

Appendix N South West (Western Power Distribution)

14.1 Summary

Geoff Stott and Blair Walter audited the South West licence area of Western Power Distribution (WPD) from 8 to 11 July 2002. Whilst the majority of Stage 1 of the audit process was undertaken during the audit visit to the WPD South Wales licence area, both reports have been written as stand-alone documents. From the questionnaires completed during the two audits it was apparent that the customer measurement systems employed by WPD are inherently accurate. A more detailed description of the measurement systems and the audit findings is included in the South Wales report, along with the details of the induction undertaken. Measurement systems were previously audited in September 2001 and full details published in Distribution Companies' Incident Reporting Systems Interim Review Final Report March 2002.

Inaccuracies in reported HV CI were generally minor and were caused by the manual transferral of customer numbers into NaFIRs reports. Inaccuracies in reported HV CML were also generally minor and were caused by errors in the preparation of incident reports.

Missing restoration stages were a feature of the audited LV incidents, possibly due to the complex nature of the LV incidents that make up the sample. Correctly estimating customer numbers on sub-feeder incidents proved to be a source of inaccuracies. In several sub-feeder incidents, the number of customer calls was used in the NaFIRs report as the best estimate of customers affected.

The audit team is of the opinion that WPD has correctly interpreted the RIG definitions of an incident and that the company is operating in accordance with them. The audit team is also of the opinion that WPD is operating in accordance with the procedure agreed with Ofgem for the identification of customers by primary traded MPAN.

WPD is a very pro-active organisation with a corporate objective consistent with the IIP requirements set by Ofgem. A high level of resource is dedicated to the IIP, including a comprehensive training and internal audit programme.

During the visit every opportunity was taken to witness real-time procedures in support of the audit. These observations reinforced the view that WPD does what it claims.

14.2 Introduction

WPD holds two separate electricity distribution licences, those for WPD South West and WPD South Wales. Information reporting under the IIP falls within the responsibility of the Business Support Division, which obtains the requisite information from across the Network Services Division.

The Network Services Division, which manages the day to day operation of the distribution system, is organised on a regional basis. It also manages the two HV Control Centres that carry out real-time management of the HV, EHV and 132kV networks, the Church Village control centre being responsible for the WPD South Wales networks and the Exeter control centre being responsible for the WPD South West networks.

WPD uses the G E Harris Energy Network Management and Control System (ENMAC) computer

system for recording trouble calls, planned shutdowns, incident management and also for managing WPD's 132kV, EHV, HV & LV connectivity.

WPD employs the MM Group as its Call Centre provider for both the South West and South Wales licence areas. The call centre(s) are equipped with the 'front-end' trouble-call module of WPD's ENMAC computer system. The staff at the call centre enter the details of incidents received via WPD's published freephone no-supply number into this front-end, thus date-stamping all no-supply calls received at the call centre. The front-end is also the part of the system from which call-takers can access the latest information on the progress of an incident, thus enabling them to update callers as necessary.

Within WPD, dispatchers are responsible for interrogating ENMAC and for ensuring that incidents are dealt with promptly. During normal office hours dispatchers at the local offices have this responsibility. Out of hours this responsibility is passed to the staff at the HV control centres.

This Appendix describes the audit of the WPD South West distribution licence area undertaken from 8 to 11 July 2002. The entire audit was undertaken at the Exeter control room.

14.3 Audit Process

This section defines the step-by-step progress of the audit.

14.3.1 Resources

The visiting auditors were:

- Geoff Stott of British Power International
- Blair Walter of Mott MacDonald.

The WPD audit team members were:

- Alison Sleightholm
- Bob Parker
- Carolyn Griffiths
- Dave Crocker

A number of other WPD personnel were available during the course of the week. As can be seen, WPD provided a very high level of resources to support the audit.

Richard Clay of Ofgem attended the first day of the audit in Exeter and the first part of the second day, before travelling to Bristol to visit the Avonbank head office and the neighbouring call centre.

14.3.2 Induction

At the start of the audit, the induction presentation from the WPD South Wales audit was revisited, partially for Richard Clay's benefit but also to update the visiting auditors on the work undertaken since the South Wales audit. This work focussed on improved reporting on changes to the system from the time of an incident to the time of the audit, including the following:

- ability to list the transformers affected by an incident compared with the current list of transformers that would be affected by the same incident, which enables WPD to identify changes in network configuration;
- ability to identify customers added to the network in the location of the incident since the time that the incident occurred;
- ability to identify customers that have been re-referenced since the time of the incident.

In addition, WPD believes it can generate reports on the removal of multiple MPANs where the system count of customers at the time of the audit is lower than the reported customers at the time of the incident, and on customers that have been disconnected. These reports have not yet been produced. It should be noted that reporting on disconnected customers should be possible on ENMAC version 3.1.3 which was installed in the South Wales area on 18 May 2002 and is due to be installed in the South West area on 26 July 2002.

During the course of the audit at WPD South West, the handling of a number of HV incidents was witnessed by the visiting auditors. Two key examples were:

- An 11 kV transformer failure at Barnstaple involving blown HV fuses after auto-reclose operations. The initial management of this fault was witnessed by Richard Clay and Blair Walter at the control engineer's terminal. The other members of the audit team followed the progress of the fault on the ENMAC system set up for the audit. It was thus possible to track the incident until all customers' supplies had been restored. This incident required the replacement of a pole-mounted transformer and the audit team was able to witness the updating of the network files with the details of the new equipment.
- An 11 kV cable fault at Wells. This fault yielded additional learning as WPD's T60 point for this circuit was moved as a result of the fault when it was discovered that switching at that position only restored one third of the customers interrupted. T60 points are pre-defined switching positions on WPD's HV network by which the company aims to restore the maximum number of customers' supplies within the first hour of the incident occurring. As such, T60 points exist throughout WPD's HV network.

14.3.3 Questionnaires

While a large part of the questionnaires relating to WPD's systems was completed during the South Wales audit, a number of further points were covered during the South West audit. For completeness and ease of reference, information is contained within both of the two WPD reports, so that each stands alone as a record of the associated audit visit.

A set of questionnaires was used to record the progress of the company since the interim review. The four questionnaires covered 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 MPAN and connectivity model questionnaires support Stage 1 of the Audit Framework. The questionnaire used to determine how the company has interpreted the RIG's definitions supports both Stage 1 and Stage 3 of the Audit Framework.

The template questionnaire is designed to check that the company has interrogated its incident data correctly and summated the requisite information before populating the template used to report to Ofgem. The Template questionnaire thus stands apart from the Audit framework.

The questionnaires were completed based largely on the information presented prior to the visit and during the induction. The auditors were also able to witness the handling of a real HV fault on the network. This added to the understanding of WPD's systems and procedures and assisted in the completion of the questionnaires. It also demonstrated to us that the company's IIP compliant procedures are being followed and it gave us confidence that the company does what it claims. The WPD team members checked the initial drafts of the questionnaires for factual accuracy, the result forming an agreed version.

WPD is a user of the EA PC-NaFIRS software system and had advised the audit team that the routines for populating the Ofgem template were written centrally by EA's software provider. As the first company to undergo the 2002 IIP audit, WPD had volunteered to contact the software provider to obtain the details of the routines. Completion of the template questionnaire was therefore deliberately carried-over from the South Wales audit to give WPD time to do this.

14.4 Accuracy of WPD South West measurement systems and reporting process-

14.4.1 Stage 1 of the audit framework - Accuracy of the measurement systems

(i) MPANs

As WPD employs the same systems for both of its licence areas, a decision was made to check three new MPANs in each of the networks in order to complete the MPAN questionnaire. During the audit of the MPAN methodology at WPD South West, the opportunity was taken to witness how the company deals with the request for an MPAN. The procedure was shown to be both rigorous and robust with mandatory fields requiring completion before the system would issue a core MPAN. The mandatory fields include referencing the address to the LV network as required to update the company's connectivity model.

WPD has identified all MPANs by interrogating the metering codes associated with its metered service connections via the Standard Settlement Configuration.

This work has also identified connections where multiple MPANs exist, enabling the company to eliminate these from its count of the total number of customers (MPANs) connected to its distribution system. The company has therefore identified its primary MPANs by this means. The status of the MPAN is held in the company's MPRS system.

Considerable work has been done to remove multiple MPANs from WPD's database. The company is aware of further multiple MPANs within its database but these can only be removed once the computerised systems are next shutdown.

The national MPRS system is subject to three separate annual audits, two of which are external to the company. Consequently, WPD places a 100% level of accuracy upon the factual information contained within its MPRS system and its count of customers by primary trading MPANs.

Ofgem has formally approved the method that WPD uses to identify its customers by Primary Trading MPANs, including the updating of the count. No deviations from this approved method were found during the audit visit.

Random tests were conducted on the company's MPAN database where premises that have been connected to the company's distribution system within the year under review. These tests confirmed that the selected premises have been issued with a primary trading MPAN and are included in the company's total count of its connected customers.

The opportunity was taken to witness the handling of an MPAN request in real time. This reinforced the view that the company is following the procedure that has been agreed with Ofgem.

(ii) Connectivity Model

WPD's connectivity models have been developed empirically over many years, WPD South West first developed a model over 30 years ago, in which customers were allocated to distribution transformers.

WPD has recently introduced an LV connectivity model that now disaggregates the numbers of customers into the LV feeder level. The total at LV feeder level sums to the aggregate number of customers at the associated distribution transformer.

The numbers of customers associated with distribution transformers can then be aggregated upwards to the higher voltage levels.

WPD carries-out a weekly reconciliation of the customer numbers held in its ENMAC management system with the total number held in the company's MPRS database. Multiple MPANs are removed and checks are run to highlight any invalid substations and any invalid LV feeders.

WPD has completed its LV connectivity model since the Interim Review and has a number of 'unknowns' at the LV level where customer connections cannot be determined absolutely. These customers are placed in an 'electronic bucket'. Work is ongoing to cleanse this data, the aim of the company being to minimise the contents of this bucket by assigning the unknowns to LV feeders.

A one-off transfer from MPRS to ENMAC identified a considerable number of inconsistencies that the company was able to eliminate from its systems. Ongoing work has identified fewer and fewer inconsistencies.

WPD estimates that the accuracy of its LV connectivity model is of the order of 98.5%. The records of the company's weekly reconciliations between numbers of customers identified by the MPAN count and those contained within the connectivity model were examined. The following results were calculated for WPD South West for the period between 04 March and 10 July 2002:

- (a) The MPRS to ENMAC checks yield an average reconciliation of 99.96%.
- (b) Customers with an invalid LV feeder reference are less than 0.82% of the total.
- (c) Customers with an invalid substation reference are less than 0.01% of the total.

There are several localities within WPD where the mains records include service cables. This enabled the audit team to carry-out dip-stick tests on the company's LV connectivity model.

A valuable by-product of these dip-stick tests demonstrated the way in which the company deals with multi-occupied premises as several large houses were found to have been sub-divided into flats, each with its own primary traded MPAN.

(iii) Conclusions

No deviations from WPD'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 WPD's MPAN processes and it can therefore be concluded that the company's estimation of 100% for the accuracy of its MPAN count is correct.

No inconsistencies were found during the audit of the WPD South West LV connectivity model and it can therefore be concluded that the company's estimation of 98.5% for the accuracy of its model is correct.

We can therefore conclude that WPD South West has inherently accurate measurement systems in place.

14.4.2 Stage 3 of the audit framework - accuracy of the reporting process

(i) Audit of HV Incidents

Following the brief induction/update, the audit team began auditing the HV incident reports. The WPD South West audit sample contained fewer HV incidents than WPD South Wales due to the different mix of HV and LV incidents in the data-set. We noted that a significant proportion of the HV incidents (5 out of 10) were pre-arranged. We will consider the impact of the mix of pre-arranged versus unplanned incidents in the incident sample and report our views in due course.

At the time of the audit, ENMAC version 2.5.6 was being used in WPD South West. A key difference between this version and the later version 3.1.3, as used in WPD South Wales, is that the older version is not completely integrated with the telecontrol system. It is therefore possible to recreate actual incidents on the system control diagram to determine the current system count of customer numbers. Whilst this was undertaken for only a few of the HV incidents audited, WPD had internally audited the complete sample prior to the arrival of the visiting auditors. Thus, once the visiting auditors were satisfied with the process used by WPD, the system results from WPD's analysis were used. When ENMAC version 3.1.3 is introduced into WPD South West on 26 July 2002, it will no longer be possible to recreate incidents in the live environment.

During the WPD South Wales audit, a number of large variances were discovered between the customer numbers reported at the time of the incident and the customer numbers reported by the system at the time of the audit. These variances were investigated further and in most cases a cause was found, such as new housing developments or removal of multiple MPANs. However, in the WPD South West audit, little variance was found between the reported (and audited) customer numbers and the system numbers when the incident was recreated.

Inaccuracies in reported HV CI were generally minor and were caused by the manual transferral of customer numbers into NaFIRs reports. Inaccuracies in reported HV CML were also generally minor and were caused by errors in the preparation of incident reports.

Due to the low number of HV incidents and restoration stages, we were able to complete the audit of HV incidents during the first day and begin the audit of the LV incidents.

(ii) Audit of LV Incidents

The make up of the LV incident sample for WPD South West was markedly different to that for WPD South Wales, with only 26 single premise incidents compared to 57 in South Wales. It is therefore reasonable to suppose that the WPD South West LV sample had a higher potential for inaccuracy in CI and the results of the audit appear to support this theory. Treatment of single premise incidents will require further consideration in ongoing IIP work.

As with the WPD South Wales audit, incidents occurring partway along a feeder proved to be a source of incorrect customer numbers as the dispatcher relies on the estimate given by the field operative. However, in a number of incidents at sub-feeder level no estimate of customers was available to the dispatcher and the number of customer calls received was used for the number of customers interrupted, despite the property addresses indicating that a greater number of customers were probably affected. This practice only occurred on incidents where the LV connectivity model was not available at the time of the incident and it is not expected to be an ongoing feature of WPD's incident reporting. As with the South Wales audit, it was usually not possible to confirm system numbers on incidents at sub-feeder level as no information was provided by the field operative to determine the exact position of the fault.

A feature of the LV incident audit for WPD South West was missing restoration stages. This is possibly due to the more complex nature of the incidents, involving a higher proportion of multiple-premise incidents with multiple restoration stages.

One short interruption was incorrectly included in a NaFIRs report as a restoration stage but this had only a minor impact on the reporting accuracy. One incident was reported twice on separate NaFIRs reports, both of which were included in the audited sample of incidents. However, this is not considered to be a common occurrence.

Reporting of time also proved to be a source of error, in particular correctly recording restoration time where both restoration time and incident completion time was reported by the field operative and included in the incident log. In a number of occasions, the incident completion time was transferred to the NaFIRs report rather than the restoration time.

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

WPD has produced an in-house document entitled "Information and Incentives Project - Interpretation of the section 2: Regulatory Instructions and Guidance Quality of Supply Measures". This document was updated to issue number 2 in April 2002 to reflect the March 2002 version of the RIGs.

Section 3 of the document details the definitions of Occurrences, Incidents and Interruptions, translating the wording of the RIGs into the everyday language used by WPD's people.

Ongoing training by dedicated people within the company's business support team is carried-out in support of the IIP Project. Records are kept of the people who have been trained and these were shown to the visiting auditors.

The business support team has also produced guidance notes and check-lists in support of this training. Examples of the documentation were given to the visiting auditors. Electronic versions of these documents are held on the company's information management system and are accessible from any computer terminal.

During the visit to the WPD South West Control Room the visitors witnessed the handling of two real incidents on the 11kV system. Whilst the control engineers did not need to refer to the company's information system, the use of it was demonstrated.

WPD is operating in accordance with the RIG requirement that the incident start time is the time at which the company first becomes aware of an incident by any means.

During the visit, the company demonstrated the following:

- When a telephone call is received the company's trouble-call system date-stamps the time at which the call is received. Subsequent calls regarding the same incident are also date-stamped but the company uses the time of the first call as the incident start time. This time is electronically fed into the company's ENMAC system.
- For tele-controlled networks the ENMAC system automatically date-stamps the time at which the incident occurs. Due to the incidents mentioned above, this was witnessed in real time.

Once a call has been logged in either WPD's trouble call or ENMAC system it cannot be lost or erased. Only certain specifically authorised people have access privileges that allow them to amend any database records. Such amendments are very infrequent and always leave an audit trail.

At the higher voltage levels the disciplined environment of the control room ensures that all unplanned incidents are captured in ENMAC.

Because all calls to the WPD telephony system are logged in trouble call, information at LV includes items such as cut-out fuse operations and problems concerning metering. These items should not be included in the count of LV incidents and the company has therefore developed an in-house screening process to eliminate them from the PC-NaFIRS reporting system. This process is a manual intervention in the data transfer routine.

The audit team witnessed a live demonstration of this screening process during their visit to the Avonbank offices as part of the audit visit to WPD South Wales.

Pre-arranged incidents have to be notified to customers in advance. Any such notification is recorded in WPD's ENMAC system and therefore cannot be lost.

At the higher voltage levels, the control engineers are responsible for operating the ENMAC system and the comments above therefore apply equally to pre-arranged incidents.

At LV, the local office team support is responsible for recording and reporting pre-arranged incidents within the ENMAC system.

Weekly cross-checking routines are carried-out by the business support teams to ensure that the

number of pre-arranged incidents raised in the ENMAC system corresponds to the number included in the PC-NaFIRS report.

Since the Interim Review, there has been no significant change to WPD's processes for recording incidents at the higher voltage levels.

At LV, the dedicated training resource mentioned above has been visiting the various sites to reinforce the initial training. Examples of best practice have been circulated to demonstrate the correct method of recording information in the incident log. These examples were shown to the visiting auditors.

Since the Interim Review, the company has been very busy with both the training of its people and the internal auditing of its process. The visitors were shown the prime documents for these areas and found them to be comprehensive with further learning points being included in the ongoing work.

The company's internal auditor is now a full-time member of WPD's IIP steering group and is thus able to contribute to the fundamental shaping of the company's approach to the IIP Project. From discussions held with him during the 2002 Audit, it was apparent that his workload has increased since the Interim Review.

(iv) Conclusions

At HV, any inaccuracies in reported CI were generally minor and were caused by the manual transferral of customer numbers into NaFIRS reports. Inaccuracies in reported CML were also generally minor and were caused by errors in the preparation of incident reports.

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

- Recording incident start and completion time is a potential source of error, arising from transferral into NaFIRS reports of the times reported by field operatives.
- Missing restoration stages is a feature of the audited LV incidents, possibly due to the complex nature of the LV incidents that make-up the sample.
- LV faults occurring at sub-feeder level have the potential for inaccurate reporting of customer numbers as the dispatcher relies on the field operative to estimate the number of premises off-supply. In several cases, the number of customer calls received was used as the customers interrupted in the NaFIRS report, giving a high potential for error. However, with the lack of better information from the field operative, this number is the best estimate that the dispatcher has.

The real-time witnessing of an 11kV auto-reclose operation referred to above demonstrates that WPD is identifying customers affected by short interruptions in an identical way to those customers affected by longer interruptions.

The audit team is of the opinion that WPD has correctly interpreted the RIG definitions of an incident and that the company is operating in accordance with them.

14.5 Overall Impressions

WPD is a very pro-active organisation with a corporate objective very much in-line with the direction being set by Ofgem. A high level of resource is dedicated to IIP, including a comprehensive training

and internal audit program. WPD was very interested in the findings of the South West audit so that further improvements could be made to their internal processes.

The visiting auditors were impressed by the work that had been done in the week between the South Wales and South West audits to provide better information on the reasons for changes in the system numbers between the time of the incident and the audit.

14.6 Conclusions

Table N-1 presents the results of the 2002 audit of the WPD South West licence area 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 N-1

Stage	Item	Accuracy
Stage 1	MPAN Measurement	100%
Stage 1	LV Connectivity Model	98.5%
Stage 1	HV Connectivity Model	99.8 to 99.9%
Stage 3	LV Incident Reporting Accuracy – CI	90% (under)
Stage 3	LV Incident Reporting Accuracy – CML	98% (over)
Stage 3	HV Incident Reporting Accuracy – CI	99% (under)
Stage 3	HV Incident Reporting Accuracy – CML	100%
Stage 3	Overall Incident Reporting Accuracy – CI	98% (under)
Stage 3	Overall Incident Reporting Accuracy – CML	100%

It is important to note when considering the above audit results that the LV connectivity model was introduced part way through the year and the LV incident reporting results are therefore based on a combination of pre- and post-IIP compliant incident reports.

14.7 Reporting to Ofgem's information Template

WPD uses the EA PC-NaFIRS system to record and report incidents on its distribution networks. WPD was instrumental in arranging for the EA's software company to prepare written responses to the visitor's enquiries regarding the routines used to extract the data from the incident reports with which the template is populated.

For WPD South West, the following template data was audited :

- The reported number of customers shown in the template was compared to the WPD South West total taken from MPRS at midnight on 30 September 2001. The number of customers in both cases is 1,356,895.
- During the visit to WPD South West control room, the method of capturing circuit identification was witnessed in real time as part of the process of dealing with actual incidents.
- A demonstration on PC-NaFIRS was also given and no inconsistencies were identified.

- WPD's person responsible for designing the company's method of identifying short interruptions is based at the South West control room. Whilst this area of reporting does not form part of the 2002 audit, the opportunity was taken to discuss the developments in this process since the Interim Review. The witnessing of short interruptions during the audit visit enabled the team to appreciate the real-time operation of the company's process. The method of capturing short interruptions was seen to be the same as for longer interruptions.
- For WPD South West the number of HV circuits affected box and the number of rows in the template both equal 955.
- Using the PC-NaFIRS enquiry system, the number of CI and CML reported as a consequence of the 15 incidents on the South West 132kV system were found to be 141541 and 3759729 respectively. Both of these figures agree with the entries in the Ofgem template.
- Three HV circuits were chosen at random from those contained in the Ofgem template. Using the PC-NaFIRS enquiry system the number of CI and CML reported as a consequence of the total number of incidents affecting each of these circuits was calculated. These numbers were then compared to those contained in the Ofgem template. In all three cases, the numbers of CI and CML agreed as shown in Table N-2 below:

Table N-2

Row in template	Circuit reference	CI from PC-NaFIRS	CI from template	CML from PC-NaFIRS	CML from template
116	113368 / 0012	6	6	1814	1814
425	260230 / 0068	5767	5767	224513	224513
618	330029 / 0015	2163	2163	51244	51244

14.8 Recommendations

The following points were identified by the joint audit team as areas for further improvement:

- It is vital to get the incident log right in the first place rather than trying to retrospectively fix the NaFIRS report
- Communication between site and dispatcher is critical to the accuracy of LV incident reporting;
- Attention is required to using the correct incident completion times on LV incidents
- Attention is required to capture all restoration stages of LV incidents, particularly complex incidents with significant numbers of customers affected
- A system for counting customers on HV sections of network would be useful in future as the current ability to replay incidents will not exist when ENMAC is upgraded to version 3.1.3 in mid-July this year.

14.9 Learning Points

The following points were identified by the joint audit team as learning points for the audit process:

- Preparation is vital to a smooth audit. Having all incident reports printed out with their associated supporting information allows the audit to progress quickly. It is useful to have a diagram of the area affected by the fault to see what is going on.

- The WPD South West audit showed a wider distribution of variances than the WPD South Wales audit, particularly on LV CI. Further work is required to understand the distribution of variances.
- Inaccuracies are contained in individual restoration stages. There may therefore be a case for including the number of restoration stages when determining audit sample size.
- The sample of 10 HV incidents took only three hours to complete or 18 minutes per incident on average. The HV incident audit was assisted by the fact that WPD staff had effectively audited the sample themselves in the week prior to the visit, making it easier to complete the audit.
- The sample of 100 LV incidents took part of the afternoon of Day 1 and all of Day 2 to complete, due to the high number of multiple-premise, multiple-restoration stage incidents. The total time for the audit of LV incidents was 11 hours or 7 minutes per incident on average.
- Seeing is believing: witnessing a process for real is invaluable in demonstrating the accuracy of the systems.