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Audit Report

Horizon Power
2011 Network Quality and Reliability of Supply Performance Audit - Operation of Compliance Monitoring Systems

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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 2011 Horizon Power commissioned Qualeng to carry out the audit in respect of the operation of such systems to cover the period 1 July 2010 to 30 June 2011.

The audit was conducted between August and September 2011 and included:

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

The audit found that actions arising from the previous audit have been completed.

Horizon Power has procedures in place to respond to customer complaints and to maintain the quality of supply. The Trouble Call System (TCS) has been implemented to manage power quality issues and faults from a customer call to resolution. Continuous power monitoring is performed at the substation busbar. Mobile equipment is available to monitor power quality at the customer point of connection in response to customer complaints.

Disconnections can be performed by service crews when customer installation may be damaged due to power quality issues. Procedures are in place to escalate the response based on the severity of interruptions.

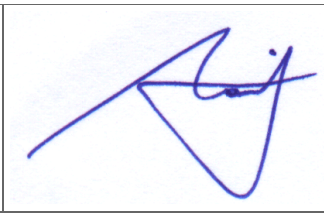
A system is in place to manage planned interruptions. Alternative means of supply are available to mitigate interruptions. Customers with special health needs are identified within the system. Interruption data is recorded and monitored for duration and occurrences and the information is reported monthly and yearly.

An opportunity for improvement has been identified in ensuring consistency of figures reported in management reports and end of year report.

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.

This report is an accurate representation of the findings and opinions of the auditors following the assessment of the client's conformance to nominated Licence conditions. The review 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	21/09/11

Audit Team

Audit Team	Description
M Zammit	Project Director and Lead Auditor
G Catteeuw	Reviewer

Issue Status

Issue No	Date	Description	Prepared	Verified	Approved
1	21/09/2011	First issue	MZ	GC	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 services across 34 townships isolated from the South West Interconnected System (SWIS). These extend from the Kimberley in the North to Esperance in the South, 5 remote Aboriginal communities and the North West Interconnected System (NWIS). In addition to its own power generation plant in Carnarvon, Marble Bar, Nullagine, Kununurra and Wyndham, Horizon Power also 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 2011 Horizon Power commissioned Qualeng to carry out the Performance Audit to cover the period 1 July 2010 to 30 June 2011.

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

1.2 Audit Objectives

The purpose of the Performance 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 is under 6 hours, or under 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 be less than 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 2011.

On Horizon Power's behalf various representatives participated in the audit and contributed to sourcing the documentation and providing evidence to the audit. Staff interviewed were:

- Mr Clive Hunt, Business System Analyst, Operations Division Asset & Work
- Mr Gerard Chow, Business System Analyst
- Mr Robert Kerrigan, Strategy Engineer
- Mr Shane Eeles, Manager, Asset and Work Capability
- Mr Greg Will, Manager Customer Service

The main auditor representatives were Mr M Zammit, Lead Auditor and Mr G Catteeuw, Reviewer.

1.4 Audit Methodology

The audit followed in part the methodology defined in the Authority's “Audit Guidelines: Electricity, Gas and Water Licences”, July 2009 including:

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

The audit proceeded through a documentation review, meetings, interviews 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	*Reference Documents*
ENMAC	Electricity Network Management and Control
NWIS	North West Interconnected System
SWIS	South West Interconnected System
TCS	Trouble Call System

2 Licensee's Response to Previous Audit Recommendations

2.1 Background

The previous quality and reliability of supply audit was completed in September 2010. 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 only finding arising from the previous report is an opportunity for improvement:

1. Continue with investigation of connectivity between TCS and customer data.

   Records for the number of interruptions were available and reported in the Performance Report 2009-10, however no analysis was included in the Report for this criterion. Currently the data is monitored by feeder (each feeder having a known number of customers). No connectivity exists between TCS and the customer database which precludes a more detailed analysis of interruption numbers, however a provision has been made to include this reporting in the monthly Asset Management Report and an action is in place to establish the required connection between TCS and the customer data.

2.2 Progress

2.2.1 Reporting of Interruption Data at Customer Level

The fundamentals on the issue of connectivity have been resolved however work on organisation wide reporting is still ongoing. Currently the Business Transformation Program is focusing on the development of a new version of Ellipse and a new GIS (based on GE Small World) which will replace DFIS. Both developments will provide the asset and work management tool and the spatial functionality down to customer level. Following this a new Business Intelligence platform will be developed next year to provide the organisation wide reporting functionality.

2.3 Further Actions and Overall Assessment

Whilst work is still ongoing, the Opportunity for Improvement identified in the 2010 audit has been identified and action taken to address it. Sufficient evidence is available to show that improvements to the system are in hand.

3 Key Findings

3.1 System to manage compliance with Part 2, Division 1, Quality Standards (sec. 5 to 8)

The Licensee is required to comply with requirements for quality of supply at the point of connection to the customer, both in terms of voltage fluctuations and harmonic distortion and to disconnect the customer where there is a possibility of damage to the customer installation.

3.1.1 System/Process

Quality of Supply

Procedures are available to manage faults originating from internal monitoring or customer contact. Internal monitoring is provided by measurement at the substation busbar for voltage fluctuations and harmonics. Electricity supply at customers connections is monitored reactively, in response to customer complaints or following unrelated operational work which identifies a potential power quality issue. Customer calls are reported by the Customer Call Centre and details of the issue are entered by a contracted Call Centre in Melbourne into TCS (Trouble Call System). Similarly field identification of power quality issues is also entered into TCS and handled by the Horizon Power Control Centre. The fault is assigned a code which identifies the type of fault and a “fault job” is assigned to a Work Delivery Team to investigate. Once the fault is investigated in the field if the problem is fixed by the crew the action is closed and the customer is advised. If the fault is confirmed as a "possible" quality fault then a recommendation may be made to investigate further. The customer is advised and mobile recorders may be installed to measure and monitor the supply quality at the customer connection. The investigation is progressed until resolved and closed. The procedure requires that the customer be contacted and advised of the results of the investigation both verbally and in writing.

Disconnection if Quality of Supply may Lead to Damage

The service crew has the responsibility to disconnect the customer if it determines that the customer installation may be damaged due to supply quality.

3.1.2 Evidence and Report

There were no "quality" events recorded during the audit period both for voltage fluctuations and harmonics. It is noted that incidents may be initially recorded as "quality" issues, however once investigated the causes of the faults may be revised. For example the Asset Management Report recorded a customer complaint in Karratha in August 2010 due to voltage fluctuation arising from a bird chewing a service cable, the incident is not reported as a quality incident in the end of year report.

Procedures are in place for the recording and management of power quality investigations.

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 is kept under 6 hours, or under 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)

Procedures are in place for managing interruptions, handling faults and responses to faults, including:

- managing the initial fault,
- acknowledgement and recording,
- management of response,
- allocation of tasks,
- fault investigation and resolution,
- reporting and closure of action.

The strategy adopted to minimise interruptions is based on giving high visibility to network performance. The focus on interruption performance is achieved through the use of Asset Management Reports (AMR) and Electricity Delivery Reports. The reports are issued monthly and present the network reliability performance in terms of power quality performance, duration and frequency of interruptions, broken down by districts. Some of the data is presented in “traffic light” reports with orange signifying “just performing” and red being over the acceptable limit. Twelve month rolling averages are tabulated and graphed, as well as forward estimates which provide a best case scenario for the return to acceptable limits. The graphs are published on Horizon Power's Powerlink intranet which allows on-demand review of district performance by all staff, including district staff.

As the formal reports are circulated to management in the Bentley office and in the districts there is high visibility on any deteriorating trend. Drops in performance result in investigation of issues and of root causes. Significant incidents are also flagged by the Customer Service group for the districts to investigate.

The end of year “Network Quality and Reliability of Supply Performance Report 2010/11” (NQRS Report 2010-11) lists an analysis of interruptions and indicates their causes.

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

Procedures are in place to manage both planned and unplanned interruptions. The crisis management procedure is available to provide a higher level of response depending on the fault severity. Special procedures are in place to manage customers with health needs and customers with critical power needs.

Special health needs customers are identified through a life support register which is maintained in the Customer Retail systems. The system relies on the customer notifying Horizon Power through a form. Once the customer is registered, a notification is sent to the regions and the account is "flagged". The "Retail" information is transferred to the Electricity Network Management and Control (ENMAC). Other special customers, like ABC transmitters, are also identified. TCS screens indicate special customers and switching programs can be arranged to suit their needs. ENMAC also shows the live state of transformers and identifies whether customers are connected or otherwise.

Regional offices, through Community and Customer Relations Managers, deal directly with customers keeping them informed of proposed interruptions.

Mobile equipment is available throughout the network and can be deployed by the Regions to provide alternative supplies where necessary.

3.2.3 Planned interruptions (Sec. 11)

Planned interruptions are managed through operational procedures. A Job Planning Work Parcel Form is used to manage jobs, the form has a step by step checklist that prompts appropriate contact with the customer, including notification by telephone, fax, card drop, newspaper or radio. Contact is maintained with the District Community and Customer Relations Manager who liaises with the customers. Up to four weeks notice are provided for planned interruptions. Horizon Power web page provides information on Horizon's obligations to customers.

3.2.4 Significant interruptions to small use customers (Sec.12)

For significant interruption (duration over 12 hours or more than 16 interruptions in the preceding year) where the Licensee considers that the standard is unlikely to be met the Licensee is required to remedy the causes of interruptions or make alternative arrangements.

Connectivity between TCS and the customer database has now been established and the number of customer interruptions is reported in the monthly Asset Management Report and in its yearly NQRS Performance Report. An analysis is carried out for interruptions over 12 hours duration and identifies the causes of interruptions. Significant events are also checked so that records which are due to "Major Events" outside of Horizon Power's control (cyclones, storms, flooding) can be separated from daily results and the different events analysed separately.

The 2010-11 NQRS Report includes data both for interruptions exceeding the prescribed duration and where customers have experienced more than 16 interruptions in the period. The 2010-11 NQRS Report lists an analysis of interruptions of over 12 hours duration and indicates the causes of the interruptions. Significant events in Carnarvon, Onslow and the NWIS (cyclone, floods and storm) have affected a high number of customers and impacted on the end of year figures. The number of premises with interruptions greater than 12 hours increased from 333 to 1142 (2009-10 and 2010-11 respectively).

Records for the number of interruptions were also available and reported in the Performance Report 2009-10 and showed that the number of premises with more than 16 interruptions decreased from 2535 to 819 between 2009-10 and 2010-11. No further analysis was included in the report for this criterion.

Data and records for the prescribed year were viewed during the audit. There appeared to be differences between the number of interruptions reported in management reports (Eg. Electricity Delivery Report) and the yearly 2010-11 NQRS report. Consistency of figures such as SAIFI reported in management reports (Eg. Electricity Delivery Report) and end of year NQRS report may need to be verified.

3.3 System to manage compliance with Part 2, Division 3, Standards for the duration of interruption of supply in particular areas (Sec. 13)

The Code provides that the average length of interruptions for areas other than the Perth CBD to be less than 160 minutes in urban areas and less than 290 minutes in any other area of the State.

The figures reported by Horizon Power in its 2010-11 Performance Report are 329 minutes (un-normalised) and 164 minutes (normalised to reflect events that are within the business control), up from 204 and 162 minutes respectively. Major events that impacted on these figures were cyclones in Carnarvon and NWIS and storms in Esperance.

Average over the four years from 2007-08 to 2010-11 is 297 (un-normalised).

Asset and Works gather the data, calculate, tabulate and graphs the results for every power system and report it. Evidence from the monthly Electricity Delivery Report shows that there is constant monitoring on network performance. Under-performing systems are individually reviewed and applicable causes and actions are reported.

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 monitoring systems are in operation and satisfy the requirements of the Code.

Actions resulting from the previous audit have been completed. One opportunity for improvement has been identified and is noted in the recommendations,

The table below summarises 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.

Table 1: Systems Compliance

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Findings / Comments	Recommended Corrective Actions / Opportunities for Improvement (OFI)
Div 1, Sec. 5 - 7	Quality and Reliability standards: voltage fluctuations, harmonics.	✓	✓	Measuring system is reactive, providing measurement at the customer connection only once a complaint is received.	
Div 1, Sec. 8	Duty to disconnect if damage may result due to power quality.	✓	✓	Responsibility to disconnect customers remains with the service crew.	
Div 2, Sec. 9	Maintain the supply with a minimum number and duration of interruptions.	✓	✓	Complies.	
Div 2, Sec. 10	Reduction of effects of interruptions or provision for alternative supplies for proposed interruptions.	✓	✓	Complies.	
Div 2, Sec. 11	Planned interruptions.	✓	✓	Complies.	
Div 2, Sec. 12	Significant interruptions to small use customers (> 16 times or > 12 Hours).	✓	✓	There appear to be differences between number of interruptions reported in management reports (Eg. Electricity Delivery Report) and yearly NQRS report.	1 - (OFI) Verify consistency of figures (eg . SAIFI) reported in management reports (Eg. Electricity Delivery Report) and end of year NQRS report.
Div 3, Sec. 13	Standards for the duration of interruption of supply in particular areas (30, 160, 290 min)	✓	✓	Within requirements if events outside of Horizon Power's control are not included.	

Code Division, Section	Code Requirement	Evidence of System	Evidence of Process	Findings / Comments	Recommended Corrective Actions / Opportunities for Improvement (OFI)
Part 4, Div. 3, Sec. 27	Publication of information about performance.	✓	✓		