Appendix M South Wales (Western Power Distribution)

13.1 Summary

Geoff Stott and Blair Walter audited the South Wales licence area of Western Power Distribution (WPD) on 24 to 28 June 2002. From the questionnaires completed during the audit it was apparent that the customer measurement systems employed by WPD are inherently accurate. The audit of HV incidents indicated that while time stamping is automatic for all telecontrol operations and semi-automatic for manual switching operations, there is potential for transcription errors when manually transferring time data into the NaFIRS reports. In addition, two HV incidents did not report reinterruptions in accordance with the RIG definitions, causing a significant variance between the reported and audited results.

The audit of LV incidents highlighted that accurately recording the start of an incident can be problematic, particularly where the first customer call does not indicate that supply has been interrupted. Auditing customer numbers on incidents affecting only part of an LV feeder proved difficult as the dispatcher relies on the information provided by the field operative. For the purpose of the audit, correct transferral of the information from the field into the NaFIRS report is considered to be accurate reporting.

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 direction being set by Ofgem. A high level of resource is dedicated to IIP, including a comprehensive training and internal audit program.

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.

13.2 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 Cardiff 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 Wales distribution licence area undertaken 24 to 28 June 2002. Day 1 was spent at the Avonbank head office in Bristol. The rest of the week was spent at the Church Village control centre near Cardiff.

13.3 Audit Process

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

13.3.1 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
- Phil Perkins.

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.

13.3.2 Induction

WPD provided the visiting auditors with a thorough induction to the company systems at its Avonbank, Bristol head office. With the information presented both prior to the visit and during the induction it was possible to complete a large proportion of the audit questionnaires.

The induction began with an overview of WPD Systems and Processes and a tour of the key systems used to create incident reports, comprising:

- capturing 'no supply' calls with Trouble Call (part of ENMAC)
- creating an incident and dispatching field operatives (ENMAC)

- preparing NaFIRS reports to record incident details in compliance with the RIGs
- ENMAC/NaFIRS link which ensures all incidents raised in ENMAC are dealt with, either by creating incident reports or by deleting as non-reportable incidents.

All of the above were demonstrated to the visiting auditors.

Next, the visiting auditors were given an update on the LV customer connectivity project which aimed to accurately reference all MPANs to specific LV feeders from distribution substations and to provide a mechanism for on-going updating. WPD has had a connectivity model down to distribution transformer level for several years. As part of the company's IIP work, the numbers of customers in these models were dis-aggregated down to the LV feeder level. WPD established a dedicated team to populate its LV connectivity models (South Wales and South West were both done in the same way). This team examined the company's geographically-based mains records and, by matching postal addresses of customers from OS Digital Mapping and Address Point information (as primary traded MPANs) to the properties shown on the records, produced the LV connectivity models from 1st principles. Where doubt existed, site visits were carried out.

An 'electronic bucket' of customer addresses not matched to the map was created and these were assigned to houses with missing details. The project was completed by the end of December 2001 and 1.5% of the South Wales customers remain in the electronic bucket, implying that the accuracy of the LV connectivity model is 98.5%. Two teams of 20 comprising mainly graduates were used to undertake the project. WPD is aiming to empty the electronic bucket by the end of July 2002.

WPD has also progressed with the removal of multiple MPANs from the customer count. At the time of the audit, 3,500 multiple MPANs remained in South Wales and these were scheduled to be removed July 26 2002 when ENMAC is upgraded in the South West area.

The induction day also included a presentation on the process for capturing new customers as MPANs and for handling disconnections, changes in customer details and re-referencing of customers using the various WPD systems.

WPD has been very pro-active in its approach to IIP and has established a number of controls to ensure that all IIP information is recognised and correctly reported. To support these controls a programme of internal audits has been undertaken during the course of the year. Details of the controls and audits were presented to the visiting auditors during the induction.

The final part of the induction was a description of the internal training that has been undertaken across all disciplines, initially to raise awareness of IIP, then targeted at specialist areas to ensure that Ofgem's requirements are met.

13.3.3 Questionnaires

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. One of the auditors was 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.

13.4 Accuracy of Measurement Systems and Reporting Process

13.4.1 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, 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 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 Wales first developed a model over 15 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 there are 3500 multiple MPANs within its South Wales data. The company's computer systems need to be shut down to enable these multiple MPANs to be removed. This work will be done at the next such opportunity, currently scheduled for 26 July 2002.

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 MPAN count and those contained within the connectivity model were examined. The following results were calculated for WPD South Wales for the period between 04 March and 10 July 2002:

- the MPRS to ENMAC checks yield an average reconciliation of 100%
- customers with an invalid LV feeder reference are less than 0.80% of the total
- customers with an invalid substation reference are less than 0.39% 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 was demonstration of 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 Wales 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 Wales has inherently accurate measurement systems in place.

13.4.2 Stage 3 of the Audit Framework - Accuracy of the Reporting Process

(i) Audit of HV Incidents

At the start of Day 2 of the audit, the visiting auditors and the four WPD audit members began auditing the HV incident reports. The first incident was completed by the entire team so that everyone understood the process. WPD had printed out the switching logs and incident logs for each incident to check the customer numbers and times reported on the NaFIRS incident report and check for manual transcription errors. An additional objective of the audit was to replicate the incident on the network and check the number of customers affected against those reported and explore where large variations occurred. However, WPD advised that because the connectivity model was integral with the tele-control of the network it was not possible to replicate the incident live on the system. It was therefore necessary to print out diagrams of the affected sections of the network for each incident and manually count the customers connected to each substation – a time consuming process with the potential for errors.

For each HV incident, the audited customers and incident durations were entered into the Incident Auditing Workbook for comparison with the reported figures. An unexpected outcome from the process was that reporting inaccuracies in customer numbers could be distinguished from genuine changes to customers numbers in a particular part of the network and the workbook was modified to report the system numbers separately. Where large variances were encountered between the reported customer numbers and the current system numbers for the same part of the network, further investigation was carried out to establish the cause. In most cases, the variance was due to customer growth or removal of multiple MPANs. For incidents with a large system variation, Alec Potter, an IT support person, was able to interrogate the source code of ENMAC and prove that the variance was due to customer growth, changes in network feeding arrangements, or customer re-referencing.

Some incidents included within the HV category involved entire primary substations with very large numbers of customers. In this situation, it was impractical to manually count the customers connected to the affected part of the network but Alec was able to provide the customer numbers through interrogation of the system. This is a learning point for future audits: an automated process for summating the number of customer affected by an incident would be beneficial when undertaking audits.

Two of the audited incidents related to a period in early July 2001 when a large number of incidents occurred over a short period due to stormy weather and lightning strikes. It was apparent that this increased pressure had an adverse affect on the quality of incident reporting, such as missing trouble call reports and confusion in separating incidents.

During the course of the HV incident audit, we did not encounter any incidents that were too complex to resolve, partly due to WPD's desire to resolve all possible issues and the ability of the WPD staff to interrogate the system and find answers. The spare HV incidents were therefore not required, however these were also audited by the team.

The majority of the HV incidents were completed by the end of Day 2, however follow-up on a few incidents was undertaken in the morning of Day 3.

(ii) Audit of LV Incidents

As with the HV incidents, the entire audit team worked through the first one or two incidents to check and understand the process. Single premise incidents were generally straightforward and contained few errors. 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 and in a number of cases the number of customers affected by a fault was under-estimated by the field operative. This was particularly true where the cable was underground.

In a few of the audited incidents, checking the customers connected to the affected feeder against the current customer count on the system highlighted large variances between the reported customers and the system customers. Further investigation by WPD staff revealed that the reported number of customers was probably correct due to the particular arrangement of equipment in that part of the network, however insufficient notes had been made in the incident reports to be certain. In these situations, Geoff Stott was called in to confirm the likely engineering methods used to restore customers' supply and the auditors were satisfied that reported customer numbers were accurate. However, there was no way to replicate sub-feeder problems on the connectivity model so the system numbers in the incident auditing workbook reflect the total customers attached to the feeder.

Reporting of time also proved to be a source of error, in particular correctly recording incident start times. In a number of situations the dispatchers used the time that the incident was first created in ENMAC as the start time rather than the time that the company first became aware of the fault, such as the first customer call reporting no supply. In some of the audited incidents customers had called in to report that while their supply had not been interrupted, there were problems with equipment such as leaning poles, fallen lines etc. In these cases it was apparent upon examination of the incident logs that the customers were only interrupted when the field operatives arrived at site and cut the supply to allow them to fix the problem.

A small number of the audited LV incidents had restoration stages missing, which is attributable to

incorrect interpretation of the incident logs when preparing the incident reports.

Introduction of the LV connectivity model around December 2001 year highlighted a noticeable improvement in the accuracy of both CI and CML reporting.

The audit of LV incidents was largely complete by the end of Day 3. A number of incidents were highlighted for further investigation where information was missing and these were incorporated into the workbook in the morning of Day 4.

(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 Wales Control Room the visitors witnessed the handling of two real incidents on the 11kV system. One of these incidents was an auto-reclose operation. This provided the visitors with the opportunity to witness how the company records and reports short interruptions. 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 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 in real time:

- 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.

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.

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

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

- Measurement of time is automatic on the telecontrol HV system and semi-automatic for manual switching operations so the chance of error is low. However, transfer of information into NaFIRS requires manual intervention and the possibility of transcription error exists.
- Measurement of customers is also automatic but recognising re-interruptions is manual and led to two significant over-reporting errors in the final CI count. Some form of automation or warning when customers are re-interrupted would help remove this source of inaccuracy.

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

- Recording incident start time is a potential source of error, particularly when the customer calls do not advise that their supply has been interrupted. The audit found that where inaccuracies occurred, these were generally under-reporting of CML.
- LV faults occurring at sub-feeder level are a potential source of inaccurate reporting of customer numbers as the dispatcher relies on the field operative to estimate the number of premises off-supply. The LV connectivity model introduced around December 2001 allows the dispatcher to verify the number of customers attached to a particular feeder and reduces the potential for inaccuracy in this area. However, there is no absolute way to verify the actual customers affected by the fault and the dispatcher must rely on the information provided by the field operative. For the purpose of the audit, correct transferral of the information from the field into the NaFIRS report is considered to be accurate reporting.

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.

13.5 Overall Impressions

WPD is a very pro-active organisation with a corporate objective very much in-line with the IIP requirements 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 Wales audit so that further improvements could be made to their internal processes.

Due to the support of the WPD team it was possible to determine the reasons for the variances in the number of customers affected by an incident. The variances were mainly proven to be due to changes in the actual numbers of customers connected during the period of time between the incident and the audit. This evidence gave us further confidence in the accuracy of the company's connectivity model and reinforced the work undertaken as part of the audit of the connectivity model itself.

13.6 Conclusions

Table M-1 presents the results of the 2002 audit of the WPD South Wales 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 M-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	94% (under)

Stage 3	LV Incident Reporting Accuracy – CML	89% (under)
Stage 3	HV Incident Reporting Accuracy – CI	93% (over)
Stage 3	HV Incident Reporting Accuracy – CML	99% (over)
Stage 3	Overall Incident Reporting Accuracy – CI	94% (over)
Stage 3	Overall Incident Reporting Accuracy – CML	99% (under)

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.

13.7 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 EA 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 Wales, the following template data was audited:

- The reported number of customers shown in the template was compared to the WPD South Wales total taken from MPRS at midnight on 30 September 2001. The number of customers in both cases is 1,041,325.

- During the visits to WPD South Wales 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.

- For WPD South Wales the number of HV circuits affected box and the number of rows in the template both equal 1519.

- Using the PC-NaFIRS enquiry system, the number of CI and CML reported as a consequence of the 40 incidents on the South Wales 132kV system were found to be 26047 and 436196 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 M-2 below.

Table M-2

Row in template	Circuit reference	CI from PC-NaFIRS	CI from template	CML from PC-NaFIRS	CML from template
66	001 / 001053	890	890	238105	238105
878	178 / 178011	132	132	60422	60422
1386	276 / 276394	43	43	6106	6106

At the time that the PC-NaFIRS template was installed, WPD carried-out tests to verify the correct

operation of the software program. By inputting known incident data into PC-NaFIRS WPD was able to verify that the output from the template agreed with its manually computed figures for CI, CML, and re-interruptions, broken down by cause and by voltage.

These reconciliation reports were shown to the visitors during the audit and no variations were found for WPD South Wales.

From the dip-stick tests described above and from examination of the company's own test results, it can be concluded that WPD South Wales is accurately reporting incident data to Ofgem via the IIP template.

13.8 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 required to getting incident start times correct at LV.
- Some weaknesses identified by audit: coping with high numbers of incidents during stormy weather; reliance on skilled individuals (problems arising when they go on holiday).
- System for counting customers on HV sections of network would be useful.
- Some form of automated warning of re-interruptions would improve reporting accuracy.

13.9 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.
- Statistical distribution of variances requires further statistical analysis.
- Variances discovered were predominantly under-reporting on LV and over-reporting on HV.
- Inaccuracies are contained in individual restoration stages. There may therefore be a case for using the number of restoration stages to determine audit sample size.
- 25 HV incidents took all of Day 2 and a few hours of follow-up by auditor (say 10 hours) = 24 minutes per incident on average. WPD staff put in quite a few extra hours to get answers on difficult HV incidents.
- 100 LV took all of Day 3 afternoon and a few hours of follow-up (say 7 hours) = 4 minutes per incident on average. Note that over half of LV incidents were single premise.
- Seeing is believing: witnessing a process for real is invaluable in demonstrating the accuracy of the systems.