TRIP OF ERARING POWER STATION No. 1 GENERATOR TRANSFORMER AND ERARING – VALES POINT 330 KV LINE ON 31 JANUARY 2018

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	0539 hrs on Wednesday 31 January 2018
Region of incident	New South Wales
Affected regions	New South Wales
Event type	Protection mal-operation
Generation impact	Nil
Customer load impact	Nil
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

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1. OVERVIEW

This report relates to a reviewable operating incident[1] that occurred on 31 January 2018 in New South Wales. This incident involved the simultaneous trip of the Eraring Power Station No. 1 Generator Transformer (unit 1 transformer[2]) and the Eraring – Vales Point, 330 kV line (24 line) at the Eraring end only.

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 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[3].

AEMO has concluded that:

- The trip of the unit 1 transformer was the result of an insulator flashover due to insulator pollution. Protection operated correctly to clear the fault.
- The offloading of 24 line was the result of a protection mal-operation at Vales Point.
- TransGrid corrected the protection on 2 February 2018, and checked for similar issues at the Vales Point 330 kV switch yard
- The power system remained in a secure operating state.
- AEMO was not required to reclassify this incident 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 TransGrid[4] and Origin Energy[5] and from AEMO Energy Management Systems.

National Electricity Market (NEM) time (Australian Eastern Standard Time, or AEST) is used in this report. Local time in New South Wales at the time of this incident is AEST plus one hour.

2. THE INCIDENT

At 0539 hrs on 31 January 2018, circuit breakers (CBs) 5212, 5012, and 242 tripped at the 330 kV Eraring switchyard, disconnecting the unit 1 transformer and offloading 24 line. There was no loss of generation, as Eraring Power Station unit 1 was out of service at the time. Refer to Appendix A for a diagram of the power system immediately after this incident.

CB 242 was closed at 0550 hrs on 31 January 2018 to return 24 line to service. CBs 5212 and 5012 were returned to service on 5 February 2018, with the unit 1 transformer remaining out of service[6].

As the offloading of 24 line was not an expected outcome, this is a non-credible contingency and hence a reviewable operating incident. In accordance with clause 4.8.15 of the NER, AEMO is required to review and report on any reviewable operating incident.

[1] See NER clause 4.8.15 and the AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents.
[2] The generator transformer consists of two transformers, 1A & 1B, operating in parallel.
[3] See NER clause 4.8.15(b).
[4] As Transmission Network Service Provider (TNSP) for New South Wales
[5] As the operator of Eraring Power Station
[6] Isolator 5211 remained open.

3. TRANSGRID / ORIGIN ENERGY INVESTIGATION

The following is based on information provided by TransGrid as transmission network service provider (TNSP) of the area in question and by Origin Energy as the operator of Eraring Power Station.

3.1 Trip of unit 1 transformer

Protection system records indicated a high voltage fault between the unit 1 transformer and the 330 kV CBs in the Eraring 330 kV switchyard. An inspection of the equipment within this area identified a flashover on a 330 kV post insulator on the unit 1 transformer earth switch. The cause of the flashover was due to insulator pollution. An insulator cleaning regime has been implemented to address this problem.

Protection operated correctly to clear the fault by opening 330 kV CBs 5212 and 5012 in the Eraring switchyard.

3.2 Offloading of 24 line

The trip of CB 242 at Eraring and consequent offloading of 24 line was not an expected outcome for the fault in the location noted above. Protection system records show the CB tripped as a result of a CB Fail intertrip receive signal, but there was no evidence of protection relays at the Vales Point 330 kV switchyard sending an intertrip signal to CB 242.

TransGrid carried out testing on the intertrip schemes on 2 February 2018. This testing revealed two touching shorting links on the 24 line No. 2 protection at Vales Point:

- The Directional Earth Fault Intertrip Send.
- The Circuit Breaker Fail Intertrip Send.

When the high voltage fault occurred, the Directional Earth Fault component of the 24 Line No. 2 protection correctly identified the fault, and initiated an intertrip to CBs 5012 and 5212 at Eraring. As a result of the two touching shorting links, this also caused a trip signal to be sent to CB 242 at Eraring via the Circuit Breaker Fail intertrip circuit.

The issue with the shorting links has been corrected by TransGrid. Other similar shorting links at Vales Point were also checked, and no further action is required.

4. 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 NER[7].

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

The power system was in a secure operating state prior to this incident and remained in a secure operating state during the incident. To manage the outage of 24 line, AEMO invoked constraint set N-ERVP_24[8] from 0550 hrs to 0600 hrs on 31 January 2018[9].

[7] 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.
[8] Out= Eraring – Vales Point (24) line.
[9] The constraint was invoked just prior to the line being returned to service.

4.1 Reclassification

Immediately after the incident, there was no requirement for AEMO to consider reclassification, as the unit 1 transformer remained out of service. Prior to the unit 1 transformer being returned to service, AEMO was advised by TransGrid that the cause of the non-credible contingency had been identified, corrective action had been taken, and the contingency was unlikely to re-occur. Based on this advice, AEMO determined that reclassification of the simultaneous loss of Eraring unit 1 and the 24 line as a credible contingency was not required.

5. MARKET INFORMATION

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:

- A non-credible contingency event – notify within two hours of the event[11].
  - AEMO issued Market Notice 61051 at 0635 hrs on 31 January 2018, 56 minutes after the incident.
- Constraints invoked with interconnector terms on the left hand side (LHS)[12].
  - AEMO issued Market Notice 61050 at 0611 hrs on 31 January 2018.
- Advice of reclassification – notify as soon as is practicable[13].
  - AEMO issued Market Notice 61084 at 1917 hrs on 2 February 2018, to advise that the cause of the incident had been identified and reclassification was not 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 unit 1 transformer was the result of an insulator flashover due to insulator pollution. Protection operated correctly to clear the fault.
- The offloading of 24 line was the result of a protection mal-operation at Vales Point.
- TransGrid corrected the protection, and checked for similar issues at the Vales Point 330 kV switch yard
- The power system remained in a secure operating state.
- AEMO was not required to reclassify this incident as a credible contingency.

[10] AEMO generally informs the market about operating incidents as they progress by issuing Market Notices – see AEMO website: http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Market-notices-and-events.

[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. Available at http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Security-and-reliability/Power-system-operation.

[12] For a short-term outage, AEMO is required to notify the market of variances to interconnector transfer limits – AEMO, *Power System Security Guidelines,* Section 22.

[13] AEMO, *Power System Security Guidelines*, section 11.1.

APPENDIX A. SYSTEM DIAGRAM

The diagram below shows the affected part of the power system immediately after the incident.