Appendix D EPN

4.1 Summary

EPN holds the electricity distribution licence for the Eastern area. EPN has contracted with 24seven to carry out management services including the operation and maintenance of EPN's distribution network. 24seven is therefore responsible for providing the information to EPN that is then reported to Ofgem under IIP. A full time IIP team currently exists, although in time this will be incorporated into their ongoing operations.

EPN/24seven have been very pro-active in meeting the IIP requirements. They have given the IIP a high level of priority and have committed a high level of resources to become IIP compliant. In general, IIP is perceived by EPN/24seven as an opportunity for business improvement.

EPN/24seven have a systematic and thorough programme of training to broaden IIP understanding. Internal audit programmes are carried out regularly to ensure IIP compliance. Staff at all levels receive thorough training. Comprehensive IIP documentation is available to all members of staff explaining processes for reporting.

A significant part of the variance between audited and reported Customer Interruptions (CI) and Customer Minutes Lost (CML) could be explained by the introduction of a more accurate connectivity model to the LV feeder between the faults occurring and the date of the audit. Other relatively minor variances encountered at HV and LV resulted from: network configuration changes and inaccuracy of reporting (missed restoration stages and incident start times taken from the moment the restoration works started rather than the time of first becoming aware of the incident). Overall there were no major problems in recording incident start times.

There is a risk of transcription errors during transfer of information from field staff to control and also when inputting data into the Fault Reporting System (FRS) and the Ofgem template. Field operatives do not always record the information correctly. This is potentially a source of error. Incorrect reading of incident logs and incorrect description of incidents were found to be the major source of errors under the old fault reporting system.

The new connectivity model has removed a number of uncertainties and inaccuracies in relation to the previous algorithmic approach. However, some connectivity errors were witnessed during the audit. The model is being continuously updated to correct such errors which should result in improving accuracy. The audit team did not have any reasons to disagree with the predicted accuracy figures.

4.2 Introduction

EPN and London Power Networks (LPN) are owned by the LE Group and operate with a combined management structure across the two companies. EPN holds the electricity distribution licence for operating the distribution networks in the 'Eastern' area.

EPN has contracted with 24seven to carry out management services including the operation and maintenance of EPN's distribution networks. 24seven is therefore responsible for providing the information to EPN that is then reported to Ofgem under the IIP. The main IIP duties fall under 24seven's Commercial Division, Electricity Division and Customer Connections Business who are

responsible for gathering, processing and making available the required information.

The Electricity Division is in charge of the day to day network operation carrying out real-time management of the EHV, HV and LV distribution systems. The Commercial Division is responsible for strategic asset management including development of the networks. The Customer Connections Business is responsible for supporting new service connections and disconnections.

To accomplish compliance with IIP a project team (called Project Lynx) was established within 24seven dedicated to delivering an end-to-end IT solution for IIP across both EPN and LPN. The aim was to provide a consistent reporting format from integrated systems coupled with a full network connectivity model which associates customers to LV feeder ways. The final solution is the Network Management System (NMS) which is a fully integrated control and fault management product. This incorporates the Energy Network Management and Control (ENMAC) system, trouble call logging and customer information, fault dispatch and management and real time information and reports. This system enables IIP compliance. The NMS has been fully functional since February 2002, although the new fault reporting system has only run in parallel with the old system since the 1st April 2002.

No-supply calls and other network related calls are dealt with by 24seven's Call Centre, with an overspill facility provided by Hays. The Telephony Incident Management System (TIMS) has been identified as the most effective call management system for 24seven. The new TIMS solution is automated and driven by incidents within the Trouble Call System (TCS).

BT Networks answers customers' calls within 3 seconds. BT Networks is able to automatically detect whether the customer is in a fault-affected area based on the call-line identification (CLI) of the customer's phone number. The system can also deal with calls received from mobile phones, and determine whether these are from a customer in a fault affected area. If the customer is affected by a fault then the customer is given advice on fault restoration, which is held within the Network Management System (NMS). This is done via recorded updated messages on fault restoration. The callers are also given the phone number to reach a call agent directly. Callers that are not affected by a fault are directly routed to a call agent.

Messages played to customers have been pre-recorded and are automatically updated with incident parameters (such as estimated time of restoration, resource allocation, type of fault etc) from the ENMAC TCS.

4.3 Audit Process

This section describes the results of the audit.

4.3.1 Resources

The audit was carried out between 22 July and 25 July 2002 at 24seven's offices in Ipswich.

The visiting auditors were:

- David Hoyle of British Power International
- David Holding of Mott MacDonald.

In addition, EPN and 24seven provided a high level of resources to support the audit.

4.3.2 Induction

A comprehensive introduction to the company systems had already been given to one of the audit team members during the previous audit of LPN. It was therefore agreed that a summarised presentation would be given in this case. The presentation was complemented with a large amount of training material used by 24seven to instruct its staff on compliance with the Regulatory Instructions and Guidance (RIGs).

The presentation included an introduction to the 24seven and EPN/LPN team followed by a briefing on the following topics:

- overview of 24seven's approach to IIP
- overview of Control Centre
- overview of 24seven IT systems & structure
- connectivity accuracy and improvements.

A tour around the premises of the Control Centre and the Call Centre followed the presentation.

During the opening presentation the visiting auditors were briefed on how the connectivity model operates and how primary traded MPANs are identified, introduced, modified and updated. This included capturing new MPANs. The process starts with an extraction of the number of customers originally stored in the Meter Point Registration System (MPRS), which is then routed to PANTHER a repository database containing data relating to MPANs and customer connectivity.

Customers are inputted into a table and are arranged together with their Line Loss Factor Code (LLFC) and their current status, i.e. whether they are currently energised or de-energised. Subsequently, a look-up function is used to identify and separate primary MPANs from secondary MPANs. Automatic overnight updates from MPRS to PANTHER, reconcile information on transfers, connections, disconnections and address details from the previous day transactions within MPRS. An exception report is produced.

Documentation on the PANTHER system was made available to the audit team.

The original fault reporting model in place during the year under audit (2001/02), was based on 'averaging' customers over distribution transformers, according to capacity, then down to feeder level, based on averaging across the number of outgoing feeders. The new model was introduced in February 2002, although it was not used to record CI or CML for 2001/2. Although the audit of incidents looks at figures produced by the old connectivity model, the audit assessed accuracy using the latest and most accurate model. Geo-spatial disposition of MPANs in the new connectivity model is carried out through an algorithm that links customers to nearest cable without manual intervention. This is carried out through the association tool, STRUMAP. The model is updated within the 14 day guideline within the RIGs. The connectivity model is also used to determine the LV feeder number and the connecting transformer.

The integrated IT system (NMS) provides information on real time data, network performance, customer history and real time customer information. The Drawing Office completes updates of network changes, field diagrams and corresponding screen geo-spatial display.

The presentation also included a description of the internal training undertaken to ensure that managers and staff comply with IIP. The visiting auditors corroborated that EPN/24seven have given IIP a high level of commitment. The training package information provided to the auditors contains handouts of presentation slides, IIP posters, briefing newsletters, a booklet produced by 24seven describing new fault reporting rules and a quick guide to the asset management system - Mincom Information Management System (MIMS).

4.3.3 Questionnaires

Four questionnaires were used to support the audit process. The questionnaires aimed at measuring progress made by EPN/24seven since the interim review in the following areas:

- MPANs: checking the company's progress in correctly counting MPANs
- Connectivity model: checking the company's progress in accurately locating MPANs on its network
- RIG definitions: checking the company's interpretation of the Ofgem guidelines
- Template: checking the company's routines for providing Ofgem with the information it requires.

The completed questionnaires were agreed with the DNO and copies were left before the conclusion of the audit. The visiting auditors have concluded that EPN/24seven managements are committed to implementing IIP. EPN/24seven have produced a rigorous and precise system to comply with Ofgem's requirements.

4.4 Accuracy of Measurement Systems and Reporting Process

4.4.1 Stage 1 of the Audit Framework – Accuracy of the Measurement Systems

(i) MPANs

The audit of MPANs based on the questionnaire was carried out by one member of the audit team supported by one member of 24seven. This process took approximately half a day.

EPN/24seven have identified primary traded MPANs using the unique Line Loss Factor Code (LLFC) and status (energised or de-energised). The company has also used the LLFC coding to identify any multiple MPANs. Only those MPANs identified in the RIGs (e.g unmetered supplies and export) have been excluded from the process. The methodology outlined to the audit team was the same as the one formally agreed with Ofgem.

The systems currently being used have been updated since the Interim Review. These systems are extremely well documented and are supported by a commitment to training and internal audit. The audit team concluded that these systems were robust, and there was no evidence to conclude that the level of accuracy of the count was different to the company's estimate of approximately 100%. Any potential sources of error were agreed to be small and were largely the result of a reliance on external systems for some data.

The random sample of five addresses was taken and the process for allocating MPANs was

demonstrated. In each of the cases the MPAN was correctly assigned although it was discovered that one was not correctly allocated at feeder level in the connectivity model (this is discussed in the following section).

(ii) Connectivity Model

The audit of the connectivity model based on the questionnaire was carried out by one of the visiting auditors supported by one member of 24seven. This process took approximately half a day.

The old model, described in the Interim Review report was based on 'averaging' customers across the network according to the capacity of the distribution transformer from which they were receiving supplies. Although this model was used to generate the numbers of customers interrupted by faults covering the period of the audit, it was decided to concentrate audit efforts on the new connectivity model, as this is what will be used to generate future returns.

EPN has now implemented a fully integrated model with full documentation. This model uses a sophisticated geo-spatial algorithm to link customers to the nearest LV feeder without manual intervention. The association tool 'STRUMAP', is integrated into the Network Management System and assigns new MPANs to the model as they are processed onto the system.

The original specification of the model was reviewed by the audit team, as well as the Change Documentation.

The new model has reduced the number of uncertainties that were apparent with the old approach.

At present 0.75% of MPANs are not allocated to the model due to a deficiency in the postcode / address data on which the system relies. Actions are being taken to reduce these deficiencies and improve allocation of the MPANs.

EPN has included a methodology for calculating accuracy within its connectivity model. For each MPAN an accuracy level is assigned depending on the configuration of the network in a tightly defined radius of the premise. These accuracy levels are believed to be conservative at this stage and are likely to be reviewed as the system develops. This model predicts a level of accuracy of 90.52% at LV feeder level and 94.39% at distribution transformer level. Accuracy at HV feeder level is believed to be higher than this.

A significant number of MPANs were observed as being assigned to Feeder 0. This is the main reason for the comparatively low figures reported above. All Feeder 0 MPANs are being reviewed on an ongoing basis, and the process of re-assigning MPANs to the correct feeder was witnessed. From the Questionnaire on MPANs one address was discovered to be assigned to Feeder 0. This was immediately corrected.

On undertaking the audit of incidents a very small number of instances were identified of customers being assigned to the incorrect feeder, apparently caused by unaccountable error with the association tool. Any occurrences that were spotted were immediately corrected, although the numbers were agreed to be insignificant.

The company is very confident of the above predictions of accuracy. Potential sources of error were discussed, and agreed to be small. These are areas also under constant review.

(iii) Stage 1 Conclusions

No deviations from EPN's method of identifying customers by primary traded MPAN, as approved by Ofgem, were found during the audit visit.

No inconsistencies have been found in the auditing of EPN's MPAN processes and it can therefore be concluded that the company's estimation of approximately 100% for the accuracy of its MPAN count is correct.

Only minor inconsistencies were found during the audit of the EPN's connectivity model and it can therefore be concluded that the company's estimation of approximately 90.52% at feeder level and 94.39% at the distribution transformer level are correct. Accuracy at the HV feeder level is believed to be higher than this.

EPN is proactively addressing all areas of inconsistency identified by the audit. It is likely that the accuracy of reporting will improve quite significantly during the following months.

We can therefore conclude that EPN has inherently accurate measurement systems in place.

4.4.2 Stage 3 of the Audit Framework – Accuracy of the Reporting Process

(i) Audit of HV Incidents

A sample of 20 HV incidents was audited at EPN/24seven. This audit was undertaken by both visiting auditors and two members of the 24seven team. The audit of HV incidents took approximately one day.

The HV incidents could not be simulated because the connectivity model currently does not incorporate fault simulation. Instead, printed diagrams were made available and used to scrutinise the reported incident.

EPN had prepared the switching logs and incident logs for each incident in advance of the visit. The visiting auditors cross-checked the customer numbers and times reported on the Fault Reporting System (FRS) with the figures reproduced by looking at this documentation.

It was not possible to manually count the customers connected to the affected part of the network. From the printed diagrams and the information contained within the logs discussed above it was possible to establish which parts of the network had been affected by a given incident. The new connectivity model was used to provide the count of customers affected by looking at the number of customers associated with each distribution transformer affected by the incident.

The auditing workbook was populated with the information provided from the switching logs and incident logs.

There were variances between audited and reported CI for all of the incidents due to the introduction of a new connectivity model by LV feeder at the end of the year. When the incidents were originally recorded the number of customers affected was estimated using transformer capacities. Some of the variances in CI found during the audit could be attributed to changes in the network between the time

of the incident and the time of the audit being undertaken. There were, however, a small number of faults that had reporting errors. Of these, one could be attributed to a misinterpretation of the notes, whereas the reasons for the other errors remain unclear.

The reporting of incident start times and restoration times was more accurate with only two minor transcription errors being discovered.

The audit of HV incidents did not identify any incidents too complex to assess. The information had been methodically recorded to the degree that the auditing team was able to distinguish unnecessary restoration stages, some of which were accounted for as re-interruptions.

Overall the visiting auditors concluded that inaccuracies encountered in CI and CML stemmed mainly from:

- the old methodology of calculating customers (i.e. the 'averaging' method using distribution transformer capacities)
- changes in the network configuration between the incident and the audit
- inaccuracy of reporting – including general transcription errors and misinterpretation of notes.

There is a risk of introducing transcription errors during transfer of information from switching logs and incident logs to the Fault Reporting System (FRS).

(ii) Audit of LV Incidents

A sample of 100 LV incidents was examined. The audit was carried out by one of the visiting auditors with one member of the 24seven team. This took approximately two days to complete. Most of the incidents had only one or two restoration stages, although one chosen had 12. A report run by EPN showed that there were only 24 LV incidents out of 3,400 with 12 or more restoration stages.

As discussed for HV incidents above, there was a variance in CI for all LV incidents due to the introduction of a more accurate connectivity model by LV feeder since the incidents were reported. There were only a small number of reporting errors. These were largely due to:

- Transcription / unaccountable errors
- Missed restoration stages
- Misinterpretation of notes

Incident start times and restoration times were reported more accurately with errors found in only seven out of the 100 incidents. There were three main reasons for these errors as outlined below:

- transcription / unaccountable errors
- incorrect extraction of incident start time from logs
- misinterpretation of notes, especially with interpretation of start / finish of restoration stages.

(iii) Interpretation and implementation of the definitions and guidance from the RIGs

EPN has devoted a significant amount of resources to produce systems and implement training programmes to ensure that all appropriate staff have a thorough understanding of the RIGs. The RIGs have been embedded into the 24seven Fault Reporting System, and comprehensive documentation has been provided to all appropriate staff. The audit team reviewed the methodologies and systems used in recording start and completion of an incident, short interruptions, and restoration stages. Differences between HV and LV systems were investigated.

This audit was carried out by one of the visiting auditors, together with one of the 24seven team. The audit took approximately half a day.

The audit concludes that there is a high level of confidence that EPN has correctly incorporated the RIG definitions into its systems.

Despite a significant change to the systems in place during the course of the year the processes remain largely unchanged. These are now supported by an increase in internal auditing and additional training.

(iv) Stage 3 Conclusions

The following general conclusions can be drawn from the HV incident auditing:

- The change in connectivity model between the time of the incident and the time of the audit resulted in differences in audited and reported CI and CML for all incidents.
- Measurement of time is largely automatic on the HV system, and therefore the chance of error is low. However, manual intervention and interpretation of notes relating to the incident have caused the majority of errors found.
- The system did not facilitate a definite answer to queries raised on several incidents, and, in these cases, differences were attributed to input error.

The following general conclusions can be drawn from the LV incident auditing:

- Manual intervention is a major source of inaccuracy – this will be addressed by improvements to training programmes that are currently being introduced.
- The improvement in systems during the year, supported by extensive documentation, and internal audit should combine to improve accuracy.

4.5 Overall Impressions

EPN has been very pro-active in meeting IIP requirements. Staff at all levels receive thorough training. Comprehensive IIP documentation is available to all members of staff explaining the processes for reporting.

EPN/24seven have given IIP a high level of priority and have committed a high level of resources to become IIP compliant. EPN/24seven have a systematic and thorough programme of training to broaden IIP understanding. Internal audit programmes are carried out regularly to ensure IIP compliance.

The variances in CI and CML were mainly due to changes in the process of counting customers, input errors, and changes to networks configuration. The visiting auditors are confident of the levels of accuracy predicted for the connectivity model. Improvements to this were demonstrated and are ongoing.

4.6 Conclusions

Table D-1 presents the results of the 2002 audit of EPN in-line with the auditing framework. Under- and over-reporting are indicated in the table. The overall accuracy results have been determined by extrapolating the audit sample variances to estimated variances in the annual total figures reported to Ofgem and then summing the LV and HV estimated variances to give an estimated overall variance, which is then used to determine accuracy against overall reported figures.

Table D-1

Stage	Item	Accuracy
Stage 1	MPAN Measurement	Approx 100%
Stage 1	LV Connectivity Model at Feeder Level	90.52%*
Stage 1	LV Connectivity Model at Transformer Level	94.39%*
Stage 1	HV Connectivity Model at HV level	Not been estimated at time of audit. Considered higher than above values.*
Stage 3	LV Incident Reporting Accuracy – CI	57% (under)
Stage 3	LV Incident Reporting Accuracy – CML	57% (under)
Stage 3	HV Incident Reporting Accuracy – CI	87% (under)
Stage 3	HV Incident Reporting Accuracy – CML	86% (under)
Stage 3	Overall Incident Reporting Accuracy – CI	82% (under)
Stage 3	Overall Incident Reporting Accuracy – CML	79% (under)

* Since the audit 24seven have provided updated estimates of accuracy based on the same methodology as their previous estimates. Accuracy at LV feeder level is 94.9%. Accuracy at distribution transformer level is 95.6% and accuracy at HV feeder level is 96.14%.

The figures shown in Stage 1 above for the connectivity model relate to the 'new' model that is currently in operation.

It should be noted that percentage accuracy figures are based on a comparison between figures generated by the 'old' connectivity model and those generated by the 'new' model. Hence the above figures for incident reporting accuracy include the change in system numbers arising from the introduction of the new connectivity model.

4.7 Reporting to Ofgem's information Template

EPN completes the Ofgem template manually. This introduces the potential for error in terms of correctly transcribing the incident information from the reports generated by FRS, into the template.

An audit of the Ofgem template was carried out by one of the visiting auditors, together with one of the members of 24seven and took approximately half a day. The audit checked to see whether the figures derived from the FRS reports had been correctly transcribed into the template. The FRS

reports were also rerun to ensure the figures obtained were consistent with those reported. Small differences (< 3%) were evident in many of the figures, resulting from the process of faults being subsequently updated with additional information during the course of the year.

The following key findings were made:

- The number of HV circuits reported in FRS is different to the figure reported to Ofgem due to the recording of all faults within FRS. This includes incidents where no customers were affected and short interruptions, not reported to Ofgem.
- Two minor transcription errors were discovered.
- Calculations appear to have been performed correctly.

4.8 Recommendations

The auditors have identified the following points for further improvement:

- Seek ways of reducing errors in the transfer of information from logs to the FRS.
- Make sure staff correctly input the incident records, in precise chronological order, and explain all the restoration stages.
- Make sure staff precisely discriminate between a restoration stage, a re-interruption, and incidents that should be recorded separately.
- It may help the audit trail if a comment could be added when compiling the fault reports so that the method of estimating the numbers of customers interrupted could be established. Although, with the new Fault Reporting System there is little need for estimating customer numbers.

4.9 Learning Points

The audit team has identified the following as learning points for the audit process:

- It will be beneficial if distribution companies populate questionnaires and the workbook prior to the arrival of the visiting auditors. Having all questionnaires, incident worksheets and any other additional auditing material populated allows the audit to progress quickly.
- Having copies of incident reports printed out and working in parallel results in a more effective audit.
- The duration of restoration stages may be prolonged by the customers' needs or requests. There should be a way of including this in the incident reports.
- Some restoration stages are difficult to replicate or analyse. It is helpful to have reserve incidents.
- The team approach of the audit and flexibility put into practice enabled a more thorough and detailed audit.
- EPN/ 24 seven raised concerns about clarity of the scope of the audit. They believe that due to the advanced nature of their systems, they are required to go into more detail and provide more information than may be required with other companies.
- EPN/24seven raised a point about more efficient use of resources. It was discussed that having

the same audit team in place for both licences would have resulted in a saving in the time taken to complete this, the second audit in conjunction with 24seven.