

# **Western Power**

## **2010/11 Network Quality and Reliability of Supply Code Audit**

### **September 2011**

#### **Limitations of use**

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Mr Ankur Maheshwari  
Branch Manager Network Performance  
Western Power  
363 Wellington Street  
PERTH WA 6000

22 September 2011

Dear Ankur

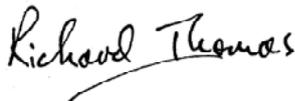
## **2010/11 Network Quality and Reliability of Supply Audit**

We have completed the Network Quality and Reliability of Supply Audit for Western Power for the period 1 July 2010 to 30 June 2011 and are pleased to submit our draft report to you.

I confirm that this report is an accurate presentation of the findings and conclusions from our audit procedures.

If you have any questions or wish to discuss anything raised in the report, please contact Andrew Baldwin on 9365 7236 or myself on 9365 7024.

Yours sincerely



**Richard Thomas**  
Partner

# Contents

Executive summary	3
Operating systems	7
Quality of supply	9
Reliability of supply	12
Variations	19
Appendix A – Compliance obligations	20
Appendix B – References	21
Appendix C – Voltage fluctuation and harmonic tables	23

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# Executive summary

## Background

In accordance with Part 4, Division 3, section 26 of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 (the **Code**), Western Power is required to arrange for an independent audit of systems that are in place to monitor compliance with Part 2 of the Code or an instrument made under section 14(3) of the Code.

Western Power appointed Deloitte to undertake the audit for the year ending 30 June 2011.

## Objective

The objective of this audit is to assess and report on the operation of the systems implemented by Western Power to monitor its compliance with Part 2 of the Code or an instrument made under section 14(3) for the 2010/11 financial year.

The relevant compliance requirements of the Code are listed at **Appendix A**.

This audit focuses on Western Power's systems and processes for monitoring compliance and does not assess the level of compliance achieved or the validity of the information reported in the annual Network Quality and Reliability of Supply performance report.

## Scope

The scope of this audit relates directly to the four divisions at Part 2 of the Code. The key elements of each division are explained below:

Audit area	Description
Quality of Supply (Division 1)	Power quality standards for quality of supply at the point of connection to the customer, specifically relating to voltage fluctuations and harmonic distortion.
Reliability of Supply (Division 2)	Standards for the interruption of supply to individual customers provide for the maintenance of supply and management of interruptions to customers, both in terms of the duration and number of interruptions. Those standards address the following: <ul style="list-style-type: none"> <li>• Provision of supply with the minimum number and duration of interruptions</li> <li>• Consideration of providing alternative supply if the interruption is expected to be significant, its effect substantial or if the customer has special health needs that require continuous supply</li> <li>• Allowing planned interruptions if the customer is notified within a suitable time and where the duration is under 6 hours, or under 4 hours for forecast temperatures over 30 degrees</li> <li>• Provision for the distributor to remedy the causes of interruptions to small use customers or enter into alternative arrangements if the supply has been interrupted for more than 12 hours continuously, or more than the permitted number of times in the preceding year ending 30 June and it is considered that the prescribed standard is unlikely to be met for the customer.</li> </ul>

Audit area	Description
Interruptions of supply standards (Division 3)	Standards for the duration of interruptions of supply in particular areas, provides that the average length of interruptions be less than 30 minutes within the Perth CBD, less than 160 minutes for urban areas other than the Perth CBD and less than 290 minutes in any other area of the State, (calculated as average of the yearly averages over 4 years).
Variation to obligations under Part 2 of the Code (Division 4)	Variations to obligations under Part 2 of the Code relate to: <ul style="list-style-type: none"> <li>• Review and approval by the Minister of applications for alternative provisions made under section 14(3) of the Code</li> <li>• Agreement between transmitter/distributor and customers to exclude or modify a provision of Part 2, in relation to the supply of electricity.</li> </ul>

## Approach

Our approach for this audit involved the following activities, which were undertaken during August and September 2011:

- Entry meeting with key representatives of Western Power's Network Performance Branch
- Examination of the Code to fully understand Western Power's related obligations. The Economic Regulation Authority's Reporting Manual was referenced
- Interviews with relevant operational level Western Power staff to gain understanding of the mechanisms in place (including relevant IT systems, referenced at the operating systems section of this report) to achieve and monitor compliance with the Code (refer to **Appendix B** for staff involved)
- Examination of documents, processes and controls to determine whether Western Power has processes in place to achieve and monitor compliance (refer **Appendix B** for reference listing)
- Reporting of findings to Western Power for review.

This report has been prepared to provide a clear understanding of Western Power's obligations under the Code and is structured to align to the four divisions of Part 2 of the Code. Each section of this report addresses:

- *Code requirement*: a summary of the specific Code requirements providing context for the observations of the report and clarity on Western Power's actual obligations
- *Western Power's mechanisms and systems designed to meet Code requirements*: this section of the report provides context on those operational mechanisms Western Power has established (e.g. through the use of the TCS system and other systems highlighted below) to meet its obligations for maintaining network quality and reliability of supply in accordance with the Code requirements
- *Western Power's mechanisms and systems designed to monitor compliance with Code requirements*: this section of the report is the key focus of the audit, addressing the mechanisms Western Power has in place to monitor its compliance with the relevant sections of the Code. For example, exception reporting arrangements and compliance specific activities to consider the impact of events on compliance
- *Opportunities for improvement*: where the audit has identified either a deficiency in mechanisms designed to achieve/monitor compliance or an opportunity for further strengthening those mechanisms.

## Responsibility

### Western Power's responsibility for compliance with the conditions of the Licence

Western Power is responsible for:

- Putting in place policies, procedures and controls, which are designed to ensure compliance with the conditions of the Code
- Implementing processes for assessing its compliance obligations and for monitoring its level of compliance.

### Deloitte's responsibility

Our responsibility is to express a conclusion on Western Power's systems established for monitoring its compliance with Part 2 of the Code, for the year ending 30 June 2011, based on the procedures we performed. We conducted our engagement in accordance with the Audit Guidelines and the Australian Standard on Assurance Engagements (ASAE) 3500 *Performance Engagements*<sup>1</sup> issued by the Australian Auditing and Assurance Standards Board, in order to state whether, in our opinion, based on the procedures performed, Western Power has established and operated systems for monitoring its compliance with Part 2 of the Code, for the 2010/11 financial year. Our engagement provides reasonable assurance as defined in ASAE 3500.

### Limitations of use

Our report will be produced solely for the management of Western Power, for the purpose of their reporting requirements under sections 26 and 27 of the Code. We disclaim any assumption of responsibility for any reliance on our report to any person other than the management of Western Power, or for any purpose other than that for which it was prepared. We disclaim all liability to any other party for all costs, loss, damages, and liability that the other party might suffer or incur arising from or relating to or in any way connected with the contents of our report, the provision of our report to the other party, or the reliance on our report by the other party.

### Inherent limitations

Reasonable assurance means a high but not absolute level of assurance. Absolute assurance is very rarely attainable as a result of factors such as the following: the use of selective testing, the inherent limitations of internal control, the fact that much of the evidence available to us is persuasive rather than conclusive and the use of judgement in gathering and evaluating evidence and forming conclusions based on that evidence.

We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and their responsibility to prevent and detect irregularities, including fraud. Accordingly, readers of our report should not rely on the report to identify all potential instances of non-compliance which may occur.

### Independence

In conducting our engagement, we have complied with the independence requirements of the Australian professional accounting bodies.

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<sup>1</sup> ASAE 3500 also provides for our engagement to be conducted in accordance with relevant requirements of ASAE 3000 *Assurance Engagements Other than Audits or Reviews of Historical Financial Information*.

## Summary of findings

This audit recognises that Western Power has established:

- A range of mechanisms and systems designed to meet its obligations for maintaining network quality and reliability of supply in accordance with the Code requirements
- An organisation wide compliance framework, which is intended to address all key compliance requirements and activity, including recognition of instances of non-compliance.

In considering the systems in place which enable Western Power to monitor its compliance with Part 2 of the Code, this audit has identified a number of opportunities for Western Power to further strengthen its mechanisms and systems to more effectively demonstrate its compliance with Part 2 of the Code. Those opportunities for improvement relate to those mechanisms and systems designed to:

- Achieve compliance. For example, where deficiencies in internal controls could potentially lead to non-compliance with Code requirements
- Monitor compliance. For example, where current monitoring arrangements do not adequately address Western Power level of compliance with specific Code requirements.

The following opportunities for improvement are further detailed at the respective sections of the report below:

### **Division 1: Quality standards**

1/2011: Recognition of quality and reliability of supply complaints within TCS

2/2011: Monitoring of power quality performance

3/2011: Reporting of quality of supply breaches (section 5(1))

4/2011: Duty to disconnect

### **Division 2: Interruption of supply to individual customers**

5/2011: Planned interruptions and hot weather

6/2011: Hand carding processes

7/2011: Instances where “planned” interruptions result in a breach of Section 9 of the Code

### **Division 3: Duration of interruption of supply in particular areas**

8/2011: Use of SAIDI targets.

## Conclusion

In our opinion, based on the procedures performed:

- Except for the effect of any issues set out below, Western Power has in all material respects, established and operated systems designed to meet its obligations under Part 2 of the Code, for the year ending 30 June 2011
- Western Power has further opportunities to improve its systems designed to effectively monitor its compliance with Part 2 of the Code.

# Operating systems

Western Power utilises the following systems and tools to help achieve its compliance and performance requirements under its distribution and transmission licences. These systems and tools also form part of the mechanisms designed to enable Western Power to monitor its compliance with Part 2 of the Code.

System	Description
Trouble Call System (TCS)	<p>TCS is a module of the ENMAC Distribution Management System (DMS). The TCS module was implemented in late 2008, replacing the Trouble Call Management System. TCS is designed:</p> <ul style="list-style-type: none"> <li>• As a central system, primarily used by the Network Operations Control Centre (NOCC) to monitor and facilitate a response to unplanned outages (faults) and to monitor planned outages</li> <li>• To maintain the network fault database from which statistics for network quality and reliability of supply performance are monitored.</li> </ul> <p>Western Power's redundancy strategy for TCS includes five redundant servers in replication.</p>
Electricity Network Management and Control (ENMAC)	<p>ENMAC is a Distribution Management System supplied by GE Energy. The system is comprised of the following modules:</p> <ul style="list-style-type: none"> <li>• Network Management</li> <li>• SCADA</li> <li>• Limit Manager</li> <li>• Distribution Power Analysis</li> <li>• Advanced User Interface</li> <li>• Data Historian</li> <li>• HV Webview (Reporting)</li> <li>• Trouble Call Management</li> </ul> <p>The base DMS system was implemented in 2003 with the TCS module being added in 2008. The HV Webview interface provides users with a web interface to utilise the data within TCS. ENMAC has been established with varying levels of user access, dependant on the information required by the user.</p>

System	Description
Permanent Power Quality Monitoring devices (permanent PQ devices)	<p>109 permanent PQ devices have been installed at select points on Western Power's network to collate quality of supply data. Western Power plans to increase the number of devices to 136 in the 2011/12 financial year.</p> <p>Permanent PQ devices are installed on the Low Voltage (LV) network in pairs, one at the distribution transformer and one at a customer premises near the end of the LV feeder. The devices:</p> <ul style="list-style-type: none"> <li>• Provide an indication of the power quality performance of an LV feeder</li> <li>• Are remotely monitored and data retrieved is stored in the PI database. Each device provides data in 5 minute intervals.</li> </ul> <p>Should a device be faulty (e.g. breakdown in a communication link or the device itself) an automated email is sent to the Power Quality email account. We understand that each device can accumulate 12 days worth of data.</p> <p>Supporting the permanent PQ devices are temporary 'logger' units that can be installed at customer premises to investigate quality of supply complaints.</p>
Distribution Quotation Management (DQM) system	<p>DQM is a job tracking and estimation tool utilised broadly within Western Power. For the purposes of the audit, DQM is primarily utilised to plan and cost works to parts of Western Power's network, which may be as a result of power quality complaints or scheduled planned works.</p>
Data Warehouse	<p>The Data Warehouse comprises the servers utilised to house read only TCS and MBS data for the purposes of reporting (specifically including reliability reporting, network planning and EOPS). Access to change or alter data is limited to members of the Extract Transform Load (ETL) team. Any change requests must be approved by the business and records maintained.</p>
Extended Outage Payment System (EOPS)	<p>EOPS is a Lotus Notes application developed to facilitate the service standard payments to customers affected by extended outages.</p> <p>Once a claim is submitted by the customer, either by mail or online, EOPS performs a number of checks, including validating the:</p> <ul style="list-style-type: none"> <li>• Customer to MBS, either by NMI number or customer name</li> <li>• Address to a customer listing within Lotus</li> <li>• Outage by comparing the NMI and date to TCS.</li> </ul> <p>Claims that are not approved through the above process are listed and manually reviewed to determine whether the claim is invalid. We understand this step was implemented as requests for service standard payments were being rejected even where a valid fault had occurred. Potential causes of such discrepancies are:</p> <ul style="list-style-type: none"> <li>• The Data Warehouse not updated with TCS data, if claim was received prior to warehouse updates</li> <li>• Customer incorrectly completes form which results in failed validation of a field e.g. address or NMI.</li> </ul>

# Quality of supply

## Division 1 - Quality standards

### Code requirement

Division 1 of the Code outlines the standards for quality of supply at the point of connection to the customer, specifically relating to:

- Voltage fluctuations and harmonic distortion (sections 5(1), 6(2) and 7)
- Disconnection of customers where there is a possibility of damage to the customers' installation (section 8).

### Mechanisms and systems designed to meet Code requirements

#### Observation of standards for voltage fluctuation and harmonics

Western Power is required to comply with the quality of supply requirements detailed in sections 6(2) and 7 of the Code (refer to **Appendix C** of this report for specific details). For the purposes of this Division we understand that power quality relates to either 'flicker' (voltage fluctuations) or harmonic distortions noticed by the customer. For these items to be recognised as power quality concerns they must be repetitive, but not result in de-energisation.

We understand that Western Power has both proactive and reactive mechanisms for monitoring power quality performance:

1. Proactive monitoring is conducted using permanently installed PQ devices which show the overall performance of the network on a sample basis.
2. Reactive monitoring uses PQ devices that are installed in response to a customer complaint (the primary source used for recognising power quality issues experienced at the customer level) to help diagnose the PQ problem in relation to the customer's connection point.

#### Recognition of network quality issues

Western Power's Power Quality Complaints Procedure indicates that:

- Western Power's response to network quality issues is reliant on the customer lodging a complaint with either the Customer Assist call centre (logged via NETCIS) or the fault line (logged via TCS). However, through discussions with Customer Assist staff, we understand that there is potential for complaints received by the Customer Assist team relating to power quality to only be logged into NETCIS and not TCS (refer to *opportunity for improvement 1/2011*)
- Once a customer has lodged a complaint or fault, Western Power can initiate its investigation processes to determine whether there are issues with power quality at the customer premises. Western Power's standard process is to install a power quality monitoring device to assist with analysing the issue
- Should issues be identified, Western Power applies its standard operations for implementing remedial actions to correct power quality issues.

### Reporting of network quality performance

Western Power has developed a Power Quality procedure for Regulatory Reporting to facilitate its power quality reporting obligations under the Code. The primary source of data for the Regulatory Report is the permanent PQ devices.

The Power Quality team produces the following reports:

- On a quarterly basis (starting from the September 2010 quarter), an “LV Network Power Quality Compliance with Electricity Industry Code 2005 and Electricity Industry Act 1945” report. The report details:
  - Steady state voltage (frequency histogram)
  - Harmonic distortion (frequency histogram)
  - Voltage unbalance compliance (not required by the Code, or considered by this audit)  
Note that voltage fluctuations are not reported as permanent PQ devices are not designed to measure this metric.
- On a monthly basis, power quality complaints per 100,000 customers (calculated on a 12 month rolling average) is reported within the Network Performance Branch report (refer to *opportunity for improvement 2/2011*)

However, through discussions with the Team Leader - Power Quality Management Team we determined that no procedural guidance has been developed on the processes required when a breach of the power quality metrics as detailed by sections 6(2) and 7 of the Code is recognised, including escalation requirements, beyond the Compliance Failure Reporting Policy and the online breach reporting form (refer to *opportunity for improvement 3/2011*).

### **Duty to disconnect**

The Team Leader - Power Quality Management Team advised that:

- To the best of his knowledge, in recent years, Western Power has not disconnected a customer where the voltage fluctuations and harmonic distortion levels breached the requirements of section 6(2) and 7 of the Code
- Western Power’s voltage fluctuations and harmonic planning levels are designed so that they will not breach the required sections of the Code.

This audit also determined that Western Power has the following practices in place in the event that a customer’s installation requires disconnection due to voltage fluctuations and harmonic distortion exceeding the requirements of the Code.

### Disconnection of a customer

The Team Leader - Power Quality Management Team advised that as part of the power quality investigation process, consideration is given as to whether or not the customer should be disconnected to prevent damage to the installation or property, unless it is in the interest to maintain supply. The Power Quality Complaint Handling Process Manual does not address the requirement to disconnect a customer in compliance with section 8 of the Code (refer to *opportunity for improvement 4/2011*).

## Mechanisms designed to monitor compliance with Code requirements

Western Power has installed permanent PQ devices on its network to proactively monitor network quality performance. To 30 June 2011, Western Power has installed 109 devices, with a plan to increase numbers to 136 devices in the 2011/12 financial year. The current number and spread of permanent PQ devices provides Western Power with network quality data, on a sample basis.

Through discussions with the Team Leader - Power Quality Management Team and examination of relevant documentation, we understand that:

- Western Power is still developing processes for:
  - Monitoring its compliance with Part 2, Division 1 of the Code (beyond its reliance on those mechanisms and systems designed to meet its Code obligations (refer to *opportunity for improvement 2/2011*))
  - Utilising data obtained from the permanent PQ devices and investigations to assist in facilitating its compliance monitoring regime.
- The Power Quality team currently does not specifically monitor or report on instances where Western Power had a duty to disconnect, or has affected a disconnection in response to a power quality complaint (refer to *opportunity for improvement 4/2011*).

## Opportunities for improvement

### 1/2011 – Recognition of quality and reliability of supply complaints within TCS

As Western Power's complaints handling process does not appear to provide for all power quality and network reliability complaints to be logged into TCS, Western Power could strengthen its processes to ensure that all complaints and faults are consistently recorded between TCS and NETCIS, to better facilitate investigation and reporting of power quality and reliability issues.

### 2/2011 – Monitoring of power quality performance

Information derived from customer complaints, permanent PQ devices and power quality loggers could be more effectively used and analysed to monitor performance against the compliance requirements of Part 2, Division 1 of the Code (quality of supply).

The Network Performance Branch monthly report currently presents the number of complaints per 100,000 customers as the quality of supply metric (with a target of less than or equal to 16 complaints). Western Power could consider making broader use of existing performance monitoring information or establishing additional metrics to monitor power quality performance.

### 3/2011 – Reporting of quality of supply breaches (section 5(1) of the Code)

To more effectively recognise and report any instances where Western Power has not complied with section 5(1) of the Code on account of it not as far as reasonably practicable, complying with the standards prescribed by sections 6(2) and 7 of the Code, Western Power could:

- Develop procedural guidance to reduce the current reliance on the knowledge and experience of existing staff
- Develop guidelines to support the existing corporate breach reporting process.

### 4/2011 – Duty to disconnect

Further to the existing power quality investigation process, Western Power could extend its processes to explicitly demonstrate the need for disconnection is considered in instances where voltage fluctuations or harmonic distortion may cause damage to customer installations. Such enhancement will facilitate reporting processes, which will enable Western Power to either:

- Demonstrate instances where a duty to disconnect was required and affected
- Provide clarity around instances where a duty to disconnect was present, however no corresponding action was taken.

# Reliability of supply

## Division 2 - Standards for the interruption of supply to individual customers

### Code requirement

Division 2 provides for the maintenance of supply and management of interruptions to customers, both in terms of the duration and number of interruptions. Division 2 addresses:

- Provision of supply with the minimum number and duration of interruptions (section 9)
- Consideration of providing alternative supply if the interruption is expected to be significant, its effect substantial or if the customer has special health needs that require continuous supply (section 10(2))
- Allowance for planned interruptions if the customer is notified within a suitable time and where the duration is under 6 hours, or under 4 hours for temperatures over 30 degrees or north of the 26th parallel (section 11)
- Provisions for the distributor to remedy the causes of interruptions or enter into alternative arrangements if the supply to small use customers has been interrupted for more than 12 hours continuously or more than:
  - 9 times in the Perth CBD or urban areas
  - 16 times in other areas

in the preceding 12 months to 30 June and it is considered that the prescribed standard is unlikely to be met for the customer (section 12(3)).

### Mechanisms and systems designed to meet Code requirements

#### Number and duration of interruptions

For the purposes of the reporting metrics used by Western Power to monitor supply reliability, the data is drawn from Western Power's Data Warehouse, which houses all TCS outage data.

#### Monitoring number of interruptions

Western Power's reporting processes, on a monthly and yearly basis, provide for the number of interruptions to be considered by Western Power management. The following metrics are reported on an annual basis as part of the Network Quality and Reliability of Supply report, as well as forming part of the monthly Network Performance Branch reporting:

- The percentage of customers within the Perth CBD who experienced no outages
- The percentage of customers of the Perth urban area who experienced 9 outages or more
- The percentage of customers of the Perth rural area who experienced 16 or more outages.

#### Monitoring of length of interruptions

Western Power's reporting processes, on a monthly and yearly basis, provide for the length of interruptions to be considered by Western Power management. The following metrics are reported on an annual basis as part of the Network Quality and Reliability of Supply report, as well as forming part of the monthly Network Performance Branch reporting:

- The percentage of customers within the Perth CBD who experienced total outage minutes of less than 30
- The percentage of customers of the Perth urban area who experienced total outage minutes of less than 160
- The percentage of customers of the Perth rural area who experienced total outage minutes of less than 290.

### **Alternate supply**

Western Power is required to (in accordance with section 10(2) of the Code) consider providing customers with alternate supply if an interruption is expected to be significant, the effect is substantial or if the customer requires continuous supply (e.g. for life support customers).

Through discussions with the Field Services Coordinator and examination of the Management of Sensitive/Priority Customers where Planning Power Interruptions procedure, we determined that Western Power has the following processes for the provision of alternate supply:

- As part of the works delivery process, the scheduler/switching operator is required to log a Distribution Network Access Request (DNAR) to the NOCC. This DNAR identifies the work required, whether any customers will be affected by the planned outage and if so, whether Customer Assist is requested to do the customer notifications
- The scheduler/switching operator or Customer Assist (if the customer notifications were delegated) is required to review ENMAC to identify customers who will be affected by the outage. Some affected customers may be identified within ENMAC as either sensitive load (SL) or life support (LS)
- Should an affected customer be identified as SL or LS within ENMAC, the DNAR requestor/switching operator or Customer Assist is required to make contact with that customer. For managed customers the Western Power Account Manager will often facilitate this contact. The customer's needs must be taken into account and if necessary, reasonable and practicable, options including back feeding, rescheduling and emergency response generation provisions will be considered
- Should alternate supply be required (e.g. generator) the Scheduling team liaise with the Emergency Generator Response Group, which is responsible for arranging and connecting a generator to the customer's premise. This action is built into the switching schedule for the works, which is the responsibility of the works Team Leader
- The Emergency Generator Response Group is required to liaise with the relevant Team Leader for the required alternate supply works. Once the generator is installed and operational, the Team Leader is notified and work can be carried out.

### **Planned interruptions**

#### Scheduling of planned interruptions

Planned interruptions, as defined by section 3 of the Code enables Western Power to de-energise customer premises for scheduled maintenance and other tasks. Through discussions with Western Power scheduling, we determined that Western Power has long established processes for scheduling planned interruptions in accordance with Division 2 of the Code.

Western Power's processes for liaising with customers encompasses all of its customer base, including small use customers to large retail customers, schools and industrial areas.. When arranging a planned interruption Western Power schedulers schedule works to be complete and lodge a DNAR to the NOCC for program writing and development of the switching schedule. The switching schedule is required to consider:

- The length of the interruption, in accordance with the timeframes of section 11(2) of the Code. Specifically, work to not to be conducted longer than six hours or only four hours, due to weather (further described below)
- Whether the customer can be appropriately notified in timeframes required, prior to work being undertaken
- If the customer is a sensitive customer (e.g. life support), consideration of alternate supply requirements, in accordance with the above processes. Note that it is the responsibility of the of the group scheduling the work for considering alternate supply needs
- If the customer has been subject to consecutive or repeat interruptions
- The weather, in accordance with the Management of Planned Outages in Hot Weather Guidelines. The Guidelines outline the following parameters and constraints for scheduling planned outages during forecasted hot weather:
  - All work less than four hours can proceed as planned
  - Conditional work (e.g. greater than four hours and temperature is greater than 30 degrees) can be undertaken if the schedule can demonstrate that all practical options to maintain supply have been considered
  - Work between four and six hours is to be cancelled where the forecast temperature at the time of the planned interruption is greater than 38 degrees. Where work is greater than six hours and the forecast temperature is greater than 35 degrees, scheduled work is to be cancelled.

**Table 1 – Hot Weather Guidelines (extract from Guidelines)**

Bureau of Metrology forecast	Outage timeframe		
	All outages less than 4 hours	Outages between 4 and 6 hours	Outages greater than 6 hours
Less than 30 degrees	OK	OK	Conditional
Between 30 and 35 degrees	OK	Conditional	Conditional
Between 35 and 38 degrees	OK	Conditional	Cancel
Greater than 38 degrees	OK	Cancel	Cancel

Through discussion with the Acting Branch Manager – Network Operations, we understand that:

- Western Power is reliant of the Scheduler and the Program Writer for determining whether or not ‘conditional’ work should proceed. Management approval or acknowledgment of the breach is not required (refer to *opportunity for improvement 5/2011*)
- During the period subject to audit, Western Power implemented Hot Weather Guidelines to strengthen governance arrangements. A checklist is currently being implemented for use when lodging a DNAR to a Program Writer. The Acting Branch Manager – Network Operations advised that this checklist will be formally in place for the 2011/12 summer period
- The Scheduler is required to estimate the weather when lodging the DNAR and request for notification to Customer Assist utilising the guidance in the Hot Weather Guideline, which estimates the temperature using historical data from the Bureau of Meteorology

- It is the responsibility of the Team Leader managing the works to confirm the temperature prior to works being undertaken and whether work should be delivered, however it does not appear that official Bureau of Meteorology estimates are being either (a) utilised or (b) maintained to demonstrate compliance (refer to *opportunity for improvement 5/2011*).

#### Customer notification of planned interruptions

Through discussions with Western Power Customer Assist staff, we understand that there are currently two processes for the notifying customers of Western Power's intention to interrupt supply:

Method	Description
Letter notification	<p>Western Power has developed a Customer Assist Notification Process Guideline to manage the notification process for planned interruptions. The process utilises ENMAC and DFIS to identify customers who will be affected by the planned interruption.</p> <p>Customer Assist is only able to notify customers with HV outages that are requested via DNAR as the report generated identifies affected transformers using HV isolation points. Therefore, if LV work is not within the HV isolation point, the customer cannot be identified automatically, and must be notified manually (i.e. hand carding).</p> <p>Customer Assist requires 10 business days notice to notify customers in the metropolitan area and 13 business days for rural customers. Should the scheduler be unable to meet the Customer Assist timeframes, Western Power staff/contractors are required to 'hand card' 3 business days in advance of the scheduled planned outage date (in accordance with Western Power's customer charter).</p>
Hand carding	<p>Western Power has implemented a hand carding process for notifying relevant customers of planned interruptions requiring staff or contractors to manually letter box drop Western Power branded cards with details of the planned interruption. Section 11(1)(b) of the Code requires customers to be notified at least 72 hours prior to the commencement of the planned interruption. Western Power, according to its Customer Charter, has set the minimum standard to be at least three business days prior to work being conducted.</p> <p>We further determined that Western Power:</p> <ul style="list-style-type: none"> <li>• Has not formalised the hand notification process, by way of procedural guidance for staff. We acknowledge that Customer Assist is currently developing work instructions for notifying planned outages by hand</li> <li>• Does not have a mechanism for effectively demonstrating that all customers had been notified prior to a planned outage, if they are hand carded.</li> </ul> <p>Refer to <i>opportunity for improvement 6/2011</i>.</p>

#### Service standard payments

Western Power will pay a service standard payment to customers, upon request, for failure to notify of a planned interruption. All service standard payments are logged into a spreadsheet for tracking purposes by the Customer Assist team. Western Power's process for validating the claim is to determine whether a planned outage was scheduled and whether there is any evidence to indicate that the customer would have been notified. Primarily, the validation can only be performed where the Customer Assist team has been responsible for notifying the customer and is able to source a copy of the letter sent. For customers who are hand carded, demonstrating

whether or not the customer was notified is problematic as current methodologies do not enable effective monitoring of hand carding activities.

We examined a sample extract of the service standard spreadsheet for outages in June 2011 and identified a number of customers on the same street (inferring the same feeder) who were not notified.

### **Remedy the causes of interruptions**

Through discussions with Western Power staff and examination of documentation, we determined that Western Power has long established processes in place to remedy the causes of interruptions. The primary system utilised is TCS, which identifies faults on the network enabling the NOCC to respond and allocate, on a prioritised basis, resources to remedy the interruption.

### **Mechanisms designed to monitor compliance with Code requirements**

From our understanding of Western Power's systems, processes and approach to deliver reliable supply, we consider that despite the efforts made to achieve compliance, Western Power needs to further improve its processes:

- For monitoring its compliance with Part2, Division 2 of the Code
- To identify where an event impacts on its compliance. For example, if the initial length of a planned outage was less than 4 hours as forecast temperature was above 30 degrees and the actual interruption was greater than 4 hours, is the event recognised as an unplanned outage?
- To provide insight into and to measure the performance of the mechanisms designed to achieve compliance (and therefore to facilitate monitoring of Western Power's compliance).

With reference to section 11 of the Code, which defines what is considered to be a planned outage, there are a number of scenarios where the 'planned' status of an outage can be challenged. Where an interruption is not scheduled and managed in accordance with Section 11 of the Code, the interruption must be considered as a breach of Section 9 of the Code. Examples of occasions where the incorrect classification of a planned outage may result in non-compliance include:

- Notification not actually received by customers (evidenced through service standard payments)
- Notification not provided within 72 hours (where Western Power discovers that notification was not properly provided)
- Outage of greater than 4 hours occurring on day with temperatures of greater than 30 degrees, where the outage was planned and notified before the BOM's official temperature forecast.

It appears that Western Power is not currently able to demonstrate where the above types of transactions resulted in a breach being recognised.

### ***Opportunity for improvement 7/2011***

## Opportunities for improvement

### 5/2011 – Planned interruptions and hot weather

Western Power has recently implemented a Hot Weather Guideline to strengthen governance arrangements for scheduling planned interruptions. The Guideline does not recognise the need for the interruption to be reported as ‘unplanned’, in instances where the interruption falls outside the Code’s provisions for planned interruption.

Western Power could strengthen its processes to ensure that:

- Where ‘conditional’ works are to be undertaken, appropriate level of management oversight is provided to demonstrate commitment to the requirements of the Code
- Processes are designed to facilitate correct categorisation and reporting of planned and unplanned interruptions
- Formal evidence is maintained to demonstrate compliance with requirements of section 11(2) of the Code.

### 6/2011 – Hand carding processes

Although Western Power’s hand carding processes are designed to comply with the Code’s requirements for notifying outcomes of planned interruptions, Western Power could more effectively demonstrate and monitor such compliance by:

- Completing and implementing existing draft procedural guidance for hand carding processes, including training of operational staff
- Ensuring adequate records of hand carding activity are maintained to demonstrate compliance.

### 7/2011 – Instances where “planned” interruptions result in a breach of Section 9 of the Code

Where an interruption is not scheduled and managed in accordance with Section 11 of the Code, the interruption must be considered as a breach of Section 9 of the Code.

Western Power can strengthen its procedures for recognising instances where a planned interruption does not meet the Code’s definition and therefore, should be recognised as an unplanned interruption. Such instances may also be included as a key metric within the Network Performance Branch monthly report.

## Division 3 - Standards for the duration of interruptions of supply in particular areas

### Code requirements

Part 2, Division 3 provides standards for the duration of interruptions of supply in particular areas. Section 12 of the Code provides that the average length of interruptions must be less than:

- 30 minutes within the Perth CBD
- 160 minutes for urban areas other than the Perth CBD
- 290 minutes in any area of the State.

The above standards are to be calculated as an average of the yearly averages over 4 years.

### Mechanisms and systems designed to meet Code requirements

Western Power has developed a Reliability Key Performance Indicator (KPI) Calculation Guide (the Guide) to assist with determining the average length of interruptions in both urban and rural areas. The purpose of the Guide is to describe the reliability indicators in terms of calculations that Western Power reports at the corporate and regulatory level during the Access Arrangement 2 (AA2) period. Section 3 of the Guide states that, “an ‘outage’ refers to any interruption lasting more than one minute”, which aligns to section 3 (definitions) of the Code. Outages lasting less than one minute are recognised as ‘momentary interruptions’ and are not captured under these performance metrics.

To determine the average length of interruptions in accordance with Part 2, Division 3, Western Power utilises the System Average Interruption Duration Index (SAIDI), which:

- Represents the average number of minutes each customer is without supply during a four year period, annualised over 12 month period on a particular network
- Is the sum of the duration of each customer interruption lasting more than one minute for each of the four financial years, divided by the average of the total number of connected customers. The four SAIDIs are averaged to give a four year annualised figure
- Is reported by the following categories:
  - Perth CBD
  - Perth metropolitan area (except for the CBD), Mandurah, Albany, Bunbury, Geraldton and Kalgoorlie
  - South West Interconnected System (SWIS)
  - Isolated networks
  - Other areas i.e. Rural, which represents the remainder of the SWIS.

### Mechanisms designed to monitor compliance with Code requirements

On a monthly basis, the Network Performance Branch reports on a range of metrics, including SAIDI for the Perth CBD, urban and rural demographics. The Branch report reflects the SAIDI targets, which are consistent with current Access Arrangements.

Those SAIDI targets are currently not aligned with the specific provisions of the Code (refer to *opportunity for improvement 8/2011*).

### Opportunities for improvement

#### 8/2011 – Use of SAIDI targets

In providing a comparison of actual performance to planned targets for the duration of supply interruptions to customers, Western Power’s Network Performance Branch monthly report could be further updated to reflect the specific provisions of Part 2, Division 3 of the Code.

# Variations

## Division 4 – Variation of obligations under this Part

### Code requirements

Variations of obligations under Part 2 provide for:

- Review and approval by the Minister or alternative requirements (section 14)
- Agreement between transmitter/distributor and the customer of extensions and modifications to the standards (section 15).

### Observation

Division 4 of the Code provides for:

- Western Power to apply to the Minister for an exemption from compliance with or the replacement of a provision of Part 2 of the Code. If granted the minister will, by instrument, exempt Western Power from compliance with the respective provision (section 14)
- Western Power to negotiate with a customer, in writing, that a provision of Part 2 of the Code is excluded or modified in relation to the supply of electricity (section 15).

The Performance Monitoring and Benchmarking Team Leader confirmed that:

- Western Power has not applied for or obtained an instrument from the Minister to exempt or replace provisions under Part 2 of the Code
- Western Power has not negotiated with a customer an amendment or exclusion to the provisions of Part 2 of the Code.

### Conclusion

For the purposes of the 2010/11 Network Quality and Reliability of Supply audit, Western Power has no compliance obligations under Division 4 for the Code.

# Appendix A – Compliance obligations

Section	Requirement
<b>Division 1</b>	
5(1)	A distributor or transmitter must, as far as reasonably practicable, ensure that electricity supply to a customer's electrical installations complies with prescribed standards ( <i>in sections 6(2) and 7, relating to voltage fluctuations and harmonics</i> ).
8	A distributor or transmitter must, so far as reasonably practicable, disconnect the supply of electricity to installations or property in specified circumstances, unless it is in the interest of the customer to maintain the supply.
<b>Division 2</b>	
9	A distributor or transmitter must, as far as reasonably practicable, ensure that the supply of electricity is maintained and the occurrence and duration of interruptions is kept to a minimum ( <i>section 11 specifies the planned interruptions that are allowable (not a breach)</i> ).
10(1)	A distributor or transmitter must, so far as reasonably practicable, reduce the effect of any interruption on a customer.
10(2)	A distributor or transmitter must consider whether, in specified circumstances, it should supply electricity by alternative means to a customer who will be affected by a proposed interruption.
12(3)	A distributor must take prescribed action in the event of a significant interruption to a small use customer.
<b>Division 3</b>	
13(2)	A distributor or transmitter must, so far as reasonably practicable, ensure that customers in specified areas do not have average total lengths of interruptions of supply greater than specified durations.
13(3)	The average total length of interruptions of supply is to be calculated using the specified method.
<b>Division 4</b>	
14(8)	A distributor or transmitter must, on request, provide to an affected customer a free copy of an instrument issued by the Minister and of any notice given under section 14(7) of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005.
15(2)	A distributor or transmitter that agrees with a customer to exclude or modify certain provisions must set out the advantages and disadvantages to the customer of doing so in their agreement.

Source: *Electricity Compliance Reporting Manual May 2011* published by the Economic Regulation Authority

# Appendix B – References

## Key Western Power staff participating in the audit

Staff member	Position	Branch
Dino Patroni	Team Leader	Power Quality Management
Nigel Wilmot	Senior Networks Engineer	Power Quality Management
Dean Frost	Acting Branch Manager	Network Operations
Nancy Leo	Analyst	Network Operations
Lucy Sheppard	Complaints and Resolutions Team Leader	Customer Assist
Joe Woodlock	Planned Outage Coordinator	Customer Assist
Aaron Gibbons	Performance Monitoring and Benchmarking Team Leader	Network Performance
David Wilkes	Lead Data Warehouse ETL Specialist	Information Technology
Dave Phelan	Contract Analysis	Information Technology
Emily Saxey	Performance and Benchmarking Analyst	Network Performance
Michael Pover	Asset Systems Analyst	Network Performance
Geoff Barnett	Audit & Process Team Leader	Network Performance

## Key documents and other information sources examined

- Electricity Industry (Network Quality and Reliability of Supply) Code 2005
- Power Quality Complaint Handling Process Manual
- PQ Procedure for Regulatory Reporting
- LV Network Power Quality Compliance with Electricity Industry Code 2005 and Electricity Act 1945 reports for
  - 1st Quarter FY 2010/11 (1 July to 30 Sept 2010)
  - 2nd Quarter FY 2010/11 (1 Oct 2010 to 31 Dec 2011)
  - 3rd Quarter FY 2010/11 (1 January to 1 April 2011)
- PQ devices Meter Commissioning guideline
- Permanent PQ Meter Lifecycle and Data Usage guideline
- TCS Training Manual for Operators
- Customer Assist's Notification Process – Guidance notes
- Work Instructions for Notifying Planned Outages by Hand
- Customer Engagement Guidelines for the Scheduling of Planned Outages (draft)
- Emergency Response Generators guideline
- Management of Sensitive/Priority Customers where Planning Power Interruptions
- Service Standard Payment Spreadsheet extract (June 2011)

**Deloitte:** 2010/11 Network Quality and Reliability of Supply Code Audit

21

*This report is intended solely for the use of Western Power for the purpose of its reporting requirements under section 26 and 27 of the Code. We do not accept or assume responsibility to anyone other than Western Power for our work, for this report, or for any reliance which may be placed on this report by any third party for any other purpose*

- Customer Complaints – Networks Division (June 2011)
- Guidelines for the Management of Planned Outages in Hot Weather
- Reliability KPI Calculation Guide over the AA2 Period
- Network Performance Branch reports – April 2011, May 2011
- IT Branch ELT Team – TCS ETL Support Procedures
- Business Continuity Plan – Customer Service Centre
- Business Continuity Checklists
- Customer Complaints Process
- 2009/10 Review of Network Quality and Reliability of Supply Performance Reporting

# Appendix C – Voltage fluctuation and harmonic tables

**Table 1 – Voltage fluctuations**

Compatibility levels	
$P_{st}$	1.0
$P_{lt}$	0.8

**Table 2 – Harmonics**

Compatibility levels for harmonic voltages (in percent of the nominal voltage)					
Odd harmonics Non multiple of 3		Odd harmonics Multiple of 3		Even harmonics	
Order h	Harmonic voltage %	Order h	Harmonic voltage %	Order h	Harmonic voltage %
5	6	3	5	2	2
7	5	9	1.5	4	1
11	3.5	15	0.3	6	0.5
13	3	21	0.2	8	0.5
17	2	>21	0.2	10	0.5
19	1.5			12	0.2
23	1.5			>12	0.2
25	1.5				
>25	0.2 + 1.3 (25/h)				

Note – Total harmonic distortion (THD): 8%