP_3715---Power-System-Security-Guidelines.pdf.

[13] 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).

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