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| POWER system insecure in victoria on 18 august 2015 | | |
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| AN AEMO POWER SYSTEM OPERATING INCIDENT REPORT FOR THE NATIONAL ELECTRICITY MARKET | | |
| Published: March 2016 |  |  |

VERSION RELEASE HISTORY

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| 1 | 3/03/2016 | S Darnell | FINAL | P Biddle | M Stedwell |

INCIDENT CLASSIFICATIONS

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| Classification | Detail |
| Time and date of incident | 0937 hrs Tuesday 18 August 2015 |
| Region of incident | Victoria |
| Affected regions | South Australia and Victoria |
| Event type | Power System not in a secure operating state for longer than 30 minutes |
| Generation Impact | No generator 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 |
| AEMO | Australian Energy Market Operator |
| CA | Real time contingency analysis |
| kV | Kilovolt |
| MW | Megawatt |
| NER | National Electricity Rules |

Important Notice

#### Purpose

AEMO has prepared this document to provide information about this particular Power System Operating Incident.

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# OVERVIEW

This report reviews a power system operating incident that occurred on Tuesday 18 August 2015 involving the Murraylink[[1]](#footnote-1) interconnector between Victoria and South Australia.

As a result of this incident the power system was not in a secure operating state for an extended period. This means that under the National Electricity Rules (NER) AEMO is required to assess power system security over the course of the incident. Specifically, 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]](#footnote-2)

AEMO concluded that:

1. Murraylink did not follow dispatch targets for 55 minutes.
2. The operator of Murraylink did not detect a telecommunication failure.
3. The power system was in an insecure operating state for 48 minutes.
4. AEMO did not return the power system to a secure state[[3]](#footnote-3) within 30 minutes.[[4]](#footnote-4)

This report is based on information provided by APA Group (APA),[[5]](#footnote-5) ElectraNet[[6]](#footnote-6) and AEMO. National Electricity Market time (Australian Eastern Standard Time) is used in this report.

# the incident

On Tuesday 18 August 2015 between 0920 hrs and 1015 hrs (55 minutes) Murraylink power flow was not in accordance with AEMO dispatch targets.[[7]](#footnote-7) APA, the operator of Murraylink, did not follow dispatch targets and as a result the power system became insecure.

The reason Murraylink did not follow dispatch targets was due to a telecommunication failure. This meant that Murraylink was not receiving dispatch targets. APA was not aware in real-time that there had been a telecommunication failure and that Murraylink was not following dispatch targets.

Generally when dispatch targets are not followed, power flows on other power system elements are affected. This may cause power flows to exceed the technical limits of those elements, in real time or post contingency, which means the power system may become insecure.

During this incident, the power system was in an insecure operating state for 48 minutes (0937 to 1025 hrs). This was because the power flow across the two 500/275KV transformers at Heywood was such that if one of the transformers had tripped the other transformer would have overloaded.

The problem, Murraylink not following dispatch targets, was identified by AEMO who notified ElectraNet[[8]](#footnote-8) who in turn notified APA. AEMO then invoked a constraint set to match Murraylink targets to Murraylink power flow and returned the power system to a secure state.

In turn, once aware of the dispatch error, APA promptly changed over to a back-up telecommunication connection. This enabled Murraylink to receive dispatch data and follow dispatch targets. AEMO then revoked the constraint set and returned the power system to normal.

The reason for reviewing this incident is that the power system was insecure for more than 30 minutes. This was during the period that Murraylink did not receive dispatch targets. AEMO is required by the NER to review incidents where the power system is insecure for more than 30 minutes.[[9]](#footnote-9)

No load or generation was lost as a result of this incident. See Appendix A for a graph illustrating Murraylink flow and dispatch targets, and Appendix B for a chronological log of the incident.

# APA Group Review

APA as the operator of Murraylink reviewed this incident and found that the root cause of this incident was an ineffective process in detecting communication failures at Murraylink.

Murraylink uses the ElectraNet telecommunications network for data communications between Murraylink and AEMO. ElectraNet provides two telecommunication channels to Murraylink which is normal electricity supply industry practice (minimum two channels per site). When a Murraylink telecommunication link fails,[[10]](#footnote-10) APA operators at Murraylink are required to manually divert telecommunications to a back-up channel.

For this incident APA were not aware that the primary telecommunication link had failed and therefore did not respond to enable the back-up channel. The problem was indirectly identified by AEMO (due to power system security concerns), who contacted the ElectraNet control room to request APA to investigate and respond to dispatch targets. ElectraNet then contacted APA who then promptly identified the failed telecommunication channel and switched to the back-up channel.

To prevent this incident from reoccurring APA has established telecommunication failure detection and automated telecommunication channel changeover facilities at Murraylink.

# 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 and return the power system to a secure state following a contingency event. This section assesses how AEMO managed power system security over the course of this incident.[[11]](#footnote-11)

AEMO first became aware that the power system was insecure at 0937 hrs. AEMO’s real time contingency analysis (CA) indicated contingency violations for the Heywood transformers. AEMO initially monitored the situation as the impact was relatively minor - the dispatch error was less than 20MW and the CA violation was 6MW. From 0940hrs the dispatch error increased to around 55 MW and at 0950 hrs it increased again to 125MW. At this point AEMO initially attempted to contact Murraylink directly (unsuccessfully) and then contacted ElectraNet to request Murraylink dispatch be investigated.8

As the problem was not resolved quickly, AEMO invoked constraint set I-CTRL\_ISSUE\_ML (at 1015 hrs). This constraint set matched the Murraylink dispatch targets to equal the actual flow. This in turn redistributed power system flows, including power flow across Heywood transformers, to resolve contingency violations and return the power system to a secure state.

For this incident AEMO did not return the power system to a secure state within 30 minutes.4 The reasons for this is that AEMO initially monitored the low CA violations and then attempted to investigate the issue prior to invoking a constraint. These actions are reasonable given the low magnitude of the initial CA violations and that an attempt was made to resolve the issue prior to intervening (invoking a constraint) in the market.

# 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[[12]](#footnote-12) over the course of this incident.

For this incident, AEMO was required to inform the market on constraints invoked that could impact interconnector limits:[[13]](#footnote-13) AEMO informed the market via the following market notices:

* AEMO issued Market Notice 49608 at 1021 hrs to notify the market that AEMO had invoked constraint I-CTRL\_ISSUE\_ML which affects flow on Murraylink.
* AEMO issued Market Notice 49609 at 1030 hrs to notify the market that AEMO had revoked constraint I-CTRL\_ISSUE\_ML which affects flow on Murraylink.

Over the course of this incident AEMO issued appropriate, timely and sufficiently detailed market information.

# conclusions

In this section AEMO draws conclusions with respect to NER clause 4.8.15(b). Specifically AEMO assesses 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 concluded that:

1. Murraylink did not follow dispatch targets for 55 minutes.
2. APA did not detect a communication failure that prevented Murraylink from following dispatch targets. To prevent this from reoccurring APA has established, communication failure detection and automated communication channel changeover at Murraylink.
3. The Power System was in an insecure operating state for 48 minutes.
4. AEMO failed to return the power system to a secure state within 30 minutes.[[14]](#footnote-14) AEMO’s actions were reasonable given the initial magnitude of CA violations and that attempts were made to resolve the issue prior to invoking a constraint.
5. Graph showing dispatch error

Graph shows Murraylink dispatch targets (red) and power flow (blue). Targets were not received between 9:20 and 10:15

1. – incident event log

Chronological Log of Incident

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| --- | --- |
| Time and Date | Event |
| 0925 hrs | Murraylink failed to receive AEMO dispatch data. |
| 0937 hrs | AEMO contingency analysis identifies contingent overload on Heywood transformers. |
| 0955 hrs | AEMO contacted APA (via ElectraNet) to report Murraylink was not following dispatch targets. |
| 0958 hrs | ElectraNet notified APA Group site technician (on-call) that Murraylink was not following dispatch targets. |
| 1015 hrs | AEMO invoked constraint I-CTRL\_ISSUE\_ML.  Communications to Murraylink re-established. |
| 1021 hrs | AEMO issued Market Notice 49608: notification that constraint I-CTRL\_ISSUE\_ML had been invoked and that it impacts interconnector limits on Murraylink. |
| 1023 hrs | ElectraNet notified AEMO that Murraylink changed over to back–up communications. |
| 1030 hrs | AEMO revoked constraint set I-CTRL\_ISSUE\_ML. Murraylink following dispatch targets. |
| 1040 hrs | AEMO issued Market notice 49609: notification that constraint I-CTRL\_ISSUE\_ML had been revoked. |

1. Murraylink is a 220MW direct current 176 km transmission cable between Red Cliffs in Victoria and Berri in South Australia. [↑](#footnote-ref-1)
2. NER Clause 4.8.15(b). [↑](#footnote-ref-2)
3. NER Clause 4.2.4. [↑](#footnote-ref-3)
4. NER Clause 4.2.6(b) – AEMO is required to return the power system to a securer operating state as soon as is practical, or at most 30 minutes. [↑](#footnote-ref-4)
5. APA Group is the operator of Murraylink. [↑](#footnote-ref-5)
6. ElectraNet is the transmission network service provider in South Australia and also provides telecommunication services to Murraylink. [↑](#footnote-ref-6)
7. Murraylink is dispatched by AEMO market systems in a similar way to scheduled generation. This means that Murraylink is required to follow dispatch targets to maintain power system security. [↑](#footnote-ref-7)
8. ElectraNet is AEMO’s pre-arranged agent for issues concerning Murraylink. [↑](#footnote-ref-8)
9. NER Clause 4.8.15(a)(1)(iv) and AEMC Reliability Panel Guidelines for Identifying Reviewable Operating Incidents – point 4. [↑](#footnote-ref-9)
10. The ElectraNet control room does not receive automated notifications about communication channel failures affecting Murraylink. [↑](#footnote-ref-10)
11. AEMO is responsible for power system security in the NEM and is required to operate the power system in a secure operating state (NER Clause 4.2.4 (a)). AEMO must thereby ensure that the power system is maintained in, or returned to, a secure operating state following a contingency event. [↑](#footnote-ref-11)
12. AEMO generally informs the market about operating incidents as the progress by issuing Market Notices – see AEMO website [↑](#footnote-ref-12)
13. For short term outage AEMO is required to notify the market of variances to interconnector transfer limits AEMO, *Power System Security Guidelines,* Section 22 [↑](#footnote-ref-13)
14. NER clause 4.2.6( b): AEMO is required to return the power system to a secure state as soon as practical and in any event within 30 minutes [↑](#footnote-ref-14)