



ABN 20 009 454 111

Audit Report
Horizon Power
2014 Network Quality and Reliability of Supply
Performance Audit -
Operation of Compliance Monitoring Systems

September 2014

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executive summary

Under the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 (the Code), Division 3, Section 26, Horizon Power is required to arrange for an independent audit of the operation of the systems that are in place to monitor its compliance with Part 2 of the Code or an instrument made under Section 14(3). In July 2014 Horizon Power commissioned Qualeng to carry out the audit in respect of the operation of such systems to cover the period 1 July 2013 to 30 June 2014.

Horizon Power supplies electricity services to 38 non-interconnected or islanded systems in regional towns and remote communities, one major interconnected system, the North West Interconnected System (NWIS) and the connected transmission network between Kununurra, Wyndham and Lake Argyle. These systems extend from the Kimberley in the North to Esperance, Norseman and Hopetoun in the South and include the Pilbara, Gascoyne, Mid West and Southern Goldfields regions. In addition to its own power generation plant that is managed by a third party, Horizon Power also purchases electricity from third parties.

The audit was conducted between August and September 2014 and included:

- review of actions resulting from previous audit recommendations;
- identification and review of supporting documents;
- interviews of key personnel;
- review of evidence, data, reports and processes demonstrating the operation and performance of the systems.

The audit found that out of the three recommendation made in the previous audit, two have been closed and one, noted below, is still pending:

- While there are procedures to guide the measurement of power quality, there are no systems to monitor compliance with flicker and voltage harmonics criteria. No measurements of individual harmonics was carried out in the audit period.

Horizon Power has a number of systems that monitor its performance against the

requirement of the Code:

- The Electricity Network Management and Control system (ENMAC) and the Trouble Call System (TCS) monitor faults and initiate investigations;
- Power Quality Investigations address faults and customer complaints regarding power quality issues;
- the Asset Management Report monitors interruptions over 12 hours, planned outages over 4 or 6 hours and where the frequency of interruptions is over 16 per customer;
- planned outages over 4 and 6 hours are monitored and reported;
- customers with special health needs are identified in the system;
- there are procedures for notification of planned outages as well as compensating customers where applicable;
- a number of strategies are in place including providing alternate power supplies to mitigate interruptions;
- there are systems in place monitoring interruptions over 12 hours, when frequency of interruptions is over 16 per customer per year and overall duration of interruptions per customer over 4 years.

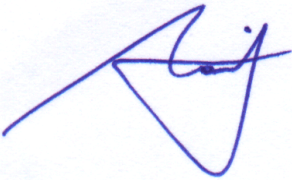
As well as the finding open from the previous audit one additional finding was recorded on completion of the audit:

- In regard to the requirement of providing notifications at least 72 hours before each planned outage, while there is a system for reporting inadequate notifications at the end of the auditing period (following customer complaints), there is not sufficient evidence that a system is in place monitoring compliance throughout the audit period.

Based on the scope of the audit defined in section 26 of the Code, and except for the findings noted above, Qualeng has found that the operation of Horizon Power's systems which monitor compliance with the requirements of the Code, is in compliance with the requirements of Part 2 of the Code, "Quality and Reliability Standards".

This report is an accurate representation of the findings and opinions of the auditors following the assessment of the client's conformance to nominated conditions. The report is reliant on evidence provided by other parties and is subject to limitations due to the nature of the evidence available to the auditor, the sampling process inherent in the audit process, the limitations of internal controls and the need to use judgement in the assessment of evidence. On this basis Qualeng shall not be liable for loss or damage to other parties due to their reliance on the information contained in this report or in its supporting documentation.

Approvals

Representation	Name	Signature	Position	Date
Auditor:	M Zammit		Lead Auditor / Engineering Manager, Qualeng	22/12/2014

Issue Status

Issue No	Date	Description	Approved
1	10/9/2014	First Issue	MZ
2	12/9/2014	Updated data and minor reporting improvements	MZ
3	22/12/14	Revised customer complaint number from 10 to 0 in p 19 as per Horizon Power's advice	MZ

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1 *Objectives and Scope of Audit*

1.1 INTRODUCTION

Horizon Power has an Electricity Integrated Regional Licence (EIRL2 Licence) (the licence) issued by the Economic Regulation Authority (the Authority) under Sections 7 and 15(2) of the Electricity Industry Act 2004 (WA) (the Act). Under the scope of the licence Horizon Power supplies electricity to approximately 100,000 residents and 10,000 businesses, including major industry. The services are provided to an area of approximately 2.3 million square kilometres extending from the Kimberley in the North to Esperance, Norseman and Hopetoun in the South and including the Pilbara, Gascoyne, Mid West and Southern Goldfields regions in Western Australia. Services are provided through 38 non-interconnected or islanded systems in regional towns and remote communities, one major interconnected system, the North West Interconnected System (NWIS) and the connected transmission network between Kununurra, Wyndham and Lake Argyle. In addition to power generating plant in Carnarvon, Marble Bar, Nullagine, Kununurra and Wyndham, Horizon Power also owns generating plant that is managed by a third party and purchases electricity from third parties.

Under the terms of the Act Horizon Power is required to comply with the Electricity Industry (Network Quality and Reliability of Supply) Code 2005 (the Code). In accordance with Division 3 "Performance reporting", Section 26 "Annual report on monitoring systems" of the Code, Horizon Power is required to arrange for an independent audit of the operation of the systems that are in place to monitor its compliance with Part 2 of the Code or an instrument under Section 14(3).

In July 2014 Horizon Power commissioned Qualeng to carry out the Performance Audit to cover the period 1 July 2013 to 30 June 2014.

The audit has been conducted and this report prepared in accordance with the Code.

1.2 AUDIT OBJECTIVES

The purpose of the Network Quality and Reliability of Supply (NQRS) audit is to assess and report on the operation of the systems implemented by the licensee to monitor its compliance with Part 2 of the Code or an instrument under section 14(3).

1.3 AUDIT SCOPE

Part 2 of the Code includes 4 Divisions:

1. Division 1, "Quality Standards" for compliance with requirements for quality of supply at the point of connection to the customer, in regard to voltage fluctuations and harmonic distortion.
2. Division 2, "Standards for the interruption of supply to individual customers" provides for the maintenance of supply and management of interruptions to customers, both in terms of the duration and number of interruptions. It includes for:
 - 2.1. Provision of supply with the minimum number and duration of interruptions.
 - 2.2. 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.
 - 2.3. Allowing planned interruptions if the customer is notified within a suitable time and where the duration does not exceed 6 hours, or 4 hours for temperatures over 30 C or north of the 26th parallel.
 - 2.4. Provides for the distributor to remedy the causes of interruptions or enter into alternative arrangements if the supply has been interrupted more than 12 hours continuously or more than 16 times in the prescribed 12 months and it is considered that the prescribed standard is unlikely to be met for the customer.
3. Division 3, "Standards for the duration of interruptions of supply in particular areas" provides that the average length of interruptions should not exceed 290 minutes in any area of the State, other than the Perth CBD and urban areas and 160 minutes for urban areas other than the Perth CBD (calculated as average of the yearly averages over 4 years).
4. Division 4, "Variations of obligations under this Part" provides for:
 - 4.1. review and approval by the Minister of alternative requirements and
 - 4.2. agreement between the transmitter/distributor and the customer of extensions and modifications to the standards.

The audit was carried out between August and September 2014.

On Horizon Power's behalf the following representatives participated in the audit, contributed to sourcing the documentation and providing evidence to the audit:

- Ms Neetha Lakshman, Senior Compliance and Performance Engineer, Asset Management Services
- Mr Gerard Chow, Business System Analyst, Operations Division Asset & Work

The main auditing team members were Mr M Zammit, Lead Auditor and Mr S Campbell, Reviewer.

1.4 AUDIT METHODOLOGY

The audit followed in part the methodology defined in the Authority's "Audit and Review Guidelines: Electricity and Gas Licences", April 2014 including:

- preparation of an audit plan and risk assessment for Qualeng internal control,
- fieldwork,
- reporting.

The audit proceeded through a documentation review, meetings and checks of processes. These were supported by additional queries to clarify aspects of Horizon Power policies and procedures.

1.5 LIMITATIONS AND QUALIFICATIONS

An audit provides a reasonable level of assurance on the effectiveness of control procedures, however there are limitations due to the nature of the evidence available to the auditor, the sampling process inherent in checking the evidence, the limitations of internal controls and the need to use judgement in the assessment of evidence.

1.6 ACRONYMS AND ABBREVIATIONS

Abbreviation	Description
A&W	Asset & Works
CAIDI	Customer Average Interruption Duration Index
Code	Electricity Industry (Network Quality and Reliability of Supply) Code 2005
ENMAC	Electricity Network Management and Control
LV	Low Voltage
NWIS	North West Interconnected System
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Frequency Duration Index
SWIS	South West Interconnected System
TCS	Trouble Call System
THD	Total Harmonic Distortion

2 Licensee's Response to Previous Audit Recommendations

2.1 BACKGROUND

The previous quality and reliability of supply audit was completed in September 2013. This section reviews Horizon Power's progress on that audit recommendations as well as Horizon Power's planned actions to address any outstanding issues.

The recommendations arising from the previous report and the confirmation and status of actions determined in this audit have been summarised in the following table.

2.2 PROGRESS OF ACTIONS FROM 2013 AUDIT

The following table lists the recommendations made in the 2013 Audit and records progress of any actions.

Item No	Code Ref	Requirement	Findings	2013 Recommendations and Opportunities for Improvement	Status
1	Div 1, Sec. 5 - 7	<p>Quality and Reliability standards, voltage fluctuations, harmonics:</p> <p>A transmitter and a distributor must, so far as is reasonably practicable, ensure that electricity supplied by the transmitter or distributor to a customer's electrical installations, as measured at the point of connection of those installations to the network, at all times complies with the standards including voltage fluctuation (flicker) and harmonics.</p>	<p>▶ There is no process for routine measurement of power quality at the customer connection. No records were available of flicker or harmonics measurements at customers connections.</p>	<p>1/2013. Initiate monitoring of compliance of power quality in respect of flicker and harmonics at customer connections (open from 2011 - 2012 period).</p>	<p>There has been no resolution of the recommendation during the audit period, however an "Advanced Metering Infrastructure" project has been initiated which will, subject to a cost benefit analysis, provide the basis for the introduction of routine power quality monitoring. Status remains as per previous audit:</p> <ul style="list-style-type: none"> HP does not monitor flicker and harmonics at customer connections. Measurement at customer connections is reactive and is carried out when there is a power quality complaint. <p>Open</p>
2	Div 2, Sec. 9	<p>General standard of reliability</p> <p>System to monitor compliance with maintaining the supply with a minimum number and duration of interruptions.</p>	<p>▶ There was no direct reporting of the number of all interruptions, including both planned and unplanned, that were greater than 4 or 6 hours duration.</p>	<p>2/2013. There should be reporting of the number of all interruptions, including both planned and unplanned, that are</p>	<p>Horizon Power has created an automatic report which is generated weekly and published on Horizon Power's public drive. The report has records of all incidents occurring over the last</p>

Item No	Code Ref	Requirement	Findings	2013 Recommendations and Opportunities for Improvement	Status
				greater than 4 or 6 hours duration.	two week period including incidents that result in loss of power of over 4 h or 6h, their timing, response information and status. Open incidents are highlighted by colour coding and shown as in progress. Closed
3	Div 2, Sec. 12	<p>Significant interruptions to small use customers (> 16 times or > 12 Hours).</p> <p>System to monitor compliance with duty for remedial action where significant interruptions to small use customers (> 16 times or > 12 Hours).</p>	<p>▶ There is no clear evidence that causes of excessive interruption frequency (i.e. frequency > 16) for the preceding period (2011 - 2012) have been remedied or or alternative arrangements made in 2012 - 2013. Remedy would require systematic identification, reporting, review and rectification.</p>	<p>3/2013. Implement a system for monitoring compliance with the requirement to remedy the causes of frequency of interruptions in excess of Code requirements for the preceding audit period (in this case 2012 - 2013) or provide alternative arrangements with customers.</p>	<p>The issues of duration and frequency of interruptions have been recognised by Horizon Power's Asset Managers and initiatives have been developed to deal with the problem. Two of the initiatives were at the townships of Wyndham and Onslow::</p> <ul style="list-style-type: none"> • In Wyndham, which is supplied by an IPP through a feeder from Kununurra, auto start generators have been installed providing back up power when the IPP or the feeder break down, this has resulted in a reduction of SAIFI from 18-20 to 5-8; • In Onslow, which is also supplied by an IPP, mobile generators have been brought in to provide back up power when interruptions



Item No	Code Ref	Requirement	► Findings	2013 Recommendations and Opportunities for Improvement	Status
					are experienced. Incident occurrence has been significantly reduced. Closed

3 Key Findings

3.1 SYSTEM TO MANAGE COMPLIANCE WITH PART 2, DIVISION 1, QUALITY STANDARDS (SEC. 5 TO 8)

Requirement: The Licensee is required to have systems in place to monitor compliance with requirements to ensure that the electricity supply quality of supply at the point of connection to the customer, both in terms of voltage fluctuations and harmonic distortion and for disconnection of customer where there is a possibility of damage to the customer installation.

3.1.1 Quality of Supply - System/Process (sections 5 - 7)

Horizon Power has reactive systems in place for monitoring compliance with the Code power quality requirements at the point of connection to the customer. The systems rely on customer raising complaints or faults.

- ▶ There are no systems in place to monitor that the electricity supply quality (for flicker and harmonics) is in compliance with the Code power quality standards at all times.

Power Quality Investigations (PQI) are initiated in response to faults which can be reported by customers, by Horizon Power's crews or by the SCADA equipment. Faults can be remedied immediately and/or can be subject to investigation.

The following documents set the intent and the procedure:

- the "AMP Instruction Module 2012/13 Module 7 – Quality," (HP_3233258)
- the "Power Quality Investigations - Handbook" (DM# 3274139)

The "AMP Instruction Module 2012/13 Module 7 – Quality" provides the requirements and an outline of the process for managing and documenting the quality of power supply. The "Power Quality Investigations - Handbook" details the process to be followed for the resolution of PQ incidents.

The system for managing customer calls and complaints is based on a mature process. The Trouble Call System (TCS) manages faults and power quality incidents experienced on the networks and affecting customers. The procedure "ENMAC TCS - call taking to be processes" (DMS#3191123) provides the instructions for recording and resolution of calls and fault handling.

The audit did not see any reports recording traces of flicker or harmonics. Power quality measurements for loads, voltage levels and frequency are performed at the transformers and at the LV network as part of the annual checks, however they do not fulfil the requirements of the code. As noted above the power quality measurements tasks are reactive, in response to customer complaints and preliminary fault investigation. Procedures for taking those measurements are documented in the "Harmonics

Allocation Manual" and the "Flicker Allocation Manual".

Reporting on PQI is regular. The monthly "Asset Management Report" reports on power quality complaints, investigations (PQI Work Orders) and Non-performing Feeders by region, months and Year To Date (YTD). PQI are reported in a register, the "0382 AMR Quality PQI Complaints (AMR Drill Report)". It was noted that not all PQIs result in a finding of power quality issues as some faults are fixed on the spot and not all power quality issues fall under the scope of the Code. In 2013-14 there were 31 PQI incidents, of which eight were assessed as Voltage Fluctuation. All of those eight were assessed as due to "Network Asset" (lightning arrester, in line fuse, loose connections, damaged consumer leads, drop out fuse) and none were assessed to be in relation to the requirements of the Code. One of the incident (number INCD-117405-p) did not show a cause, on enquiry Asset Management Services confirmed that the incident was due to a loose connection on the ABC conductor. No flicker or harmonic measurements were taken against PQIs in the audit period.

Once the PQI findings are finalised the regions perform a cost/benefit analysis and determine the best whole of life solution which is then included in the following year asset management plan.

On the preventive side, Flick is a network analysis tool to determine the fluctuations on the network when new disturbance loads are connected to the network. This tool is used when designing new customer funded jobs to ensure that the PQ standards are achieved.

3.1.2 Duty to Disconnect if Quality of Supply may Lead to Damage (section 8)

The fault handling process allows the field crews, in conjunction with the power system "Controller", to disconnect supply where required.

A Field Instruction, the "FI 5.1, Customer Defective Electrical Equipment" provides the instructions to the field crew for disconnecting customer electrical connection when the customer's electrical equipment is found defective.

3.1.3 Summary of power quality monitoring findings

The following findings have been made on the operation of systems, processes and practices dealing with monitoring the quality of supply:

Table 1: Systems to monitor compliance with requirements for quality of supply

Site	Flicker (Pst ≤ 1.0; Plt ≤ 0.8)	Harmonics (THD ≤ 8%)	Customer Complaints or Faults Related to PQ
All	▶ Reactive system. No measurements available	▶ Reactive system. No measurements available	None assessed as power quality incidents related to the Code.

Finding:

<p>1/2014. There is no process for routine measurement of power quality (for flicker and harmonics) at the customer connection. No records were available of flicker or harmonics measurements at customers connections.</p>

3.2 SYSTEM TO MANAGE COMPLIANCE WITH PART 2, DIVISION 2, STANDARDS FOR INTERRUPTION OF SUPPLY

The Licensee has to comply with requirements for the management of interruptions to customers, both in term of the duration and number of interruptions. The requirements are for the Licensee to:

- Maintain the supply with the minimum number and duration of interruptions.
- Reduce the effects of interruptions; provide alternative supply if the proposed interruption is expected to be significant, its effect substantial or if the customer has special health needs that require continuous supply.
- Ensure that where interruptions are planned, where practicable the customer is notified within a suitable time and the duration does not exceed 6 hours, or 4 hours for temperatures over 30 C or north of the 26th parallel.
- Remedy the causes of interruptions or enter into alternative arrangements if the supply has been interrupted more than 12 hours continuously or more than 16 times in the prescribed 12 months and it is considered that the prescribed standard is unlikely to be met for the customer.

3.2.1 Maintain the supply with a minimum number and duration of interruptions (Sec. 9)

Requirement: The licensee must establish systems to monitor compliance with the requirement to ensure, so far as is reasonably practicable, that the supply of electricity to a customer is maintained and the occurrence and duration of interruptions is kept to a minimum.

The "Fault Management Procedure" establishes the identification and investigation of incidents. The "Monthly Asset management Report" provides monitoring of performance in respect of the number and

duration of interruptions ("Asset Management Report" p 26). In addition Horizon Power has created an automatic report which is generated weekly and published on the public drive. The report has records of all incidents occurring over the last two week period including incidents that result in loss of power of over 4 h or 6h, their timing, response information and status. Open incidents are highlighted by colour coding and shown as "in progress". Regional offices monitor the report and take action to close the incidents.

The "Asset Management Report" reports on:

- the number of customers subjected to more than 16 interruptions in the year by region;
- the number of interruptions over 12 hours duration by region, month and period to date compared to previous period;
- the number of planned outages over 4 or 6 hours duration (as applicable) by region, month and period compared to previous period;
- the number of outstanding Incidents over 7 days old in TCS.
- the SAIDI, SAIFI and CAIDI performance, (ie. the average total duration of outages for each customer served, the number of interruptions that a customer experiences and the average length of each interruption per customer respectively) over the period.

Summary:

Table 2: Systems to monitor compliance with requirement to maintain supply the occurrence and duration of interruptions to a minimum

Site	Procedures dealing with outages	Systems and Procedures monitoring performance
All	Yes	Yes

3.2.2 Reduction of effects of interruptions and provision for alternative supplies for proposed interruptions (Sec. 10)

Requirement: The licensee must establish systems to monitor compliance with its duty to reduce the effect of any interruptions and provide alternative supply for proposed interruptions if the interruption is greater than 4 or 6 hours, or there is a substantial effect on the business or there are special health needs customers.

Reduce the effect of any interruptions

Horizon Power has systems in place to monitor compliance with its duty to reduce the effects of any interruption.

Faults can be reported by customers, by Horizon Power's crews or by the SCADA equipment. Customer interruptions are monitored through the Trouble Call System (TCS) provided as a part of the Electricity Network Management and Control system (ENMAC). ENMAC records when a customer's supply is interrupted and when the supply is restored, the incident dispatch details, restoration actions and associated equipment failure.

The priority on attendance to the fault, after ensuring it is safe to do so, is for the field crews to rectify the fault in the first instance and restore supply.

The Trouble Call System (TCS) manages all faults on the networks and affecting customers. The procedure "ENMAC TCS - call taking to be processes" provides the step by step recording and resolution of calls and fault handling. Incident reports show that every significant step taken by the crew attending the fault is recorded by action and time stamp.

Incidents remain open until the fault crew restores power to the customer and provides confirmation of a restored supply to HPCC. The incident is fully closed once the Power Services Officer completes the "Fault Report".

As reported in section 3.2.1 an automatic report is generated weekly and published on Horizon Power's public drive. The report has records of all incidents occurring over the last two week period including incidents that result in loss of power of over 4 h or 6 h, their timing, response information and status. Open incidents are highlighted by colour coding and shown as "in progress". Accountancy for the incidents is placed on the regional offices which monitor the report and take action to close the incidents. Fault times are checked by Operations Division Asset & Work to verify that fault statistics are correct.

In addition the monthly Asset Management Reports report on outages over 4 or 6 hours by regions and progressively through the year. The figures are compared year-on-year to the previous audit period, they are colour coded to show deterioration/improvement and a brief outline of reason(s) provided if there are significant changes.

Provision of Alternative Supply

Horizon Power has systems in place to monitor compliance with the requirement to reduce the effects of planned interruptions. The "Horizon Power Control Centre Outage Management Process" (DM; 3488293) provides the guidelines for responses to:

- planned interruptions
- forced interruptions
- network disturbances
- power quality incidents and
- a variety of other interruptions.

Fault management procedures include consideration for bypassing faults, using Independent Power Providers (IPP) or mobile equipment to provide alternate power generation, feeder rotation plans and

supply restoration plans to re-establish supply in a timely manner. Sites have arrangements to provide alternative supply for extended outages. Mobile equipment is available throughout the network.

Special Health Needs Customers and Commercially Sensitive Loads

Procedure "CS_Framework process map_Life Support", under the "Customer Service Framework", DM 3412209, documents the processes for handling Special Health Needs (SN) customers. SN customers are identified when they fill an application form for connection to Horizon Power's electricity supply or for a change in circumstances. The customer data is stored in account records and then transferred to ENMAC. Customer information is uploaded by Gentrac Velocity (the customer services application) into ENMAC/TCS on a nightly basis. Identification of SN customers and commercially sensitive loads is provided on the system panels, the "HV Network" diagram (the online schematic display of the network which has online real-time system status) so that controllers and operators are aware of their presence. Switching programs can then indicate SN customer presence when outages are planned.

Summary

Table 3: Systems to monitor compliance with duty to reduce the effect of interruptions and provide alternative supply for planned interruptions

Site	Reduce the Effect of Interruptions	Alternative Supply	Special Health Needs Customers
All	Yes	Yes	Identified

3.2.3 Planned interruptions acceptable if less than 4 or 6 hours and if notified (Sec. 11)

Requirement: The licensee must establish systems to monitor compliance with the requirement to maintain planned outages not exceeding 4 or 6 hours and providing notifications at least 72 hours before each planned outage.

Horizon Power has a system to manage and monitor planned outages.

Planned Outages Not Exceeding 4 or 6 Hours

Planned outages exceeding 4 or 6 hours are reported in report "0234 Planned Outage Incidents Outside Charter (2013-2014)", The incidents are categorised, some details provided and the cause of the incident noted with a generic classification. The data in the report is quoted in the "Asset Management Report" which is issued monthly across the organisation. Data for the previous period was reported in "DM# 3299471 - Horizon Power Planned Outages Outside Charter Report".

There were 65 planned outages exceeding the specified duration in the audit period compared to 85 for

the previous period (2012 - 2013). It was noted that the Asset Management Report for June 2014 showed a figure of 133 planned outages over the limit, however the report noted that "As a result of the recent changes made to the ENMAC-Powerson Fusion environment, the TCS Data that feeds the report above [will] require some redevelopment.", the issue was rectified by early August.

Planned Outage Notifications

The process of planned outage notification is mapped in the "CS - Framework Process Map - Notification Of Planned Outages" (HP3722547).

Customers not notified of a planned outage receive a letter (DM#3490959) along with a claim form. If a customer does not receive sufficient notification of the outage the customer has recourse to Horizon Power through the complaint system. Horizon Power advised that systems are in place in the Districts to advise customers where notification is not provided in accordance with the Code, however there was not sufficient evidence to verify the performance of the system and its monitoring.

- ▶ There was no evidence of separate and progressive reporting of planned outages having insufficient notification, the current system relies on reporting by customer through customer complaints. In 2013-14 there were no customer complaints regarding inadequate notification.

Summary

Table 4: Systems to monitor compliance with planned outages not exceeding 4 or 6 hours and providing notifications at least 72 hours before each planned outage

Site	Notification ≥ 72 hours prior	Duration ≤ 4h or 6h (as practicable)
All	Reporting is reactive in response to customer complaints, no monitoring is in place. There were customer complaints regarding inadequate notification.	Monitored 65 planned outages > 4 or 6 hours

2/2014. While there is a system for reporting inadequate notifications (following customer complaints) at the end of the auditing period, there is not sufficient evidence that a system was in place throughout the audit period monitoring compliance with the requirement of providing notifications at least 72 hours before each planned outage.

3.2.4 Significant interruptions (over 12 hours duration or more than 16) to small use customers (Sec.12)

Requirement: The licensee must establish systems to monitor compliance with the requirement to remedy the causes of interruptions or make alternative arrangements where significant interruption (duration over 12 hours or more than 16 interruptions in the preceding year) occurred for small use customers and where the Licensee considers that the prescribed standard (9 years out of 10) is unlikely to be met.

The audit has found that there is a system for monitoring compliance with the requirements to remedy the causes of significant interruptions or make alternative arrangements so that the prescribed standard is met.

Monitoring is provided by the automated Cognos Express report "0386 - HP Customers with Outages >12 Hrs" (DM# 3283015) and by the monthly Asset Management Report, which reports on the interruptions and includes a non-performing feeder chart identifying fault causes. The Cognos Express report provides the data on customers affected by interruptions over 12 hours by townsites and districts. Interruptions are traced to the transformer which allows traceability of customer numbers and addresses. The report "Over 12 hours TCS Incidents by Restoration Stage" is provided to the regions and it is the role of the Asset Managers in the regions to monitor the performance.

The prescribed standard (duration over 12 hours or more than 16 interruptions in the preceding year) was not fully met currently due to events outside of Horizon Power's control (cyclones) and slower implementation of reliability improvement projects due to limitations in available funding.

The audit reviewed the automated report from Cognos Express generated on 24 May 2014 for April 2014, and the Asset Management Report for the same month, which showed 2430 premises interruptions over 12 hours compared to 571 in the previous audit period.

At the end of the audit period there were a total of 3785 premises interruptions, of these 3494 were caused by cyclone Christine. The causes of the interruptions have been identified. For most interruptions only one premise was affected. Karratha had the highest number of interruptions over 12 hours with 3412.

Over the audit period there were 1263 instances of premises that experienced more than 16 interruptions.

Remediation

The issues of duration and frequency of interruptions have been recognised by Horizon Power's Asset Managers and initiatives have been developed to deal with the problem. Two of the initiatives were at the townships of Wyndham and Onslow:

- In Wyndham, which is supplied an IPP through a feeder from Kununurra, auto start generators have been installed providing back up power when the IPP or the feeder break down, this has resulted in a reduction of SAIFI from 18-20 to 5-8;
- In Onslow, which is also supplied by an IPP, mobile generators have been brought in to provide back up power when interruptions are experienced. Incident occurrence has been significantly reduced.

Summary

Table 5: Systems for monitoring compliance with interruption duration not to exceed 12 hours

Site	2014 > 12 hours	9 Years out of 10 (≤ 12 hours)	Causes of Interruption Remedied / Alternative Arrangements
		Compliance	2014
All	3785 premises affected	Not available	Major causes were identified for interruptions > 12h Main contributors to interruptions were identified and alternative arrangements implemented.

Table 6: Systems for monitoring compliance with interruption frequency not to exceed 16 per customer per period

Site	2014 > 16#	9 Years out of 10 (≤16#)	2013 > 16#	Causes of Interruption Remedied / Alternative Arrangements
		Compliance		2013
All	1263 premises	Not available	826 ¹ premises	Major causes were identified for frequency > 16 for the preceding year (2012 - 2013 period); there is evidence of remediation.

Notes:

1. As noted above, figures have been adjusted as a result of the recent changes made to the ENMAC-Poweron Fusion environment, the TCS Data that feeds the reports have required some redevelopment.

3.3 SYSTEM TO MANAGE COMPLIANCE WITH PART 2, DIVISION 3, STANDARDS FOR THE DURATION OF INTERRUPTION OF SUPPLY IN PARTICULAR AREAS (SEC. 13)

Requirement: The licensee must establish systems to monitor compliance with the Code requirement to ensure that the average total length of interruptions per customer for the four years up to the current year for areas other than the Perth CBD do not exceed 160 minutes in urban areas or 290 minutes in any other area of the State.

Horizon Power has implemented a system that identifies both the length of interruption of supply to each customer of every town in outage minutes and the target that each town should reach to achieve a complying supply for the entire networks.

The overall four year average is 330 minutes for the four years up to 30 June 2014, which is higher than the required figure however the figure is inclusive of interruptions due to external factors outside of Horizon Power's control. The figure for the 2014 audit period was 335 minutes. Horizon Power also calculates the same data excluding major external events such as storms cyclones, floods, vehicle, vandalism etc. The resulting data is defined as "Normalised Data" and corresponds to the network performance within Horizon Power's control. Once the external causes are removed the audit period figure is reduced from 335 to 155 minutes.

The average over the last four years, inclusive of 2014, was greater than 290 min in 12 out of the 38 systems (including 37 town sites and the NWIS system).

Summary

Table 7: Systems to monitor compliance with requirement for interruption not to exceed 290 minutes average per customer over 4 years.

Site	2014 (≤ 290 m)	4 Year Average (Avg over 4 years ≤ 290 min)
		Figures have been calculated over 4 years up to 2014.
All sites	335	330
NWIS (for information only)	496	309

3.4 PROVISIONS MAY BE EXCLUDED OR MODIFIED BY AGREEMENT WITH CUSTOMERS (SEC 15)

Requirement: A customer and a transmitter or a distributor may agree in writing that a provision of this Part is excluded or modified in relation to the supply of electricity by the transmitter or distributor to the customer and the agreement must set out the matters that the parties consider are the advantages and disadvantages.

Horizon Power has entered into agreement with a limited number of customers to interrupt the supply by following a documented procedure. Horizon Power benefits through demand management and the customer through financial benefits.

4 *Audit Summary and Recommendations*

Under Section 26 "Annual report on monitoring systems" of the Code, Horizon Power is required to arrange for an independent audit of the operation of the systems that are in place to monitor its compliance with Part 2 of the Code. or an instrument under Section 14(3).

The audit has found that Horizon Power's systems monitoring compliance with Part 2 of the Code are in general compliance with the requirements of the Code, except as noted below.

There were three recommendation arising from the 2012 - 2013 audit. The audit found that one action is still open and has been included in this year findings:

- HP carries routine monitoring of power quality at substation busbars and not at customer connections, however monitoring does not include parameters required by the Code. Monitoring at customer connections is reactive and is carried out when there is a power quality complaint. No measurement of flicker, harmonics and individual harmonics, required under sections 6 and 7 of the Code, was carried out.

There were no "Opportunity for Improvement" raised in the previous audit.

In addition to the action still open from the previous audit, the audit made one new finding:

- While there is a system for reporting inadequate notifications (following customer complaints) at the end of the auditing period, there is not sufficient evidence that a system was in place throughout the audit period monitoring compliance with the requirement of providing notifications at least 72 hours before each planned outage.

Table 8 below provides a summary of the findings and recommendations of the report in regard to the system operation.

The table rates the various element as satisfactory (✓), unsatisfactory (✗), or as actions in progress, observations or opportunities for improvement.

Throughout the audit it was evident that staff were aware of the Code requirements and there was commitment to improvement of the system compliance.

Based on the scope of the audit defined in section 26 of the Code, Qualeng has found that the system and processes within Horizon Power are in compliance with the requirements of Part 2 of the Code, "Quality and Reliability Standards".

Table 8: Systems Compliance

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
	General system Systems monitoring compliance with the requirements of the Code.	✓	✓	Operation of the systems which monitor Horizon Power's compliance with the Code, complies with the Code requirements except for the findings noted below.	
Div 1, Sec. 5 - 7	System to monitor compliance with quality and Reliability standards: voltage fluctuations, harmonics.	✓	✓	The system monitored power quality complaints and no complaint was identified as due to quality of supply.	1/2014. Provide monitoring of compliance of power quality in respect of flicker and harmonics at customer connections (open from 2011 - 2012 period).
		✓	✓	▶ There is no process for routine measurement of power quality at the customer connection. No records were available of flicker or harmonics measurements at customers connections.	
Div 1, Sec. 8	System to monitor compliance with duty to disconnect if damage may result due to power quality.	✓	✓	Fault responses are documented. Responsibility to disconnect customers remains with the service crew. Field Instruction covers disconnection where fault is due to customer.	
Div 2, Sec. 9	System to monitor compliance with maintaining the supply and minimise the number and duration of interruptions.	✓	✓	Procedures and processes are in place to monitor and to attend to faults and interruptions and restore supply as early as possible.	

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
Div 2, Sec. 10	System to monitor compliance with reduction of effects of any interruption and provision for alternative supplies for proposed interruptions where it affects business or special health needs customers	✓	✓	<p>Monthly reports are in place to monitor compliance. Priority of crews attending interruptions is to restore supply.</p> <p>Alternative supply is used to reduce the effect of interruptions.</p> <p>There is a formal system for managing special needs customers.</p>	
Div 2, Sec. 11	System to monitor compliance with length (less than 4 or 6 hours) and notifications for planned interruptions.	✓	✓	<p>There is a system for monitoring length of proposed interruptions. Planned outages lasting over 4 hours are reported and causes identified.</p> <p>There is a formal system for notification of planned outages to customers.</p> <p>▶ While there is a system for reporting inadequate notifications (following customer complaints) at the end of the auditing period, there was not sufficient evidence that a system was in place throughout the audit period monitoring compliance with the requirement of providing notifications at least 72 hours before each planned outage.</p>	<p>2/2014. Monitor and report against the requirement of providing notifications at least 72 hours before each planned outage.</p>
Div 2, Sec. 12	System to monitor compliance with duty for remedial action where significant interruptions to small use customers (> 16 times or > 12 Hours).	✓	✓	<p>A system is in place to monitor the number of interruptions greater than 12 hours or where the frequency of interruptions exceeds 16.</p> <p>For each interruption the causes had been identified and rectified. Overall there was an increase due to extreme weather events.</p>	

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Operation of the System Findings / Observations	Recommended Corrective Actions / Opportunities for Improvement (OFI)
		✓	✓	A system is in place to monitor whether the frequency of interruptions exceeds 16. Remedial actions have been taken to remove some of the causes of major interruptions.	
Div 3, Sec. 13	System to monitor compliance with standards for the duration of interruption of supply in particular areas ($\leq 30, 160, 290$ min)	✓	✓	There are systems in place to monitor compliance. Monthly reports monitor the duration of interruptions. The average over four years is 330 min which is above the 290 min limit. Removal of major event days reduces the figure to acceptable levels which implies that significant weather events have affected Horizon Power's performance.	
Div. 4, Sec. 15	Systems to monitor compliance with provisions may be excluded or modified by agreement	✓	✓	Complies.	