Reliability Panel
AEMC

REVIEW

Reliability Panel AEMC

FINAL REPORT

Review of the guidelines for identifying reviewable operating incidents

20 December 2012

Reference: REL0048
Final report

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About the AEMC

The Council of Australian Governments (COAG), through its then Ministerial Council on Energy (MCE), established the Australian Energy Market Commission (AEMC) in July 2005. In June 2011, COAG established the Standing Council on Energy and Resources (SCER) to replace the MCE. The AEMC has two main functions. We make and amend the national electricity, gas and energy retail rules, and we conduct independent reviews of the energy markets for the SCER.

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.

Foreword

I am pleased to present the Reliability Panel's (Panel's) final report on the review of the guidelines for identifying reviewable operating incidents.

In preparing this final report, the Panel has taken into consideration comments from stakeholders and whether there have been changes to the National Electricity Market or the National Electricity Rules (NER) that may have affected the guidelines.

The Panel has amended its guidelines to improve the efficiency of the current process for the Australian Energy Market Operator (AEMO) and other organisations involved in incident reviews.

The Panel published a draft report with proposed amendments to the guidelines in September 2012. The final amendments to the guidelines differ in two main ways from the draft approach. Firstly, the Panel has modified the first guideline to require AEMO to review non-credible contingency events and multiple contingency events in the transmission system if they impact critical transmission elements. This requires AEMO to review incidents impacting elements that are critical for the supply of electricity in or between regions, regardless of their nominal voltage. Secondly, the Panel has added a new guideline that requires AEMO to review any other incident, including more minor incidents, that are of significance to the operation of the power system.

These amendments have been adopted following consideration of issues raised by stakeholders. We also consider the amendments better reflect the intent of the NER in relation to incident reviews, where incidents are to be reviewed if they are of significance to the operation of the power system or represent a significant deviation from normal operating conditions. The revised guidelines take effect from 1 April 2013 to provide time for AEMO to consult with stakeholders on which transmission elements should be considered critical for power system security.

I would like to thank stakeholders for their valuable contribution to this review process through formal submissions and in discussions with Panel staff.

Neville Henderson
Chairman, AEMC Reliability Panel
Commissioner, AEMC

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1 Introduction

In 2006, the Reliability Panel (Panel) published guidelines for identifying reviewable operating incidents as required by the National Electricity Rules (NER). The guidelines are used by the Australian Energy Market Operator (AEMO) in deciding which operating incidents that occur in the power system are to be investigated and reported on. In response to suggested changes from AEMO, the Panel carried out this review of the guidelines to determine whether amendments or updates are required.

Publication of this final report follows the Panel's publication of an issues paper in May 2012 and a draft report in September 2012. This final report discusses the Panel's consideration of the issues raised by stakeholders and sets out the Panel's rationale for amendments to the guidelines. These amendments involve changes to better reflect the intent of the guidelines under the NER and other minor updates and clarifications. A change-marked copy of the revised guidelines is provided at Attachment A. The final version of the guidelines is available on the AEMC website.[1] The revised guidelines take effect on 1 April 2013.

1.1 Reviewable operating incidents

The NER require AEMO to investigate every 'reviewable operating incident' in the power system and report on its findings.[2] Reviewable operating incidents are generally unusual power system events that impact the normal operation of the National Electricity Market (NEM).

Historically, these incidents have involved a range of event types including busbar trips, loss of transmission elements, loss of generating units, load interruptions or the power system being in an insecure operating state for a prolonged period. The causes of these incidents can include equipment failures, internal plant issues, equipment protection and control issues, operating errors, failure to follow dispatch targets, inadequate procedures, lightning strikes or other environmental issues (eg. bushfires, high winds, extreme temperatures, pollution).

The type and total number of incidents vary significantly from year to year, with busbar trips being the most common event type over the five years up to the end of June 2012.[3] The incidents differ in terms of their market impacts and power system security impacts. The focus of reviewing these incidents is the latter – promoting power system security.

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1 www.aemc.gov.au.

2 Clauses 4.8.15(b) and 4.8.15(c) of the NER require AEMO to conduct reviews and prepare reports. Clause 4.8.15(a) defines 'reviewable operating incident' and sets out that the incident must be identified in accordance with the guidelines determined by the Reliability Panel to be of significance to the operation of the power system or a significant deviation from normal operating conditions.

3 AEMO Statistics of reviewable operating incidents: reporting period - January 2007 to end June 2012, 7 December 2012.

1.2 Identifying incidents that are reviewable

Clause 4.8.15(a) of the NER provides high level criteria for identifying reviewable incidents and the Panel's guidelines provide further detail on the type of incidents to review under these criteria. There are three main parts to the clause that relate to identifying reviewable incidents. Part one of the clause is set out as follows:

> "Reviewable operating incident means:
>
> (1) an incident comprising:
>
> (i) a *non-credible contingency event* or multiple *contingency events* on the *transmission system*; or
>
> (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*,
>
> 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;"

There are two additional parts to clause 4.8.15(a) that describe other incidents that are reviewable by AEMO. Part two requires AEMO to review incidents where AEMO has been responsible for the disconnection of facilities of a registered participant in an emergency.[4] This is the only type of operating incident where AEMO is not required to make its incident report available to the public. The Panel's amendments do not affect this incident type.

Part three enables the Panel to include any other incidents in the guidelines that it considers to be 'of significance to the operation of the power system or a significant deviation from normal operating conditions'. When the Panel's guidelines were developed in 2006, the Panel added the following incidents to the list of reviewable incidents in accordance with this clause:

- the power system is not in a satisfactory operating state for more than 5 minutes[5];

4 The circumstances where this disconnection applies are described in NER clause 5.9.5.

5 Excluding issues resulted to potential oscillatory or transient stability

- on-line oscillatory and transient stability monitoring systems detecting a potential instability for 30 minutes, continuously;
- certain incidents on a distribution network that affect the security of the transmission system[6];
- incidents that result in the operation of under frequency or over-frequency protection and control schemes[7]; and
- incidents that Panel requests AEMO to review.

Parts one and three of clause 4.8.15(a) involve the incident being identified in accordance with the Panel's guidelines as being 'of significance to the operation of the power system or significant deviation from the normal operating conditions'.

In conducting this review, the Panel has determined that a number of incidents in the transmission and distribution network that are reviewable under the guidelines are not 'of significance to the operation of the power system' and do not ' involve significant deviations from the normal operating conditions'. As such, the guidelines have been amended to focus reviews on incidents of significance to the operation of the power system. This is to better reflect the intent of the NER and better promote the objective of incident reviews and the Panel's guidelines. These amendments are discussed in sections 3.2 and 3.3 of this report.

1.3 Objective of reviewing operating incidents

The objective of requiring AEMO to conduct incident reviews is not explicit in the NER. 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 NER – the power system security chapter.

The Panel considers the overarching objective of reviewing operating incidents is to promote the secure operation of the power system.

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;
- whether the actions taken to restore or maintain power system security were appropriate; and
- recommended actions to reduce the likelihood or impact of incident recurrence.

6 Specific examples of incidents in this category are provided in the guidelines.

7 Ibid.

Information is provided to AEMO by transmission network service providers (TNSPs), generators and other relevant parties to inform AEMO's review. The findings of the reviews are published in AEMO's operating incident reports on AEMO's website.

1.4 Purpose of the guidelines

The NER require AEMO to review incidents identified in accordance with the Panel's guidelines.[8]

Undertaking reviews of operating incidents can lead to power system improvements, 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. The guidelines are to identify incidents of significance to the operation of the power system or that represent a significant deviation from normal operating conditions, which goes towards ensuring that AEMO does not unnecessarily undertake investigations. The guidelines also act to promote the objectives of incident reviews by ensuring incidents of potential importance to power system security are within the scope of what is considered 'reviewable' by AEMO.

1.5 Panel's review of the guidelines

There are no specific requirements under the NER for the guidelines to be reviewed and this is the first review since their establishment in 2006.

In January 2012, AEMO sent a letter to the Panel proposing that changes be made to the guidelines.[9] Given that AEMO's proposal raised issues that were justified for further consideration, and 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.[10]

The Panel is conducting this review in accordance with the AEMC terms of reference.

8 Clause 4.8.15(a)(1). The requirement for the Panel to establish the guidelines was introduced to the NER 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; available at www.aemc.gov.au.

9 AEMO's 31 January 2012 letter to the Panel is available on the AEMC's website.

10 The terms of reference for this review are published on the AEMC's website.

1.6 The Panel's decision

The Panel has made a number of amendments to the guidelines and a change-marked version of the guidelines is provided at Appendix A. The Panel's rationale for the amendments is discussed in Chapter 3. The amendments are summarised as follows:

- guideline 1 (transmission events) no longer requires the review of all non-credible contingency events or multiple-contingency events – only events that impact critical transmission elements or impact the transmission system of multiple NEM regions are reviewable under the revised guideline;
- guideline 6(c) (distribution events) clarifies that the security of the transmission system involves the incident impacting critical transmission elements;
- a new guideline 6(f) requires AEMO to review any other events that it considers of significance to the operation of the power system - examples of such incidents are provided in the guidelines, where AEMO should consider reviewing recurring minor incidents if there may be underlying system issues or incidents involving material loss of load or generation;
- the reference to 'regions with minimal load' has been deleted from guideline 2 to reflect that such regions no longer exist in the NEM;
- the exact values for the operational frequency tolerance band are no longer specified in the guidelines to ensure that changes in value are automatically captured in the guidelines – the guidelines now state 'as set out in the Reliability Panel's frequency operating standards';
- references to 'NEMMCO' have been updated to 'AEMO'; and
- the guidelines have been reformatted to make them easier to use by including the details of each NER clause the guidelines relate to, italicising terms that are defined in the NER and other minor formatting changes.

The key change from the amendments proposed in the draft report is the introduction of the term 'critical transmission elements' and the addition of guideline 6(f). These modifications are to capture incidents involving transmission elements below 220 kV that have system security implications and to capture any other incidents of significance to the operation of the power system, respectively.

To support the implementation of the amended guidelines and to address other issues raised by stakeholders, the Panel also recommends:

- AEMO consult with stakeholders on its list of critical transmission elements and publish the list on AEMO's website (section 3.2 refers);
- AEMO consider scaling the reporting of less significant incidents and AEMO consult with stakeholders on any material changes to its reporting approach (section 3.4 refers); and

- AEMO consider any cost-effective options to enable stakeholders to easily locate market notices on non-credible contingencies (section 3.2 refers).

1.7 Effective date of the revised guidelines

The Panel has consulted AEMO on the implementation of the revised guidelines and has agreed that the guidelines will take effect from 1 April 2013. That is, the revised guidelines will apply to operating incidents that occur from 1 April 2013 onwards. Any ongoing investigations and reporting for incidents that occurred before 1 April 2013 will need to be completed by AEMO in accordance with the previous guidelines.

The Panel has recommended in this final report that AEMO consult with stakeholders on which transmission elements should be considered 'critical transmission elements' for the purposes of the guidelines. This is discussed in further detail in section 3.2. The Panel has also recommended that AEMO should consult with stakeholders if it plans to implement any material changes to the format of its incident reporting. This is discussed in section 3.4.

The delayed start is to provide time for AEMO to consult with stakeholders and to adjust any internal procedures to implement the revised approach for incident reviews.

1.8 Consultation process

The Panel has consulted with stakeholders during the review by providing the opportunity to make submissions on the issues paper and the draft report and offering to hold a public meeting.

The issues paper discussed a series of amendments to the guidelines, including amendments proposed by AEMO in a letter to the Panel on 31 January 2012. The Panel received three submissions on its issues paper from Grid Australia, the Private Generators Group and Origin Energy, which are available on the AEMC's website[11]. A summary of the submissions is provided at Appendix D.

AEMO reviewed the submissions to the issues paper and subsequently revised its proposal in response to the issues raised by stakeholders. A revised proposal was sent from AEMO to the Chairman of the Panel on 30 July 2012.[12]

The Panel considered AEMO's revised proposal and adopted most of AEMO's amendments with some modifications, which were discussed in the draft report. Stakeholder submissions were due on the draft report by 4 October 2012. Two submissions were received from the Private Generators Group and Origin Energy. A summary of the submissions is provided at Appendix E.

A public meeting was advertised but did not go ahead due to limited registrations. Panel staff contacted stakeholders who had provided submissions in order to discuss

11 Available at: http://www.aemc.gov.au; project code: REL0048.

12 Ibid.

the details of their submission and subsequently arranged a teleconference on 1 November 2012 for Panel staff and interested stakeholders to discuss key issues for the final report.

Participants in the stakeholder teleconference - included representatives from AEMO, Origin Energy, Pacific Hydro, and the Private Generators Group. A record of the meeting, along with all other relevant documents for this review, is available on the AEMC website.[13]

The Panel's final report for this review reflects the position taken in the draft report that the guidelines should enable AEMO and other participants to focus their resources on reviewing incidents of importance to power system security. The guideline amendments proposed in the draft report have been modified following consideration of issues raised by stakeholders and further discussions with AEMO. These modifications are discussed in Chapter 3 of this report.

1.9 Structure of the paper

The remainder of this paper is structured as follows:

- **Chapter 2 - factors taken into consideration:** sets out the factors the Panel considered in preparing this report and the revised guidelines;
- **Chapter 3 - amendments to the guidelines:** sets out the Panel's consideration of specific issues in amending the guidelines;
- **Appendix A –** refers to a change-marked version of the Panel's guidelines;
- **Appendix B –** provides a glossary for terms used in this report;
- **Appendix C –** provides an example of how the revised guidelines may be interpreted;
- **Appendix D –** provides a summary of stakeholder submissions on the draft report;
- **Appendix E –** provides a summary of stakeholder submissions on the issues paper;
- **Appendix F –** provides AEMO's draft list of critical transmission elements;
- **Appendix G –** sets out the Panel's analysis of the impact its amended guidelines would have if they applied retrospectively to 2010-11 operating incidents.

13 Ibid.

2 Factors taken into consideration

This chapter sets out the factors the Panel considered in preparing this final report and the amended guidelines. Specific issues raised, and the Panel's response to these issues, are discussed in Chapter 3.

2.1 Improving the efficiency of reviews

AEMO is required to investigate and prepare a public report on any operating incident that is considered 'reviewable' under the Panel's guidelines. The report is typically published on AEMO's website 70 to 120 days after the incident occurred, depending on the magnitude and complexity of the incident.[14]

The Panel has considered whether amendments to the guidelines could improve the efficiency of the overall review process by helping to reduce the costs of producing the reports while preserving any important benefits.

To inform this assessment, the Panel sought information from stakeholders in its issues paper and draft report on the costs and benefits of the existing arrangements. The Panel also sought views on the potential impacts of amendments to the guidelines that reduce the total number incidents or alter the type of incidents that are reviewed in future.

A key objective of the Panel's review is to help avoid detailed investigation and reporting on incidents that are benign from a system security perspective. The NER makes explicit that incidents should be reviewed where they represent a significant deviation from normal operating conditions or where they have a significant impact on the power system. The Panel has considered whether the guidelines were consistent with these principles.

The Panel has determined that AEMO should focus its comprehensive incident reviews only on incidents where the event involves a real or potential power system security impact. That is, AEMO should focus on incidents that represent a significant deviation from normal operating conditions or have a significant impact on the power system. This is to help promote a more efficient use of resources for AEMO and other organisations involved in incident reviews and to better reflect the intent of reviewing operating incidents under the NER, while preserving the key benefits of incident reviews.

Benefits of incident reviews

Incident reviews involve a comprehensive investigation of an incident and the preparation of a public report on the outcomes of its investigation. AEMO's incident reviews are holistic in their approach where the performance of all relevant parties is considered – including the performance of AEMO itself. AEMO's operating incident

14 AEMO has advised it is planning to shorten this timeframe for less complex reviews.

reports are the only comprehensive source of information that is publicly available on the cause and impacts of unusual operating incidents in the power system.

With respect to power system security, we consider the current key benefits of AEMO's operating incident reviews to be:

- identifying recommended actions to improve power system security;
- identifying any trends that may indicate underlying systemic power security issues or that the system may be drifting into an insecure state;
- providing a learning opportunity for AEMO, market participants and other organisations to better understand the dynamics and capability of the power system; and
- sharing information with market participants to promote awareness of risks – particularly where it is possible the risk is common to multiple participants across the NEM.

There can be additional reliability and market benefits from AEMO's incident reporting, however the Panel's focus when considering amendments to the guidelines has been on promoting power system security. This is the broader objective of incident reviews as outlined in section 1.3 of this report.

Potential costs of incident reviews

The main costs of incident reviews relate to the staff required to investigate and prepare the incident reports.

Table 2.1 provides an indication of the process involved in undertaking an incident review; outlining the steps involved and time estimated for each step.

Table 2.1 Process for incident reviews

Step	Typical time-frames (cumulative business days after event)
Determine whether the power system incident is reviewable and allocate appropriate resources	5
Request information from relevant parties	8
Receive information	28[15]
Complete 1st draft and seek internal feedback	38

15 Under clause 4.8.15(g) of the NER, AEMO must allow 20 business days for registered participants to respond to such requests for information.

Step	Typical time-frames (cumulative business days after event)
Complete 2nd draft and seek comments from relevant parties	43
Receive feedback from relevant parties	53
Complete negotiations regarding recommendations	63
Prepare final draft and seek internal feedback	65
Receive feedback on final draft	68
Incorporate feedback into final version	69
Publish report	70

Source: AEMO Feedback on power system incident reporting, 21 December 2010, p. 5.

AEMO has advised the Panel that incident reviews currently involve an equivalent of around one and a half full time employees throughout the year. However, at peak times around 18 to 20 system incident investigations can be active, which can involve up to approximately 14 employees. There are also costs for other market participants in allocating time and resources to provide information to AEMO to assist their incident investigations and to provide feedback on AEMO's draft reports.

Under the Panel's amendments, it is possible reporting would be reduced by around 30 per cent based on the Panel's assessment of 2010-11 operating incident reports. This assessment is set out in Appendix G. The Panel notes that the number of reports and the nature of incidents can vary significantly depending on the year. A 30 per cent reduction is only indicative and the actual reductions could be higher or lower from year to year.

Any reduction in reporting requirements can enable organisations to reduce costs or reallocate resources to areas that provide greater value to the organisation, its stakeholders or to the market as a whole.

2.2 Objectives of the Panel's guidelines

In determining whether amendments to the guidelines are required the Panel has focussed on the role of the guidelines, which is to clarify what kind of incidents AEMO should review in order to promote the secure operation of the power system while helping to avoid the costs of unnecessary reviews.

Under clause 4.8.15(a) of the NER, the guidelines are to identify incidents 'of significance to the operation of the power system or a significant deviation from normal operating conditions'.

The guidelines identify incidents under a series of provisions in the NER. The guidelines provide additional clarification on how the provisions under the NER should be interpreted and provide other clarifications and details.

The Panel considers its amendments improve the operation of the guidelines in three main ways:

- the amendments reflect changes in the NEM since the guidelines were created in 2006;
- the formatting changes and language clarifications should make the guidelines easier to interpret; and
- the changes realign the guidelines towards the original intent of the NER where the guidelines are to identify incidents of significance to the operation of the power system or significant deviations from normal operating conditions.

The Panel considers that these amendments will help to balance the costs of undertaking incident reviews with the associated power system security benefits, helping to promote the efficient allocation of resources to the review process.

2.3 The National Electricity Objective

The Panel has considered whether any amendments to the guidelines would contribute to the national electricity objective (NEO), which 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 -

- price, quality, safety, reliability and security of supply of electricity; and
- the reliability, safety and security of the national electricity system."

Specifically, the Panel has considered how the Panel's amendments would impact the efficient operation of electricity services.

The amendments remove the requirement for AEMO to report on minor incidents that do not impact the NEM power system security. This can reduce resource requirements for AEMO and market participants involved in incident reviews. The amendments retain the requirement for AEMO to report on incidents that are important from a system security perspective.

In addition to the existing benefits of incident review outlined in section 2.1, the Panel considers its amendments provide a number of other benefits that include:

- enabling AEMO to focus on incidents of relevance to power system security, which is consistent with the requirements under the NER;

- promoting the review of other incidents, including non-credible and multiple contingency events in the distribution and transmission network, at AEMO's discretion and with the option to use a scaled reporting approach;
- minimising the duplication between AEMO and TNSP investigation and reporting;[16] and
- minimising operational costs for AEMO and other participants to implement the updated guidelines.

Overall, the Panel considers the amendments will result in a more efficient operation of electricity services.

16 The Panel notes TNSP information provision to AEMO is to expand from mid-2013. This is discussed further in section 3.3.

3 Amendments to the guidelines

This chapter sets out the Panel's consideration of specific issues in amending the guidelines, including those raised in stakeholder submissions. The amendments are set out in a change-marked version of the guidelines in Appendix A.

Panel's draft report

In making its draft decision, the Panel took into consideration two separate proposals from AEMO. The Panel published its draft report in September 2012, which proposed a new guideline 1A that applied to three of the six guidelines. This guideline 1A removed from the scope of future reviews incidents that:

- involve a transmission element of a nominal voltage below 220 kV being forced out of service; and
- did not result in a threat to the power system security of the higher voltage transmission network.

Material levels of load and generation interruption on the low voltage transmission network would be reviewable under the Panel's draft amendments. Incidents on the distribution network that cause the loss of one or more generating units (scheduled or semi-scheduled) would also be reviewable under the draft amendments. The draft recommendations were based on the Panel's assessment of two proposals made by AEMO and submissions on the Panel's issues paper.

The Panel also received some subsequent advice from AEMO on regional differences in critical transmission elements to help modify the approach following submissions on the draft report.

AEMO's advice throughout the review relates to the concept that incidents isolated to 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.[17]. A large number of incidents that AEMO is required to review under the existing guidelines involve contingencies on the low voltage transmission network that are benign with respect to power system security. AEMO was seeking to refocus the guidelines on incidents of direct relevance to power system security.

Panel's final decision

The Panel has modified its draft approach following its consideration of issues raised by stakeholders on the draft report. The key change from the amendments proposed in the draft report is the introduction of the term 'critical transmission elements' which affects the interpretation of guideline 1 and guideline 6(c). Section 3.1 discusses the draft approach and section 3.2 discusses the Panel's rationale for its final approach.

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

3.1 A 220 kV threshold for reviewing transmission contingencies

The NER set out that reviewable operating incidents should involve events that are of significance to the operation of the power system or a significant deviation from normal operating conditions. Under the guidelines developed in 2006, all non-credible contingency events and multiple contingency events in the transmission network were reviewable. However, a number of these events only involving non-critical transmission elements are not considered by AEMO to be of significance to the operation of the power system.

The Panel agrees with AEMO that reviews should focus on issues of power system security and recognises that the previous guidelines capture incidents on the low voltage transmission network that are benign in this respect. In developing the draft report, the Panel considered AEMO's advice that the security of transmission lines below 220 kV is less critical than the higher voltage network with respect to the safe and secure operation of the NEM power system. This is in part due to faults on the lower voltage transmission network generally being more isolated, with a lower risk the fault will propagate through the system. The draft report proposed a 220 kV nominal voltage threshold for determining which transmission contingencies should be reviewable.

The Panel also agreed with stakeholders that there can be security impacts for the higher voltage network that originate from transmission elements below 220 kV being forced out of service. Therefore, in addition to reviewing incidents occurring directly on the higher voltage network, the draft amendments required the review of incidents on the lower voltage transmission network that posed a 'threat' to the security of the higher voltage network.

The Panel included an example in the guidelines to provide some guidance as to what it considers a 'threat' to the power system security of the higher voltage transmission network. The example involved a material level of load or generation loss on the lower voltage transmission network. AEMO was to have discretion over what quantum of load or generation loss constitutes a 'material' level.

Stakeholder views

Origin noted that references to the 220 kV network were not appropriate given the importance of the 110 kV and 132 kV networks in the operation of the NEM. Origin considered the guidelines should be determined on the functional aspect of the interruption to generation or load rather than the voltage level of the network at which the interruption occurred.

The Private Generators noted that the amended guidelines would prevent the review of a threat to the power system security of assets below 220 kV, which could lead to serious incidents passing without review. The Private Generators provided an example, where the loss of multiple 132 kV assets in southeast South Australia would be a threat to the power system but would not be reviewable under the revised guidelines.

The Private Generators noted it would be inappropriate for the guidelines to impose restrictions on the scope of what should be reported, which is established by clause 4.8.15 of the NER. They suggested these changes should be sought through a rule change request. The group did, however, support the intent of focussing resources on incidents that pose the greatest threat to power system security. As such, they reaffirmed their support for the scaled approach proposed in their submission to the Panel's issues paper. This would involve AEMO scaling the detail of their reports according the severity of the incident.

Following submissions on the draft report, AEMO performed further analysis and identified that using a 220 kV threshold may inadvertently exclude some incidents affecting important transmission elements. AEMO revised its original proposal to suggest a regional approach for identifying transmission elements of critical importance to power system security. AEMO developed the approach through internal consultation, which identified a preliminary list of critical transmission elements on a regional basis, some of which are below 220 kV. This preliminary list is provided in Appendix F.

Panel's considerations

The Panel has determined it is appropriate for the guidelines to impose restrictions on the scope of reviewable incidents. Clause 4.8.15(a) of the NER states that reviewable incidents are those incidents identified, in accordance with the Panel's guidelines, to be of significance to the operation of the power system or a significant deviation from normal operating conditions. The Panel considers this provides scope for the guidelines to clarify which incidents can be considered of significance or a deviation from normal conditions. This approach is also consistent with the previous guidelines, which acted to limit the scope of other incident types set out in the NER. For example, the guidelines define what should be considered a multiple contingency event in the NEM transmission system and what should be considered a 'black system' condition in Queensland.

The Panel agrees with AEMO and other stakeholders that the draft guidelines may inadvertently exclude some important incidents by adopting a 220 kV threshold. The Panel's final amendments introduce the concept of 'critical transmission elements', recognising that the importance of lower voltage networks differs between regions. This approach is set out in the next section.

3.2 Critical transmission elements

For the purposes of the Panel's final guidelines, critical transmission elements are those with a minimum voltage of 220 kV or elements of a lower voltage that have been identified by AEMO as critical for the supply of electricity in or between regions. The new guideline 1 reads as follows:

> "Under clause 4.8.15(a)(1)(i): a reviewable operating incident is an incident comprising a non-credible contingency event or multiple contingency events that impact critical transmission elements or that impact the

transmission system of multiple National Electricity Market regions. Under this provision:

(a) apply the definition of a non-credible contingency event in clause 4.2.3 of the NER; and

(b) define a multiple contingency event as an incident comprising of contingency events, including any inappropriate automatic or manual operation of a transmission element, that occur within 30 minutes of each other and where the residual impact of an earlier contingency event interacts with a later contingency event; and

(c) define critical transmission elements as elements with a nominal voltage of 220 kilovolts or above or transmission elements of a lower nominal voltage that are critical to the supply of electricity in or between regions."

Under this approach, AEMO will have discretion to identify the critical transmission elements. This is to avoid the guidelines becoming overly prescriptive and rigid, where Panel reviews would be required to make any changes to which elements are considered 'critical'.

The Panel understands that AEMO will maintain a list of elements for each region that are important in maintaining power system security for the purpose of incident reviews. Under the adopted approach, elements may be added or removed from the list depending on the identification of unknown power system vulnerabilities, changes to local generation or network infrastructure or the development of the power system more broadly.

The Panel recommends AEMO consult with stakeholders in developing the list and publishes the list on AEMO's website.

The revised guidelines also require AEMO to review non-credible or multiple contingency events if they impact the transmission systems of multiple NEM regions. This is in recognition of the value AEMO provides where an incident investigation requires coordination between multiple regions and the system security implications of an incident where the impact of a fault is propagated through two interconnected regions.

Stakeholder views

Panel staff discussed the approach involving critical transmission elements with stakeholders during the teleconference on 1 November 2012, as outlined in section 1.8 of this report. Teleconference participants noted the possible new amendments were an improvement on the amendments proposed in the draft report but raised issues with the proposed approach.

Some stakeholders considered that defining which elements should be considered 'critical' would be a challenge and noted AEMO's draft list did not include some

elements that should be considered critical. For example, some lower voltage transmission elements in New South Wales and Northern Queensland were not included in AEMO's draft list.

Some stakeholders consider AEMO should have discretion around the level of detail provided in its incident reports, but not around whether an incident should be reported on. As such, they advocated that the guidelines should not be amended to remove incidents from the scope of AEMO reviews. Instead, they supported the Private Generators' proposal that AEMO adopt a scaled approach to reporting, where less detail could be provided for less significant incidents.

A concern was also raised regarding the lack of information available on credible contingencies for the purpose of complying with generator performance standards. Generators are required to ride through credible contingencies, however it can be difficult for generators to find information about credible contingencies. Participants recognised this was outside the scope of the guidelines, but noted that the existing AEMO incident reporting assists in this process as the reporting highlights which incidents are considered a non-credible or a multiple credible contingency.

Panel's considerations

The Panel has determined that changes to the guidelines are necessary. The NER set out that reviewable incidents should be 'of significance to the operation of the power system or represents a significant deviation from normal operating conditions'. However, under the existing guidelines all non-credible or multiple credible contingencies on the transmission network are reviewable regardless of the impact of the incident.[18]

Given the comprehensive investigation and reporting involved in incident reviews, this type of review can be resource-intensive for AEMO and the market participants involved in providing information, developing recommendations and reviewing the contents of the reports prior to publishing. The Panel considers it important that incident reviews focus resources on incidents where detailed investigation and reporting will contribute to the key objective of promoting the secure operation of the power system.

The Panel also considers it appropriate to afford AEMO discretion in which incidents to review. AEMO's highest priority as power system and market operator of the NEM is managing power system security.[19] The Panel considers AEMO has the appropriate incentives and expertise to exercise discretion as to which incidents are important to review from a power system security perspective. However, should the Panel or other

18 For example, low voltage busbar trips on non-critical transmission networks may not necessarily represent a 'significant' deviation from normal operating conditions nor are they necessarily of 'significance' to the operation of the power system. Incidents of this nature currently constitute a large proportion of AEMO's incident reviews and reporting on these incidents can potentially be considered exceeding the requirements of the NER.

19 http://www.aemo.com.au/About-AEMO/Services/Operations.

stakeholders consider AEMO is not appropriately applying its discretion under the guidelines, the Panel may undertake a subsequent review of the guidelines.

Part of the discretion to be exercised by AEMO under the revised guidelines involves AEMO identifying which transmission elements to classify as 'critical'. AEMO has identified a preliminary list of critical elements that it has stated requires further consideration. This draft list is at Appendix F. The Panel agrees with stakeholders that this process of separating critical transmission elements from non-critical may be challenging. The Panel recommends AEMO consult with stakeholders on which elements should be included in this list, with AEMO to assess suggestions against the incident review objective of promoting power system security. The Panel also recommends AEMO publish the list on its website to promote transparency around the new process for the review of transmission contingencies.

Where an incident is not eligible for review under the revised guideline 1, it may be eligible under the new guideline 6(f). This new guideline requires AEMO to review any other incidents that are of significance to the operation of the power system, regardless of the voltage of the transmission or distribution networks involved. This guideline is discussed in the next section.

The Panel agrees with stakeholders that information on single credible contingencies is outside the scope of this review. It notes, however, that market notices will continue to be prepared for all non-credible contingencies, regardless of any amendments to the Panel's guidelines. These notices can be used to isolate credible contingencies from non-credible contingencies for the purpose of performance standard compliance in a similar way that stakeholders may currently use incident reports.[20] However, the Panel agrees with stakeholders that market notices can be difficult to search and recommends AEMO consider any cost-effective options to enable stakeholders to easily locate market notices on non-credible contingencies.

3.3 Other incidents to be reviewed

A new item has been added to guideline six where AEMO should review any other non-credible or multiple contingency event that it considers of significance to the operation of the power system. This guideline is to capture unforeseen incident types and promote the review of certain minor incidents where there may be a power system security benefit. This could include incidents with a significant impact on power system security that are unforeseen incidents and would not otherwise be captured by the guidelines. Or it may include more minor incidents where AEMO considers a review may be beneficial.

20 The Panel recognises that market notices provide limited information on the incident and, in this instance, are only being compared to incident reports in terms of helping to identify whether a contingency is classified as credible or non-credible.

Stakeholder views

A concern that has been raised at various stages of this review is that minor incidents that do not affect critical transmission elements would be lost from AEMO's future reporting. This concern partly related to the desire to maintain the ability for AEMO to identify any underlying trends involving minor incidents. It also related to the possibility that minor incidents could lead to more serious incidents if left unchecked.

Origin submitted that incident reports provide transparency on AEMO decision making that serve to provide confidence to market participants. Participants have made significant investments in load and generation assets and transparency should be provided where these assets are interrupted to preserve the security of the power system, irrespective of network voltage.

Panel's consideration

The Panel agrees there may be benefit in AEMO reviewing some incidents that do not fall under the other criteria in the guidelines. As such the Panel has added an additional guideline where AEMO should review any other significant incident. The new guideline 6(f) reads:

> "6(f). AEMO should review any other power system event that it considers of significance to the operation of the power system. This includes (but is not limited to) recurring minor incidents where there may be underlying systemic issues or incidents involving material loss of load or generation."

It would be at AEMO's discretion to define what is considered a 'material' level of load or generation loss that would have possible power system security implications.

Under this new guideline, AEMO could consider reviewing:

- minor incidents in the transmission system that could lead to more serious incidents if they remain unchecked;
- recurring minor incidents where there may be underlying systemic issues; or
- unique events that have security impacts, but do not meet the other criteria in the guidelines.

It is highly likely AEMO would review the third kind of incident listed above regardless of whether the guidelines contain this provision; however the Panel considers this guideline item is a useful inclusion as it could promote the review of other more minor incidents. For example, AEMO may decide to review more minor non-credible or multiple contingency events in the distribution or transmission network that do not directly impact critical transmission elements but involve a material level of generation of load loss.

As this provision could include the review of more minor incidents, AEMO may want to consider adopting a 'scaled approach' (discussed in further detail in section 3.4) where it chooses to report on these minor events.

The Panel considers this provision to help preserve the benefits of incident reviews outlined in section 2.1.

In addition to this provision, guideline 6(e) has remained unchanged and enables the Panel to request AEMO to review incidents as required.

3.4 Altering the incident report format

The Panel considered whether it may be beneficial to provide additional guidance on the nature of reporting within the guidelines to improve the quality of reporting or limit its costs. Neither the NER nor the Panel's guidelines stipulate the format of AEMO's incident reports or the level of detail that must be included.

This consideration is particularly relevant to AEMO's proposal to reduce the costs of reporting by narrowing the scope of reviewable incidents. The Panel considered how the guidelines could be amended to reduce the costs of reporting where possible. The Panel also considered whether there was a demonstrated need to improve the quality of the reporting.

Stakeholder views

Origin Energy agrees with the Panel's draft report recommendation to afford AEMO some discretion in determining how the information is reported notwithstanding the reasonable expectations of participants.

The Private Generators submitted to the issues paper and draft report that, while all power system incidents potentially provide some valuable insights into power system operation, there is a cost associated with the investigation and reporting process. A scaled approach would therefore seem appropriate. This could involve different levels of reporting detail, which is scaled relative to the quantum of load or generation interrupted. For example, for incidents involving load or generation loss below 5 MW, a very basic report similar to the current AEMO irregularity report would be sufficient. Where between 5 and 30 MW of load or generation is interrupted, a slightly more detailed report with some recommendations would be made.

During the stakeholder teleconference, all participants indicated support for the scaled reporting approach suggested by the Private Generators Group. The scaled approach would involve AEMO continuing to review all non-credible and multiple contingencies in the transmission network (regardless of their importance to system security) but the reports would be less detailed for less severe incidents.

Panel's considerations

The Panel noted in its draft report that it was supportive of AEMO exercising its discretion on the level of detail included in reports. It was further noted that AEMO was already permitted to scale their reporting under the existing NER and the guidelines did not need to explicitly direct AEMO to do so.

The scaled approach supported by stakeholders does not change the scope of what is considered reviewable under the current guidelines and involves AEMO continuing to review all non-credible events and multiple contingency events in the transmission system, regardless of their impact.

The Panel does not support this option as it considers continued reporting on every non-credible event and multiple contingency events in the transmission system to be inconsistent with the intent of the NER, as discussed in section 3.2.

The Panel considers that AEMO has managed its review and reporting obligations well to date. This is in part evidenced by the consultation process AEMO initiated in December 2010 on its incident reporting to obtain stakeholder suggestions on any improvements that could be made. The Panel favours maintaining the current approach in the guidelines and allowing AEMO to determine how best to fulfil their incident reporting obligations in a way that compliments their broader role in operating the power system in a safe and secure manner.

The Panel maintains its view that AEMO is already permitted to scale its reporting under the NER and the guidelines do not need to explicitly direct AEMO to do so. AEMO has advised that it does not consider it necessary to include this provision in the guidelines. The Panel notes that AEMO's current level of reporting detail appears to be appropriate for most types of operating incidents. However AEMO may wish to consider less-detailed reporting if it decides to review any minor incidents under the new guideline 6(f).

The Panel recommends AEMO consult with market participants prior to making material changes to the structure of its incident reports. The Panel recognises that AEMO undertook similar consultation on changes to reporting in 2010-11.

3.5 Other minor amendments

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

- an introductory paragraph has been added and introductory sentences are included for each criterion to improve the ease of use of the guidelines;
- all terms defined in the NER have been italicised;
- 'NEMMCO' references have been updated to 'AEMO';
- the reference to 'regions with minimal load' has been removed given that the NEM no longer has regions that can be considered as having 'minimal load'; and
- the reference to the operational frequency tolerance band has been 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.

3.6 Incidents no longer reviewed and other reporting

Under the Panel's guidelines an incident that was previously reviewable will no longer be reviewed if:

- it occurs directly on a transmission element that is not identified by AEMO as a critical transmission element; and
- it has no impact on any critical transmission elements; and
- AEMO does not consider it reviewable under the guideline 6(f) - that is, it does not involve material levels of load or generation loss, it is not a recurrent incident that AEMO considers may be related to a systemic issue, or it is not of significance to the operation of the power system for any other reason; and
- it does not meet any of the other criteria in the guidelines (there are six criteria in total).

The Panel considers that the loss of reporting on minor transmission incidents should not present issues in terms of system security, provided that AEMO uses appropriate judgement in determining which transmission elements are critical in maintaining power system security and which less critical incidents could be of significance to the operation of the power system. This should include AEMO providing the opportunity for stakeholder comment on its list of critical elements.

The Panel notes there are a number of additional processes in place, outside of AEMO's incident review process to avoid important incidents passing without detection.

For all non-credible contingencies in the transmission network (regardless of whether the guidelines list them as 'reviewable'), AEMO performs preliminary internal analysis of the event and prepares a market notice to inform market participants and the general public that the incident has taken place. AEMO also considers whether the incident should be reclassified as a credible contingency. These steps are important in informing AEMO's operation of the power system, logging information on incidents and ensuring the market is notified whenever a non-credible contingency occurs. These steps will continue to occur regardless of any amendments to the Panel's guidelines.

AEMO also prepares pricing event reports and monthly frequency and time deviation reports. The pricing reports discuss events that involve a regional reference price exceeding $300 per megawatt-hour or below -$30 per megawatt-hour in a 30 minute trading interval. The frequency reports discuss events where relevant frequency operating standards are not met.

TNSPs also investigate non-credible contingencies. This helps to identify operational or asset-related issues, including more systemic issues. Some of this information is shared

voluntarily between TNSPs and, in some cases, TNSPs will report to affected participants on the outcomes of its investigation. The nature of this reporting depends on the terms of each participant's connection agreement and the information is generally not made public.

Generators have similarly shared information in the past on a voluntary basis with other market participants, where important incidents arise, to promote awareness of possible common risks in the NEM.

AEMO also plans to expand its existing incident trend analysis and reporting, which will not be impacted by any changes to the Panel's guidelines. The Panel understands that AEMO and TNSPs have reached agreement that TNSPs will provide information to AEMO on all transmission contingences - both credible and non-credible. AEMO currently reports semi-annually on its statistical analysis of reviewable operating incidents (non-credible and multiple contingencies), which represent less than ten per cent of all contingencies.[21] The Panel understands that AEMO's expanded analysis and reporting will cover all contingencies and will identify any trends on the basis of event type, primary cause and system impact. The new approach to AEMO's semi-annual reporting is expected begin in mid-2013.[22]

The Panel recognises that incident reviews differ from other AEMO and participant reporting but considers incident reviews are best reserved for important incidents due to the resource-intensive nature of the reviews.

The Panel appreciates that some participants derive benefits from operating incident reports that do not directly relate to power system security. Reducing the number of incidents that are reviewed may have therefore have some costs for participants; however the Panel considers these issues are better addressed through other arrangements rather than in the guidelines, which are specifically focussed on power system security. For example, participants could approach AEMO directly to determine if there is an alternative way to receive the desired information. Otherwise participants or AEMO could propose a rule change if they identify there is a current omission in the NER around market-related information provision and do not consider that an appropriate solution can be implemented on a voluntary basis between relevant participants and AEMO.

21 These statistical analysis reports are available on AEMO's website.

22 This reporting was a recommendation of the Ministerial Council on Energy's policy response to the AEMC's review of the effectiveness of NEM security and reliability arrangements in light of extreme weather events.

Abbreviations

AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
Commission	See AEMC
NEM	National Electricity Market
NEO	national electricity objective
NER	National Electricity Rules
Panel	Reliability Panel
TNSPs	transmission network service providers

A The amended guidelines

The final version and a 'change marked' version of the guidelines are published on the AEMC Reliability Panel website with this report.

B Glossary

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

Term	Definition / Explanation
black system	black system is defined under the NER 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 NER, 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 NER to take any action in accordance with the provisions under the NER or the National Electricity Law
contingency event	a contingency event is defined under the NER 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 NER)
credible contingency event	a credible contingency event is defined under the NER as a contingency event that AEMO considers to be reasonably possible in the surrounding circumstances (see clause 4.2.3(b) of the NER)
damping	power system damping is defined under the NER 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
	should not exceed (except as a result of a contingency event or a load event)
	- 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.
	- 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
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 NER. Separate standards apply for the 'mainland NEM' and for Tasmania
load shedding	load shedding is defined under the NER as reducing or disconnecting load from the power system
major supply disruption	major supply disruption is defined under the NER 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 NER as a contingency event other than a credible contingency event (see clause 4.2.3(e) of the NER)
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 NER 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
secure operating state	the power system is considered to be in a secure

Term	Definition / Explanation
	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

C Incident example using the revised guideline criteria

The Panel considers that the guidelines have been amended in a way to capture any important incident, provided it is of significant to power system security. To illustrate this point, the example provided in the Private Generators' submission to the draft report is used below. This incident was previously reviewable under guideline 1 of the Panel's 2006 guidelines.

Example - determining if a 132 kV incident is reviewable

The example involved a loss of multiple 132 kV transmission assets in southeast South Australia, which is presumably either a non-credible contingency event or a multiple contingency event. This incident would no longer be reviewable under the revised guidelines only if all of the following conditions are met:

- the 132 kV assets are not 'critical transmission elements' for the supply of electricity in or between regions;
- the loss of the 132 kV non-critical elements did not impact the security of any 'critical transmission elements';
- the incident did not comprise a black system condition;
- the incident did not involve the frequency being outside the operational frequency tolerance band;
- the incident did not lead to the power system being in an insecure operating state for more than 30 minutes;
- the incident did not involve a clause 4.8.9 load shedding instruction;
- the incident did not lead to the power system being in an insecure operating state for more than 5 minutes (excluding issues resulting from potential oscillatory or transient stability);
- AEMO's on-line oscillatory and transient stability monitoring systems did not detect a potential instability for 30 minutes, continuously; or
- the Reliability Panel did not request AEMO to review the incident;
- the incident did not involve material levels of load or generation loss;
- it was not a recurrent incident that may be linked to systemic issues; and
- the incident was not of a nature that AEMO considered significant to the operation of the power system.

D Summary of submissions - draft report

Issues raised in submission on the draft report are summarised below. Submissions are published on the review's webpage on the AEMC website under the project code: REL0048.

Issue	Stakeholder	Detail	Panel response
Proposed 220 kV threshold	Origin Energy Private Generators Group	Origin considered the guidelines should be determined on the functional aspect of the interruption to generation or load rather than the voltage level of the network at which the interruption occurred. Any interruption to generation or load on a lower voltage network to preserve the security of the power system at a higher voltage transmission network should be reviewable. The Private Generators highlight that the amended guidelines would prevent the review of a threat to the power system security of assets below 220 kV, which could lead to serious incidents passing without review. The Private Generators provide the example of a loss of multiple 132 kV assets in southeast South Australia, which would be a threat to the power system but would not be reviewable under the revised guidelines.	This issue is considered and discussed in sections 3.1 and 3.2 and in Appendix C.
Guidelines restricting which incidents are reviewable	Private Generators Group	The Private Generators believe it is not appropriate for the guidelines to impose restrictions on the scope of what should be reported, which is established by clause 4.8.15 of the NER. They suggest these changes should be sought through a rule change request.	This issue is considered and discussed in section 3.1.
Altered reporting approach	Origin Energy Private Generators	Origin agrees with the Panel's recommendation to afford AEMO some discretion in determining how the information is reported notwithstanding the reasonable expectations of	This issue is considered and discussed in section 3.4.

Issue	Stakeholder	Detail	Panel response
	Group	participants. The Private Generators have reaffirmed their support for the scaled reporting approach proposed in their submission to the Panel's issues paper. (Further details in appendix E). The group suggest adding an overarching guideline to make explicit that AEMO may use a scaled approach for its reporting. They note AEMO should consult with stakeholders on changes to the reporting approach.	
Panel's periodic review of the guidelines	Origin Energy	Origin Energy has suggested the Panel undertake periodic reviews of the guidelines; Origin recognises this is not currently required in the NER.	The Panel supports undertaking future reviews of the guidelines as required. The AEMC can direct the Panel to undertake a review at any time (as was the case for this review) and the Panel does not consider it necessary at this time to propose a rule change to implement a periodic review period. If stakeholders strongly support a the Panel undertaking a regular, periodic review of the guidelines, they could propose a rule change to the AEMC.

E Summary of submissions - issues paper

Issues raised in submission on the issues paper are summarised below. Submissions are published on the review's webpage on the AEMC website.

Issue	Stakeholder	Detail	Panel response
Purpose and benefits of providing information to the market on incidents on networks below 220 kV	Origin Energy Private Generators	Origin submitted that incident reports provide transparency to market participants on operating incidents that may impact generating plant or load across the network. The value of the report is in the provision of information as to why an event occurred and what actions can be taken to mitigate recurrence. The reports promote transparent decision making by AEMO, which is crucial to maintain participant confidence in the operation of the NEM. The Private Generator Group agrees with the Panel that the objective of operating incident reviews is to promote the secure operation of the power system. Operating incidents provide opportunities to: better understand the dynamics and capability of the power system; assess compliance with security obligations; determine if existing power system security arrangements are still appropriate; assess the adequacy of ancillary service arrangements; and understand causes of events and review procedures to respond or prevent recurrence.	This issue is considered and discussed in sections 3.1 and 3.3.
Availability of information on low voltage incidents from sources other than AEMO	Grid Australia Origin Energy Private Generators	Grid Australia submits that its members investigate all power system incidents on their networks, regardless of the voltage. Actions to prevent or mitigate future incidents are also identified and acted on. TNSPs provide an explanation of the incidents to any affected customers. Some member TNSPs also have jurisdictional obligations to report on events above a given severity threshold. Origin notes that AEMO's current reporting provides a more holistic view of power system security compared to the type of information that the TNSP responsible for the affected connection point could provide to the	This issue is considered and discussed in section 3.2.

Issue	Stakeholder	Detail	Panel response
		market. TNSP incident reports are not publicly available and only the affected connecting party could receive a report. The Private Generators noted that, while it may be the case that TNSPs currently prepare reports under terms of their connection agreements, these reports are not provided to all industry stakeholders.	
Continued reporting of low voltage incidents involving load or generation interruption	Origin Energy Private Generators	Origin submits that limiting the criteria for the identification of reviewable operating incidents would decrease the transparency to market participants into the operation and maintenance of system security. Origin considers AEMO's proposed 220kV threshold to be too high as it would exclude reporting on incidents involving a substantial volume of generation and load connected to the network below 220kV. If the Panel considers a threshold level is required, Origin has suggested a threshold of 100kV and above could be more appropriate. The Private Generators submitted that, while all power system incidents potentially provide some valuable insights into power system operation, there is a cost associated with the investigation and reporting process. A scaled approach would therefore seem appropriate. Examples are provided in the submission, where reporting would involve different levels of detail scaled proportionally to the level of load or generation interrupted.	This issue is considered and discussed in section 3.1.
Costs and benefits of existing arrangements	Grid Australia Origin Energy Private Generators	Grid Australia submits that AEMO's proposal to change the existing arrangements will result in a reduced effort for AEMO and TNSPs, whilst not reducing the quality of service to affected customers. Origin submits that, while the proposed reporting limits would reduce AEMO's reporting costs, the decreased transparency into NEM operations is likely to erode confidence. On the balance, this is unlikely to promote the NEO. Origin acknowledges AEMO's costs of preparing reports and the reduction in merit associated with reporting on incidents on the high voltage sub-network. However, Origin considers incident	This issue is considered and discussed in sections 3.1 and 3.3.

Issue	Stakeholder	Detail	Panel response
		reports are important in identifying power system security incidents as well as disruption to generation and load to preserve system security. The Private Generators recognise there are industry costs associated with the preparation and publication of power system incident reports. However, they believe the potential value of these reports is high and limiting the scope of reporting carries a risk that important lessons will be missed and the power system might drift into insecure territory. The scaled approach is thought to provide a good balance between ensuring the value of incident investigation is obtained with a view to efficiency of effort and cost.	
TNSP reporting on incidents	Grid Australia Origin Energy Private Generators	Grid Australia submits that, under the current arrangements, TNSPs investigate all power system incidents on their networks (regardless of voltage). TNSPs report directly to affected customers and some also have jurisdictional obligations to report on events above a given severity threshold. Such obligations would remain unchanged as a result of AEMO's proposal. Origin submits that AEMO's proposal to have TNSPs report on lower voltage incidents does not actually reduce the cost of reporting; rather it just reallocates the cost from AEMO to TNSPs. Origin queries how TNSPs could report holistically on events that include low voltage assets across regions given TNSPs' jurisdictional focus and notes that AEMO, on the other hand, can provide cross-regional insight. The Private Generators note it is difficult to comment on any duplication as TNSP reports are not visible to most participants. The Private Generators submit that, if the proposal is that TNSPs perform the task of preparing reports on lower voltage assets, then it will be important that such reports are made available to all industry stakeholders, and that their scope and detail is at least consistent with the level of reporting currently carried out by AEMO.	This issue is considered and discussed in section 3.2.

Issue	Stakeholder	Detail	Panel response
Minor amendments	Grid Australia Private Generators	Grid Australia supports the minor amendments described in Section 4.2 of the issues paper. Notably, the Tasmania frequency standards have changed since the guidelines were published, making the numerical values in clause 3 of the guidelines incorrect. The Private Generators have no objection to the minor amendments proposed by the Panel.	This issue is considered and discussed in section 3.4.

F AEMO preliminary list of critical transmission elements

The revised guidelines 1 and 6(c) require AEMO to consider an incident in the context of its impact on 'critical transmission elements'. This is discussed in section 3.2 of this report. AEMO had identified a preliminary list of critical transmission elements for the purposes of identifying reviewable operating incidents under the two aforementioned guidelines. This list is a preliminary list and is provided below for illustrative purposes.

The Panel recommends AEMO consult with stakeholders in finalising the list below to seek comment on which elements are critical for promoting power system security in each region. The Panel also recommends that AEMO publishes the final list on AEMO's website.

Region	Critical transmission elements
Queensland	Any element with an operating voltage of 220kV or above Network elements from H4 Mudgeeraba to the QLD – NSW border that are connected to Directlink
New South Wales	Any element with an operating voltage of 220kV or above Directlink Network elements from Lismore to the QLD – NSW border that are connected to Directlink Possibly some of the network assets owned by AusGrid deemed by the ACCC to be part of the transmission network (to be determined)
Victoria	Any element with an operating voltage of 220kV or above Murraylink
South Australia	Any element with an operating voltage of 220kV or above Any element with an operating voltage of 132kV that provides support to the 220kV network Murraylink Any element with an operating voltage of 66kV that connects generation in the Torrens Island area
Tasmania	Any element with an operating voltage of 220kV or above Any element with an operating voltage of 110kV that provides support to the 220kV network

G Low voltage transmission incidents – 2010-2011

As discussed in section 2.1, the table below summarises the details of 16 operating incidents that occurred in the 2010-11 financial year that were confined to transmission elements below a nominal voltage of 220 kV. There were 36 reviewable incidents in total in 2010-11.

The table has been prepared to illustrate how low voltage operating incidents would potentially be considered under the Panel's revised guidelines, where AEMO is to consider transmission contingencies in terms of their impact on critical transmission elements under the revised guidelines 1 and 6. The last column indicates whether the incident would be reviewable if assessed under the revised guidelines. The Panel notes that the list of critical transmission elements is yet to be determined by AEMO and this is just indicative of the kind of incidents that may no longer be reviewable. It is also possible some of these incidents would be reviewable under the new guideline 6(f).

Of the 16 low voltage incidents, five incidents would potentially be reviewed by AEMO under the revised guidelines and eleven incidents would be excluded. This represents a reduction in reporting for 2010-11 of 30 per cent. The Panel notes that the nature and number of reviewable operating incidents vary considerably between years. As such, the amended guidelines could lead to larger or smaller reductions in reporting in future years than for 2010-11.

Information in the table was drawn from AEMO's relevant operating incident reports available on AEMO's website[23].

23 A copy of each incident report is located at: http://www.aemo.com.au/Electricity/Resources/Reports-and-Documents/Power-System-Operating-Incident-Reports.

Examples of operating incidents that would likely meet the Panel's revised guidelines – 2010-11

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted	Likely to be reviewed under revised guidelines?
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	Yes
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	-	Yes
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	-	No
6 December 2010	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	132 kV line 132 kV busbar	-	-	No
7 December 2010	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines	-	-	No

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted	Likely to be reviewed under revised guidelines?
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	-	Possibly
14 January 2011	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines 132 kV busbar	-	-	No
3 February 2011	Trip of Waterloo busbar	Transmission (busbar)	Non-credible	Single	Two 132 kV lines 132 kV busbar	-	-	No
5 February 2011	Trip of Cowra busbar	Transmission (busbar)	Non-credible	Single	132 kV line One 132 kV busbar	50 MW	-	No
8 February 2011	Trip of Central Queensland Feeders	Transmission (transmission lines)	Non-credible	Multiple	Four 132 kV feeders	-	-	No
15 February 2011	Trip of Keith – Snuggery line and	Transmission (Transmission	Non-credible	Multiple	132 kV line	-	-	No

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted	Likely to be reviewed under revised guidelines?
	transformer	lines / transformer)			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	-	-	Yes, if it impacted Directlink.
25 April 2011	Trip of Redbank busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 kV lines	-	71 MW	Possibly
2 May 2011	Trip of Columboola busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Two 132 kV lines	28 MW	-	No
9 May 2011	Trip of Tully busbar and Tully-Ingham South Tee Cardwell line	Transmission (busbar)	Non-credible	Multiple	132 kV busbar Five 132 kV lines 132/22 kV transformer	-	-	No

Date	Incident	Fault type	Event type	Number of events	Transmission element(s) affected	Load interrupted	Generation interrupted	Likely to be reviewed under revised guidelines?
8 June 2011	Trip of Kareeya busbar	Transmission (busbar)	Non-credible	Single	132 kV busbar Five 132 kV lines	-	44 MW	No