

Reliability Panel AEMC

## FINAL ISSUES PAPER

### Guidelines for identifying reviewable operating incidents

8 May 2012

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## **About the AEMC**

The Council of Australian Governments, through its Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. The AEMC has two principal functions. We make and amend the national electricity and gas rules, and we conduct independent reviews of the energy markets for the MCE.

### **About the AEMC Reliability Panel (Panel)**

The Panel is a specialist body within the AEMC and comprises industry and consumer representatives. It is responsible for monitoring, reviewing and reporting on reliability, security and safety of the national electricity system and advising the AEMC in respect of such matters. The Panel's responsibilities are specified in section 38 of the National Electricity Law.

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# Contents

<b>1</b>	<b>Introduction .....</b>	<b>1</b>
1.1	Reviewable operating incidents .....	1
1.2	Objective of reviewing operating incidents.....	1
1.3	Purpose of the guidelines.....	2
1.4	Review of the guidelines .....	2
1.5	Timetable for review and consultation process .....	3
1.6	Submissions on the issues paper.....	3
1.7	Structure of the paper .....	4
<b>2</b>	<b>Current provisions for power system security reviews .....</b>	<b>5</b>
2.1	Current reporting on system security issues.....	5
2.2	Operating incident reviews .....	7
<b>3</b>	<b>Assessment framework.....</b>	<b>14</b>
<b>4</b>	<b>Issues for consideration .....</b>	<b>15</b>
4.1	Overall scope of reviewable operating incidents.....	15
4.2	Minor amendments.....	18
4.3	Other issues.....	19
	<b>Abbreviations.....</b>	<b>20</b>
<b>A</b>	<b>Glossary .....</b>	<b>21</b>
<b>B</b>	<b>Low voltage transmission incidents - 2010/11 .....</b>	<b>24</b>

# 1 Introduction

In 2006, the Reliability Panel (Panel) published the 'guidelines for identifying reviewable operating incidents' (the guidelines). The guidelines are used by the Australian Energy Market Operator (AEMO) in deciding which power system 'operating incidents' to review and report on. The Panel is carrying out this review of the guidelines to determine whether amendments or updates are required. Publication of this issues paper is the first step in the Panel's review process. The purpose of this paper is to facilitate consultation and seek views on relevant issues.

## 1.1 Reviewable operating incidents

Under the National Electricity Rules (rules), AEMO is required to conduct a review, and publish a report on each review, of every 'reviewable operating incident'.<sup>1</sup> The rules also set out the criteria to determine which operating incidents of the power system must be reviewed.<sup>2</sup> Reviewable operating incidents are generally incidents that occur in the power system that could have a significant effect on the operation of the power system in terms of system security.

Reviewable operating incidents include non-credible contingency events or multiple contingency events.<sup>3</sup> These types of power system events may involve significant deviations from the normal operating conditions of the national electricity market (NEM). When these events occur, AEMO conducts an investigation to determine the cause of the incident and assess the adequacy of the response.

## 1.2 Objective of reviewing operating incidents

The objective of requiring AEMO to conduct incident reviews is not explicit in the rules; however it is somewhat implicit that the focus is system security, given that the operating incident review provisions are contained in chapter four of the rules – the power system security chapter. As such, the Panel concludes the overarching objective of reviewing incidents relates to promoting the secure operation of the power system.

The information gained from undertaking these reviews can also lead to improvements in the reliability of the power system infrastructure, but promoting the security of the power system is considered the primary objective. The Panel welcomes any comments on the objective of reviewing operating incidents.

To help achieve this objective, AEMO's review of each incident considers:

- the nature of the incident;
- the adequacy of the provision and response of facilities or services; and

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1 Clauses 4.8.15(b) and 4.8.15(c) of the rules.

2 Clause 4.8.15(a) of the rules.

3 The definitions of non-credible and credible contingency events are discussed in Chapter 2.

- whether the actions taken to restore or maintain power system security were appropriate.

Incident investigations can identify corrective action that can be taken to help minimise the likelihood of similar incidents reoccurring. This can include modifying equipment or operating procedures directly associated with the incident. Reviewing incidents also involves information sharing with market participants through the incident reports AEMO publishes, which may promote awareness of potential operating issues across the NEM and facilitate risk mitigation.

### **1.3 Purpose of the guidelines**

Undertaking reviews of operating incidents can lead to improvement of the power system, however the reviews also impose costs on market participants. The costs arise from the requirement for participants to take part in reviews and also through AEMO's costs in conducting these reviews. For this reason, an appropriate balance is required between investigating incidents to ensure that the power system is operating in a secure way and minimising the overall costs to the market.

The purpose of the guidelines is to provide additional clarity and certainty on the review requirement, which goes towards ensuring that AEMO does not unnecessarily undertake investigations.

### **1.4 Review of the guidelines**

The Panel established the guidelines in 2006.<sup>4</sup> As there are no specific requirements under the rules for these guidelines to be reviewed, they have not been reviewed and remain unchanged since their establishment.

In February 2012, the Panel received a letter from AEMO proposing that changes be made to the guidelines.<sup>5</sup> Given that AEMO's proposals were justified for further consideration, and that other minor updates to the guidelines appeared necessary, the Australian Energy Market Commission (AEMC or Commission) provided terms of reference for the Panel to undertake a review of the guidelines.<sup>6</sup> The Panel is conducting this review in accordance with the AEMC terms of reference.<sup>7</sup>

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<sup>4</sup> The requirement for the Panel to establish the guidelines was introduced to the rules in 2006 as a part of the 'timely information to NEMMCO after operating incidents' Rule change. See AEMC, National Electricity Amendment (Timely information to NEMMCO after operating incidents), February 2006.

<sup>5</sup> AEMO's proposed changes are set out in its letter to the Panel and discussed in Chapter 3. The letter is published on the AEMC Reliability Panel website.

<sup>6</sup> The terms of reference for this review are published on the AEMC Reliability Panel website. Changes proposed by AEMO are discussed in Chapter 3.

<sup>7</sup> The terms of reference include the requirement to carry out this review in accordance with the provisions under clause 8.8.3 of the rules, which include the requirement to undertake consultation.

## 1.5 Timetable for review and consultation process

An indicative timetable for the review is set out below. As part of this review process, the Panel will engage with stakeholders by seeking submissions on the issues paper and draft report as well as through a public meeting.

### Indicative timetable

Milestone	Date
Publish issues paper	8 May 2012
Close of submissions on issues paper	6 June 2012
Publish draft report	17 July 2012
Close of submissions on draft report	15 August 2012
Public meeting	21 August 2012
Publish final report	1 October 2012

## 1.6 Submissions on the issues paper

The Panel invites comments from interested parties on this issues paper by 6 June 2012. All submissions will be published on the AEMC Reliability Panel website.

Electronic submissions must be lodged online through the AEMC website [www.aemc.gov.au](http://www.aemc.gov.au) using the "lodge a submission" function and reference code "REL0048". The submission must be on letterhead (if submitted on behalf of an organisation), signed and dated.

Upon receipt of the electronic submission, the AEMC website will issue a confirmation email. If this confirmation email is not received within three business days, it is the submitter's responsibility to ensure the submission has been delivered successfully.

Or, if choosing to make submissions by mail, the submission must be on letterhead (if submitted on behalf of an organisation), signed and dated. The submission may be posted to:

The Reliability Panel  
Australian Energy Market Commission  
PO Box A2449  
SYDNEY SOUTH NSW 1235

## 1.7 Structure of the paper

The remainder of this paper is structured as follows:

- **Chapter 2 - Current provisions for power system security reviews:** sets out the details of the current arrangements in the NEM for reviewing and reporting on incidents relevant to power system security;
- **Chapter 3 - Assessment framework:** sets out how the Panel plans to assess any potential amendments to the guidelines;
- **Chapter 4 - Issues for consideration:** sets out specific issues for consultation including the issues raised by AEMO; and
- **Glossary** - sets out explanations of select terms to provide background and context to this issues paper.
- **Appendix B** - sets out a summary of the reviewable operating incidents in 2010-11 that only impacted low voltage transmission infrastructure, which is of relevance to issues discussed in chapter 4 of this paper.

## 2 Current provisions for power system security reviews

When an operating incident occurs in the NEM that could impact the security of the power system, various NEM parties can be involved in investigating the incident's cause, reviewing operating procedures and reporting on the findings. This chapter outlines the various system security reporting undertaken by different parties in the NEM. It then focusses on one particular type of incident reporting that is the focus of the Panel's review – AEMO's operating incident reviews.

### 2.1 Current reporting on system security issues

Reporting on operating incidents in the NEM is primarily undertaken by AEMO. Transmission Network Service Providers (TNSPs) and the Panel also report on some issues of system security, but AEMO prepares the majority of public reports. An overview of reporting by AEMO, TNSPs and the Panel is provided below.

#### AEMO

Under the rules, AEMO is responsible for ensuring that the NEM power system is operated in a safe, secure and reliable manner. The rules establish processes to enable AEMO to plan and conduct operations within the power system to achieve and maintain power system security.

Part of this work involves AEMO publicly publishing information to inform market participants of incidents relevant to system security. This includes reports that are prepared by AEMO on reviewable operating incidents. The Panel's review of the guidelines for reviewable operating incidents relates specifically to these reports. Further discussion of these operating incident reviews and reports is contained in section 2.2.

AEMO also publishes statistics on trends in operating incidents over multiple years.<sup>8</sup> This includes trends in the performance of power system equipment, secondary equipment and operating staff. The statistics are drawn directly from the findings of AEMO's operating incident reviews. AEMO is not required to produce these reports under its statutory obligations.

Monthly reports on frequency and time deviation are also prepared by AEMO, which is required under clause 4.18.15 of the rules.<sup>9</sup> These reports involve AEMO identifying power system events where the relevant frequency operating standards are not met.

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<sup>8</sup> AEMO's statistics of reviewable operating incidents: reporting period - January 2007 to end June 2011, available at: [http://www.aemo.com.au/reports/incident\\_reports.html](http://www.aemo.com.au/reports/incident_reports.html).

<sup>9</sup> Further information is available on AEMO's website at: [http://www.aemo.com.au/reports/performance\\_monitoring.html](http://www.aemo.com.au/reports/performance_monitoring.html).

The reports do not, however, contain detailed analysis of the incident that caused the frequency deviation.<sup>10</sup>

AEMO also prepares power system operations event reports to provide an overview of an event that has significantly impacted the secure operation of the NEM.<sup>11</sup>

Operations event reports are not required under the rules. These reports are less frequent than AEMO's operating incident reports as they are only prepared for events that materially impact the NEM.<sup>12</sup>

Event reports are published within one week of a significant event and, therefore, only contain a summary of the impacts, the chronology of events and the constraints invoked, as well as some preliminary information on the possible cause of the event and its impact. They do not contain detailed analysis of the incident and its cause. Detailed analysis of the incident for these events is contained in a separate operating incident report - this operating incident reporting is the focus of the Panel's review. A short report of the operating incident is also included in AEMO's operational irregularities reports on the day following a power system incident. The operational irregularities reports are issued by AEMO to market participants in accordance with clause 3.13.4(w) of the rules.<sup>13</sup>

### **Transmission Network Service Providers**

In addition to AEMO's reviews and reporting, TNSPs will undertake their own reviews of certain operating incidents. The nature of the investigations and the subsequent reporting can vary depending on TNSP business practices, jurisdictional requirements and the terms set out in connection agreements for particular TNSPs.

The Panel understands that some TNSPs conduct their own investigations of network incidents where they suspect there are systemic issues or if the incident has had material consequences (e.g. significant load shedding). The primary purpose of these investigations is to assist TNSPs to determine whether there is a need to change practices to improve the delivery of the functions for which TNSPs are responsible. In any event there are usually exchanges of relevant information between TNSPs and AEMO to assist both parties to meet their respective responsibilities in these matters.

TNSP investigations do not, however, generally result in the public release of information. In some cases, the TNSP may report directly to affected customers or to

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<sup>10</sup> However, we note that incidents where the frequency is outside the operational frequency tolerance band would be 'reviewable operating incidents' and reported on under clause 4.8.15 of the rules. This requirement is further discussed in section 2.2.

<sup>11</sup> Power system operating event reports are published on AEMO's website at: [http://www.aemo.com.au/reports/nemreports.html#pso\\_events](http://www.aemo.com.au/reports/nemreports.html#pso_events).

<sup>12</sup> For example, at the time of this issues paper publication there was only one event report available on AEMO's website - the 2 July 2009 event report on the multiple generator disconnection and under frequency load shedding.

<sup>13</sup> AEMO has advised that it will be consulting with Participants in the near future on the need to continue to issue this report, noting that all information contained in the report is also provided through Market Notices.

AEMO, but broader information sharing may be relatively limited where information is of a commercial-in-confidence nature.<sup>14</sup>

## **Reliability Panel**

The Panel also reports on incidents impacting system security as part of its annual market performance review. It is a requirement under the rules for the Panel to conduct an annual review of the performance of the market.<sup>15</sup> The Panel draws on AEMO's reporting of operating incidents and reviews the incidents against the system operating incidents guidelines and relevant frequency standards (where applicable). The discussion of operating incidents in the annual market performance reviews focusses primarily on major incidents that occurred during the year of reporting.<sup>16</sup>

## **2.2 Operating incident reviews**

Of the full suite of system security reporting, AEMO's operating incident reviews contain the most analytical detail on an incident's cause and impact. As noted earlier, it is this type of system security reporting that is the focus of the Panel's review. This section describes AEMO's incident review process and the Panel's guidelines for reviewable operating incidents.

### **2.2.1 Process for investigations and reporting**

Reviewable operating incidents are identified using a set of criteria under the rules, which are further clarified in the Panel's guidelines. The criteria focus on the likelihood and the impact of the incident. Where AEMO determines that an incident meets the criteria, it initiates an operational incident review. The Panel understands the general review process operates as illustrated in Figure 2.2.1.<sup>17</sup>

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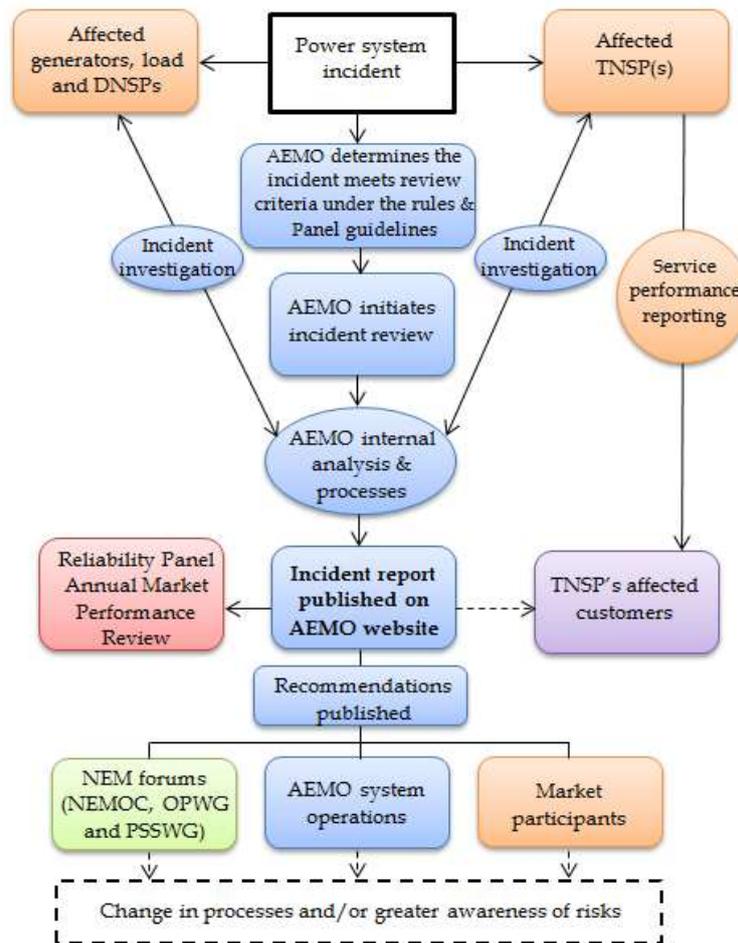
<sup>14</sup> TNSPs are commercial entities, whereas AEMO has a non-commercial limited liability structure. The Panel understands that AEMO's non-commercial limited liability structure can enable it to more openly provide information to the public; while recognising that commercial-in-confidence provisions also apply to AEMO.

<sup>15</sup> The Panel's annual market performance review is conducted under clause 8.8.3(b) of the rules.

<sup>16</sup> For an example of this reporting, see the 2011 annual market performance review, available at: <http://www.aemc.gov.au/Market-Reviews/Completed/annual-market-performance-review-2011.html>.

<sup>17</sup> The Panel confirmed its understanding of the process through preliminary discussions with AEMO and TransGrid. We note this is not an exhaustive representation of all interactions and steps for reviewable operating incidents - we have attempted to reflect the key elements of the process. Stakeholder comments are welcome on whether the process is accurately represented in this paper and whether any key steps have been overlooked.

**Figure 2.2.1 Incident review process**



Following a power system incident, AEMO assesses the incident against requirements in the rules and the Panel's guidelines on reviewable operating incidents to determine whether an incident review should be undertaken.

The Panel understands that once a review has been initiated, AEMO liaises directly with each of the affected market participants to investigate an incident's cause, impacts and the appropriate follow up actions. Once AEMO has collected and assessed relevant information on the incident, it creates an incident report that is published on the AEMO website.

TNSPs also report to their customers that have been affected by the incident under a process separate to AEMO's review.

The Panel considers that while anyone in the general public is able to access the operating incident reports, AEMO, network service providers and generators are likely to have the most interest. These parties are able to consider the findings and recommendations in the report to develop risk mitigation strategies or system improvements.

Incident reports are also discussed at a number of forums including the National Electricity Market Operations Committee (NEMOC),<sup>18</sup> the Operations Planning Working Group (OPWG)<sup>19</sup> and Power System Security Working Group (PSSWG)<sup>20</sup>.

Depending on the nature of the incident, the review process can result in a series of recommendations for market participants. These may include (but are not limited to) recommendations for TNSPs or generators to continue investigations to determine whether there are systemic risks, recommendations for market participants to investigate options for risk mitigation and recommendations that AEMO conduct broader investigations to determine if there are similar risks in other areas of the NEM. 124 recommendations have been made since July 2009, of which 84 are reported to have been completed to date.<sup>21</sup>

## 2.2.2 The objective of the Panel's guidelines

The guidelines are set out to reflect the criteria under the rules for explaining the meaning of 'reviewable operating incidents'.<sup>22</sup> The guidelines provide additional clarification on how the provisions under the rules should be interpreted and provide other specific clarifications and details. Each aspect of the current guidelines is discussed in this chapter. (Italicised terms are defined under the rules and selected terms are outlined in the glossary in this paper.)

## 2.2.3 Guidelines for provisions under the rules

Under clause 4.8.15(b) of the rules, AEMO must conduct a review of a reviewable operating incident described in clause 4.8.15(a)(1) or (3). Clauses 4.8.15(a)(1) and (3) state that a reviewable operating incident means:

"(1) an incident comprising:

- (i) *a non-credible contingency event or multiple contingency events on the transmission system; or*

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<sup>18</sup> This committee consists of TNSP, jurisdictional planning bodies and AEMO representatives. The committee discusses electricity network operation issues and facilitates the operational interface between AEMO and TNSPs.

<sup>19</sup> The working group reports to the NEMOC and is comprised of members from each of the TNSPs and AEMO staff. It is a technical working group that considers operations planning issues under the control or influence of AEMO and/or the TNSPs with a view to improving the management of power system security and NEM efficiency.

<sup>20</sup> This working group consists of operations representatives from TNSPs and AEMO. It aims to achieve consensus solutions to electricity system security issues at an operational level.

<sup>21</sup> On 4 May 2012, AEMO published a report listing all recommendations for reviewable operating incidents (between July 2009 and December 2011) with advice on the progress of each recommendation's implementation. The list of recommendations will be updated on a quarterly basis and is available at:  
<http://www.aemo.com.au/en/Electricity/Market-and-Power-Systems/NEM-Reports/Recommendations-arising-from-Power-System-Operating-Incident-Reports>.

<sup>22</sup> Clause 4.8.15(a) of the rules.

- (ii) a *black system* condition; or
- (iii) an event where the *frequency* of the *power system* is outside limits specified in the *power system security and reliability standards*; or
- (iv) an event where the *power system* is not in a *secure operating state* for more than 30 minutes; or
- (v) an event where *AEMO* issues a *clause 4.8.9 instruction for load shedding*,<sup>23</sup>

being an incident identified, in accordance with guidelines determined by the *Reliability Panel* under rule 8.8, to be of significance to the operation of the *power system* or a significant deviation from normal operating conditions; or

...

(3) any other operating incident identified, in accordance with guidelines determined by the *Reliability Panel* under rule 8.8, to be of significance to the operation of the *power system* or a significant deviation from normal operating conditions;

but does not include an incident in respect of which *AEMO* is required to conduct a review under clause 3.14.3(c)."<sup>24</sup>

Each component of these clauses and how the guidelines consider the provisions are discussed in detail as follows.

#### **2.2.4 Non-credible contingency or multiple contingency events**

Clause 4.8.15(a)(1)(i) of the rules states that reviewable operating incidents include 'a *non-credible contingency event* or *multiple contingency events* on the *transmission system*'.

As a non-credible contingency event is defined under the rules, the guidelines state that the rules definition applies and no other specific guidance is given for interpreting 'non-credible contingency events'.

However, as the term 'multiple contingency events' is not specifically defined under the rules, the guidelines provide guidance by defining that a multiple contingency event is reviewable when:

- the events, including any inappropriate automatic or manual operation of a transmission element, occur within 30 minutes of each other; and
- the residual impact of an earlier contingency interacts with a later contingency.

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<sup>23</sup> Clause 4.8.9 of the rules sets out the powers of *AEMO* to issue directions and instructions to registered participants.

<sup>24</sup> Clause 3.14.3(c) of the rules is about *AEMO* conducting a review in the event that there is a suspension of the spot market.

### 2.2.5 Black system conditions

Clause 4.8.15(a)(1)(ii) of the rules states that reviewable operating incidents include 'a *black system condition*'.

As 'black system' is defined under the rules, the guidelines state that the rules definition should apply. A black system is defined as '[t]he absence of *voltage* on all or a significant part of the *transmission system* or within a *region* during a *major supply disruption* affecting a significant number of *customers*'.

However, the rules do not define what would be considered 'a significant part of the transmission system'. For this reason, the guidelines clarify what constitutes a 'significant' part of the transmission system taking into account the interpretation used by AEMO (NEMMCO at the time) in its operating procedures at the time the guidelines were first established.<sup>25</sup>

Currently the guidelines provide that 'a significant part of a transmission system' is considered to be at least 60 per cent of the predicted regional load with the exception of:

- regions with a minimal load (for example the Snowy region);<sup>26</sup> and
- the Queensland region, where the loss of 60 per cent of the load (excluding the pot line loads) in any of the Northern Queensland, Central Queensland or Southern Queensland areas is also considered to be a major supply disruption.

### 2.2.6 Operational frequency tolerance band

Clause 4.8.15(a)(1)(iii) of the rules states that reviewable operating incidents include an event where the frequency of the power system is outside limits specified in the *power system security* and *reliability standards*.

The Panel interprets this provision to refer to the frequency limits as specified in the frequency operating standards that are set by the Panel. The frequency operating standards specify a number of frequency bands including a '*normal operating frequency band*', a '*normal operating frequency excursion band*', an '*operational frequency tolerance band*' and an '*extreme frequency excursion tolerance limit*'.<sup>27</sup>

In preparing the current guidelines the Panel noted that AEMO prepares a monthly report on the performance of the power system against the frequency standards. This report identifies events where the power system frequency deviates from the frequency standards and the circumstances of each event. The Panel considered that this reporting provided a suitable summary of the performance of the power system for

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<sup>25</sup> For example see AEMO's Power System Security Guidelines (SO\_OP3715) available at <http://www.aemo.com.au/electricityops/3715.html>.

<sup>26</sup> The Snowy region was abolished in June 2008, after the guidelines were first established.

<sup>27</sup> An explanation of each of these defined terms is provided in the glossary.

small deviations in power system frequency. Hence, events where there are small deviations would not need additional reporting. The Panel considered that only larger deviations should be treated as reviewable operating incidents. For this reason, only incidents where the frequency is outside the operational frequency tolerance band are defined as reviewable operating incidents under the guidelines.

### **2.2.7 Secure operating state**

Clause 4.8.15(a)(iv) of the rules states that reviewable operating incidents include an event where the power system is not in a *secure operating state* for more than 30 minutes.<sup>28</sup>

As the rules provide a clear definition for 'secure operating state' the Panel did not consider further clarification was necessary in the guidelines for this provision.

### **2.2.8 Load shedding**

Clause 4.8.15(a)(v) of the rules states that reviewable operating incidents include an event where AEMO issues a *clause 4.8.9 instruction for load shedding*.

The guidelines define all incidents where there is load shedding due to a clause 4.8.9 instruction as a reviewable operating incident because load shedding could have a material impact on participants and the power system. The Panel did not consider that additional clarification on this requirement was necessary. However the Panel did consider that automatic under frequency load shedding should also be investigated.<sup>29</sup> The requirement relating to under frequency load shedding is included in the guidelines as one of the 'other operating incidents' (see section 2.7 below).

### **2.2.9 Other operating incidents**

Clause 4.8.15(a)(3) of the rules provides that the Panel may identify other operating incidents that should be reviewable operating incidents.

In preparing the current guidelines, the Panel noted that under the rules AEMO is required to operate the power system in a 'secure operating state'. As such, an investigation should be undertaken for any incidents where the power system is not in a satisfactory operating state for more than five minutes. A specific limit of five minutes prevents unnecessary investigations being undertaken for transient issues in the power system.

The Panel also took into account that AEMO operates a number of systems or analysis tools to monitor the stability of the power system. Systems are used to test the transient

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<sup>28</sup> Secure operating state is defined under the rules with reference to specific provisions as set out under clause 4.2.4 of the rules. This includes references to the power system security principles as described in clause 4.2.6 of the rules. Additional information is provided in the glossary.

<sup>29</sup> The concept of 'under frequency load shedding' is explained in the glossary.

stability and to monitor the damping of the power system.<sup>30</sup> The Panel considered that where these analysis tools identify any abnormalities that persist for more than 30 minutes, these incidents should also be investigated.

As noted above, any incident that results in load shedding can have a material affect on participants and the power system. As such, the guidelines require the investigation of any incident that involved any under frequency load shedding.

The guidelines also clarify that incidents on the distribution network that affect the security of the transmission network should be considered a reviewable operating incident.

The Panel also noted that it is not possible to identify in advance all potential system incidents that may require investigation. For this reason, the guidelines provide for the Panel to request AEMO to review and report on incidents on an ad hoc basis. However, the Panel notes that a request under this provision has not been made to date.

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<sup>30</sup> The concepts of 'transient stability' and 'damping' are explained in the glossary.

### 3 Assessment framework

This section outlines the proposed assessment framework the Panel will use in this review process to determine whether amendments should be made to the guidelines.

The Panel will consider the overarching objective of the operating incident reviews to promote the secure operation of the power system. This will include considering the benefits of reviews, such as identifying necessary process and equipment modifications and enabling information sharing on potential system security risks. The consideration of the benefits will be weighed against the potential costs of undertaking such reviews.

The Panel will also consider the National Electricity Objective (NEO) when assessing the need for changes to the current guidelines. The NEO is set out in section 7 of the National Electricity Law (NEL) as follows:

“The objective of this Law is to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to:

- (a) price, quality, safety, reliability and security of supply of electricity;  
and
- (b) the reliability, safety and security of the national electricity system.”

Within this framework, the Panel will consider the following specific issues:

- whether the guidelines act to promote the secure operation of the NEM power system;
- whether the potential benefits of any amendments to the guidelines are likely to outweigh the costs;
- which party can most efficiently carry out the review of, and reporting on, different types of operating incidents; and
- which party can most efficiently coordinate the investigation of operating incidents that involve multiple agents.

The Panel welcomes any comments on the proposed assessment framework.

## 4 Issues for consideration

This chapter outlines a number of specific issues for consideration including the amendments proposed by AEMO. Stakeholders are requested to consider and respond to these issues. Stakeholders are also invited to raise any other relevant matters.

### 4.1 Overall scope of reviewable operating incidents

AEMO proposes a number of amendments as it has set out in a marked-up version of the current guidelines, which is published on the AEMC Reliability Panel website with this paper. AEMO's key proposed amendment is to introduce a new overarching provision to limit the scope of reviewable operating incidents to be incidents that:<sup>31</sup>

- affect one or more of transmission elements with a nominal voltage of 220 kilovolts (kV) or above; or
- resulted in a threat to the power system security of the higher voltage transmission network (that is elements of the network with nominal voltage of 220kV or above).

AEMO's proposal is based on its consideration that incidents for transmission subsystems with voltage levels below 220 kV, while important at the local level, do not normally threaten the security of the main transmission network.<sup>32</sup> In addition, AEMO notes that incidents involving transmission elements with voltages below 220 kV are addressed by the transmission network service provider under connection agreements.

As such, AEMO considers the current reporting arrangements to be a duplication of effort between AEMO and TNSPs. AEMO considers that its proposal would improve the overall efficiency of conducting investigations without reducing the effectiveness of the review process.<sup>33</sup> This recognises that, under AEMO's proposed amendments, AEMO would continue to report on incidents involving transmission elements below 220 kV if the incident threatened the power system security of the higher voltage transmission network.

AEMO's operating incident reports are the only reports the Panel is aware of that are publicly available and provide detailed analysis of reviewable operating incidents. The Panel's review of the guidelines therefore needs to consider whether there is value in continued reporting on low voltage incidents where there is no impact on higher voltage (> 220 kV) transmission networks.

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31 AEMO, proposed amendments to the guidelines, p. 1.

32 Letter from Mr Matt Zema to Mr Neville Henderson, 31 January 2012.

33 *ibid*

Questions	Scope of reviewable operating incidents
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|----|---|
| 1. | <b>Is there a need in the market for information on operating incidents that only involve transmission elements with a nominal voltage below 220kV? If so, what are the purpose and benefits?</b> |
| 2. | <b>Is information on low voltage incidents currently available anywhere other than in AEMO operating incident reports?</b>  |

The Panel considers that AEMO's proposed amendments raise two key issues in terms of the scope of reviewable operating incidents:

- Whether there are benefits in continued reporting on sub-set of low voltage incidents - for example, low voltage incidents where there is interruption to generation and/or load.
- Whether there is a way to improve the efficiency of the operating incident reporting process to reduce any material costs.

To address the first point, this review must determine the costs and benefits of existing reporting on low voltage incidents and whether there are likely to be any impacts if these incidents are removed from the scope of future reviews.

The Panel has performed some preliminary analysis on 2010-11 financial year operating incident reports to determine what kind of low voltage incidents could be excluded from future reviews, were AEMO's amendments to be adopted. In the 2010-11 financial year, around 17 of a total of 36 incidents appear to have involved only transmission elements below 220 kV.

Of the 17 low voltage incidents, 16 would likely be excluded from AEMO operating incident reports if AEMO's proposed amendments had been in place at the time. This represents a reduction of around 44 per cent of the total number of operating incident reports prepared by AEMO in 2010-11. A table summarising the 16 incidents that would be excluded from 2010-11 reporting is at Appendix B.

Of the 16 incidents that would be excluded from reviews, eight involved disruption to load and/or generation. The largest level of load interrupted was 300 megawatts (MW) of potline load at an aluminium smelter from the tripping of four 132 kV transmission lines. It should be noted that any frequency issues arising from this kind of event would still be covered by the monthly frequency reports.<sup>34</sup>

The Panel considers there may be value in reviewing incidents where a significant level of load or generation is interrupted and is interested in stakeholder views on this issue.

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<sup>34</sup> As noted in section 2.1 of this paper, these reports involve AEMO identifying power system events where the relevant frequency operating standards are not met. The reports do not, however, contain detailed analysis of the incident that caused the frequency deviation.

**Questions      Low voltage incidents interrupting load or generation**

- 1.      Should AEMO be required to review and report on incidents where there is load or generation interruption, regardless of the nominal voltage of the transmission infrastructure affected?**
- 2.      If so, should there be a reporting threshold for the level of load or generation interrupted and what factors would need to be considered in setting the threshold?**

To address the second issue raised by AEMO's proposal (i.e. the efficiency of the current process), we need to establish whether the costs of the existing review requirements could be reduced. This includes determining the costs of the existing arrangements and, in addition, whether there is duplication of effort between AEMO and TNSP reporting.

AEMO has advised the Panel that incident reviews currently involve around one and a half full time employees throughout the year. AEMO notes, however, that the workload tends to fluctuate. At peak times, around 18 to 20 system incident investigations can be active, which can involve up to approximately 14 employees. AEMO has provided initial advice that the number of incidents reviewed would approximately halve under their proposed amendments.

On the issue of duplication of effort, the Panel has received some preliminary advice on the type of incident reviews undertaken by TNSPs. The advice suggests that TNSP-led incident reviews may have a different focus to those undertaken by AEMO because their functions and responsibilities are different. The nature of TNSP incident reviews may also vary between jurisdictions and TNSPs.<sup>35</sup>

In addition to the different review approaches for AEMO and TNSPs, the Panel notes that the level of public reporting also varies.<sup>36</sup> As such, AEMO may currently be the only source of public information on low voltage incidents. This suggests that, if there is duplication of effort, it could potentially be marginal and necessary duplication. The Panel welcomes stakeholder views on this point.<sup>37</sup>

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<sup>35</sup> The Panel sought some preliminary advice from TransGrid and AEMO's Victorian TNSP area to better inform our understanding of this process. Formal stakeholder consultation commences with the publication of this issues paper and the Panel welcomes other TNSP views on any information in the paper.

<sup>36</sup> As noted in section 2.1, there may be necessary differences in the degree of public reporting due to the different liabilities of AEMO and TNSPs.

<sup>37</sup> The Panel sought some preliminary advice from TransGrid and AEMO to better inform our understanding of this process. Formal stakeholder consultation commences with the publication of this issues paper and the Panel welcomes other TNSP views on any information in the paper.

<b>Questions</b>	<b>Efficiency of operating incident reporting</b>
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- |           |   |
|-----------|---|
| <b>1.</b> | <b>What are the costs and benefits of the existing arrangements for AEMO's operating incident investigations and reports?</b> |
| <b>2.</b> | <b>Is there currently a duplication of effort between AEMO and TNSPs reporting on low voltage incidents?</b>                  |
| <b>3.</b> | <b>What kind of reports do TNSPs provide to market participants on low voltage incidents?</b>                                 |

#### **4.2 Minor amendments**

A number of other minor amendments have also been proposed by AEMO and identified by the Panel in its preliminary assessment. These proposed minor amendments are discussed below.

- AEMO proposes to update 'NEMMCO' references to 'AEMO';
- AEMO proposes to remove the reference to the 'Snowy region' in the clarification of black system conditions. However, the Panel proposes to take the further step to also remove the reference to 'regions with minimal load' altogether given that the NEM regions now do not have any that can be considered as having 'minimal load';
- The Panel proposes that the reference to the operational frequency tolerance band should be clarified to specify that the values under the relevant 'frequency operating standards' apply. The reference to the exact figures of the operational frequency tolerance band can therefore be deleted as the reference to the 'operational frequency tolerance band' itself is sufficient clarification and the exact values are set out in the frequency standards. In addition, should there be future changes to the operational frequency tolerance band, this would automatically be captured in the guidelines.

<b>Questions</b>	<b>Minor amendments</b>
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- |           |   |
|-----------|---|
| <b>1.</b> | <b>Are there any objections to the Panel adopting these minor amendments?</b> |
| <b>2.</b> | <b>Are other minor amendments to the guidelines required?</b>                 |

### **4.3 Other issues**

The Panel also welcomes any comments on other relevant issues.

<b>Question</b>	<b>Other issues</b>
<b>Are there other issues that should be considered as part of this review?</b>	

## Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
Commission	See AEMC
DNSP	Distribution Network Service Provider
kV	kilovolts
MW	megawatts
NEL	National Electricity Law
NEM	national electricity market
NEO	National Electricity Objective
Panel	Reliability Panel
rules	National Electricity Rules
TNSP	Transmission Network Service Provider

## A Glossary

This glossary outlines explanations of select terms to provide background and context to this issues paper. Where terms are defined under the rules, please refer to Chapter 10 of the rules for the precise wording of the rule definitions.

Term	Definition / Explanation
black system	black system is defined under the rules as the absence of voltage on all or a significant part of the transmission system or within a region during a major supply disruption affecting a significant number of customers
clause 4.8.9 instruction	under the rules AEMO has powers to issue directions and instructions to registered participants. A 'clause 4.8.9 instruction' refers to an instruction by AEMO, or a person authorised by AEMO, to a registered participant under clause 4.8.9(a1)(2) of the rules to take any action in accordance with the provisions under the rules or the National Electricity Law
contingency event	a contingency event is defined under the rules as an event affecting the power system which AEMO expects would be likely to involve the failure or removal from operational service of one or more generating units and/or transmission elements (see clause 4.2.3(a) of the rules)
credible contingency event	a credible contingency event is defined under the rules as a contingency event that AEMO considers to be reasonably possible in the surrounding circumstances (see clause 4.2.3(b) of the rules)
damping	power system damping is defined under the rules as the rate at which disturbances to the satisfactory operating state reduce in magnitude
extreme frequency excursion tolerance limit	see frequency operating bands
frequency operating bands	there are four frequency operating bands as defined under the frequency operating standards. The concepts, and the actual values, of the bands are outlined in the standards. The concepts are briefly summarised below (refer to the standards for the full explanations and context):
	- normal operating frequency band: subject to impacts of events on the power system, generally the frequency should not exceed the normal operating frequency band for more than five minutes on any occasion
	- normal operating frequency excursion band: this is the band that the frequency of the power system

Term	Definition / Explanation
	<p>should not exceed (except as a result of a contingency event or a load event)</p> <p>- operational frequency tolerance band: this is the band that should not be exceeded following a network event. The timeframe to recover the system varies for the type of event.</p> <p>- extreme frequency excursion tolerance limit: in one example this is the band that should not be exceeded for more than two minutes as a result of any multiple contingency events</p>
frequency operating standards	the frequency operating standards set out the standards of the frequency of the power system in operation. The standards are determined by the Reliability Panel in accordance with provisions under the rules. Separate standards apply for the 'mainland NEM' and for Tasmania
load shedding	load shedding is defined under the rules as reducing or disconnecting load from the power system
major supply disruption	major supply disruption is defined under the rules as the unplanned absence of voltage on a part of the transmission system affecting one or more power stations
non-credible contingency event	a non-credible contingency event is defined under the rules as a contingency event other than a credible contingency event (see clause 4.2.3(e) of the rules)
normal operating frequency band	see frequency operating bands
normal operating frequency excursion band	see frequency operating bands
operational frequency tolerance band	see frequency operating bands
power system security and reliability standards	these are the standards (other than the system restart standard) governing power system security and reliability of the power system. These standards are approved by the Reliability Panel on the advice of AEMO
satisfactory operating state	satisfactory operating state is defined under the rules with reference to the criteria set out under clause 4.2.2. Summarily the NEM is considered to be in a satisfactory operating state when the frequency and voltage are within operating standards, transmission lines and other plant are within operating limits and the power system is safely configured

Term	Definition / Explanation
secure operating state	the power system is considered to be in a secure operating state if the power system is in a satisfactory operating state and, in AEMO's reasonable opinion, the power system will return to a satisfactory operating state following the occurrence of any credible contingency event (see clause 4.2.4)
transient stability	transient stability relates to the ability of the power system to maintain synchronisation between relevant parts of the system following a disturbance and the ability of the power system to then regain a state of equilibrium
under-frequency load shedding	when the frequency of the power system falls, it is possible that load could be shed in order to restore the frequency to required levels

## B Low voltage transmission incidents - 2010/11

As discussed in section 4.1, the table below summarises the details of 16 operating incidents that occurred in the 2010-11 financial year, involving transmission infrastructure only below a nominal voltage of 220 kV.

The table has been prepared to illustrate the type of operating incidents that could be excluded from future reporting, were AEMO's proposed guideline amendments adopted. Information in the table was drawn from AEMO's relevant operating incident reports available on AEMO's website<sup>38</sup>.

### Examples of operating incidents that do not meet AEMO's proposed review guidelines

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted
26 September 2010	Trip of New Osborne busbars	Transmission (transmission lines)	Non-credible	Multiple	66 kV substation (two busbars tripped)  Five 66kV lines  66/11kV transformer	29 MW	116 MW
24 October 2010	Trip of Kurri to Rothbury line and Hydro Aluminium potlines	Transmission (transmission line)	Non-credible	Multiple	Four 132 kV lines	300 MW	-

<sup>38</sup> A copy of each incident report is located at: [http://www.aemo.com.au/reports/incident\\_reports.html](http://www.aemo.com.au/reports/incident_reports.html).

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted
6 December 2010	Trip of double circuit Mackay-Collinsville Tee Proserpine and lines	Transmission (transmission lines)	Non-credible	Multiple	Two 132 kV lines Two 132/66kV transformers	54 MW	-
6 December 2010	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	132 kV line 132 kV busbar	-	-
7 December 2010	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines	-	-
10 January 2011	Trip of Glenn Innes busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 lines Two 132/66kV transformers 66kV feeder	2 MW	-
14 January 2011	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines 132 kV busbar	-	-
3 February 2011	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines 132 kV busbar	-	-

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted
5 February 2011	Trip of Cowra busbar	Transmission (busbar)	Non-credible	Single	132 kV line One 132 kV busbar	50 MW	-
8 February 2011	Trip of Central Queensland Feeders	Transmission (transmission lines)	Non-credible	Multiple	Four 132 kV feeders	-	-
15 February 2011	Trip of Keith – Snuggery line and transformer	Transmission (Transmission lines/transformer)	Non-credible	Multiple	132 kV line 132 kV transformer	-	-
13 March 2011	Trip of Mullumbimby busbar and multiple lines	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 kV lines 132/66 kV transformer	-	-
25 April 2011	Trip of Redbank busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 kV lines	-	71 MW
2 May 2011	Trip of Columboola busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 kV lines	28 MW	-
9 May 2011	Trip of Tully busbar and	Transmission	Non-credible	Multiple	132 kV busbar	-	-

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted
	Tully-Ingham South Tee Cardwell line	(busbar)			Five 132 kV lines  132/22 kV transformer		
8 June 2011	Trip of Kareeya busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar  Five 132 kV lines	-	44 MW