Trip of Loy Yang A1 and A2 generating units within 30 minutes on 8 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	1419 and 1449 hrs Monday 8 May 2017
Region of incident	Victoria
Affected regions	Victoria
Event type	Generating unit trip
Generation Impact	Loy Yang A1 (560 MW) and A2 (530 MW) disconnected within 30 mins
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 Monday 8 May 2017 at Loy Yang Power Station (LYPS) in Victoria. This incident involved the trip of the Loy Yang A1 and A2 generating units from 560 MW and 530 MW respectively.

There was no loss of customer load 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 Loy Yang A2 unit was due to a Rotor Earth Fault.
- The cause of the tripping of Loy Yang A1 unit is unknown.
- All protection systems operated as designed and as expected for Loy Yang A2 unit.
- The power system remained in a secure operating state during this incident.
- AEMO correctly assessed the incident and did not reclassify it as a credible contingency event.

This report is prepared in accordance with clause 4.8.15 of the National Electricity Rules (NER). It is based on information provided by AEMO and AGL.

2. THE INCIDENT

On Monday 8 May 2017 at 1419 hrs, Loy Yang A2 tripped from 530 MW. Less than 30 minutes later, at 1449 hrs, Loy Yang A1 tripped from 560 MW. As a result of the incident, there was no loss of customer load.

Loy Yang A1 was returned to service at approximately 2120 hrs on 8 May 2017, and Loy Yang A2 was returned to service at approximately 1655 hrs on 9 May 2017.

The reason for investigating this incident is that a trip of two generating units within 30 minutes is a multiple contingency event.

3. PARTICIPANT INVESTIGATION

The following is based on information provided by AGL as operator of the Loy Yang A power station.

3.1 Loy Yang A2 Unit:

At 1419 hrs on 8 May 2017, Loy Yang A2 tripped when the rotor earth fault protection system detected a fault. Inspection and testing of the rotor brushwork identified low insulation resistance as a possible cause of the trip. An alarm indicating low rotor earth (insulation) resistance had previously activated on 27 March 2017. As a result, rotor resistance was being monitored. Prior to returning the unit to service, the rotor brushwork was cleaned and brushes replaced, increasing the measured rotor resistance.

[1] See NER clause 4.8.15
[2] See NER clause 4.8.15(b).

3.2 Loy Yang A1 Unit:

At 1449 on 8 May 2017, Loy Yang A1 tripped after the Distributed Control System (DCS) received a Master Fuel Trip (MFT) signal from the electrical protection system. The cause of the electrical protection system operating could not be identified and the event was not recorded by any electrical protection system relay. The relay manufacturer was unaware of any situation where the electrical protection system relay would operate without recording an event.

It is known that the MFT could be initiated if the wiring between the DCS and electrical protection system was to be either open or short circuited. In the event of an open circuit, an additional alarm would be received to indicate this condition. There were no alarms to indicate an open circuit. Therefore, it is accepted the cause of the MFT was the short circuiting of the cables between the electrical protection system and DCS. Testing of the cables identified no issues with their integrity. Consequently, no root cause of the short circuit and the subsequent MFT could identified.

At 2226 hrs on 11 July 2017, an identical fault occurred with Loy Yang A3. As with the early trip of unit 1, an investigation of the event did not identify any equipment faults. As a result, AGL has increased security and monitoring around key infrastructure.

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.[3]

No action was required by AEMO to maintain power system security during this incident.

5. RECLASSIFICATION

AEMO assessed whether or not to reclassify the simultaneous loss of both units as a credible contingency event[4]. For this incident, AEMO did not reclassify the event as there was no information to indicate that the two events were related, and AEMO assessed that the simultaneous trip of two generating units was unlikely to reoccur.

For this incident, the power system remained in a secure operating state over the course of the incident. The power system frequency[5] and voltages[6] remained within limits. AEMO correctly assessed the incident and did not reclassify the incident as a credible contingency event.

6. 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 on the following matters:

- AEMO was not required to advise participants of any matter as a result of this incident.

[3] 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
[4] 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 re-classification criteria were applied - NER Clause 4.8.15 (ca)
[5] Operating Frequency Tolerance Band specified in AEMC Reliability Panel Frequency Operating Standards
[6] NER Schedule 5.1a System Standards Clause S5.1a.4 - Power frequency voltage

7. CONCLUSIONS

AEMO has assessed this incident in accordance with clause 4.8.15 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 Loy Yang A2 unit was due to a Rotor Earth Fault.
- The cause of the tripping of Loy Yang A1 unit is unknown.
- All protection systems operated as designed and as expected for Loy Yang A2 unit.
- The power system remained in a secure operating state during this incident.
- AEMO correctly assessed the incident and did not reclassify the incident as a credible contingency event.