Appendix K Scottish and Southern Energy (SSE) - Southern Electric

11.1 Summary

Bill Slegg and Janet Berry audited SSE Southern Electric between 1 to 3 July and 8 to 10 July 2002.

Southern Electric has demonstrated that the company has systems in place for its licence area that provide the basis for IIP reporting. The systems are compliant with the requirements of the RIGs and are capable of delivering the required levels of accuracy.

On the basis of the audit we believe that the company is now in a position where it has IIP compliant systems in place, with processes and staff training developed and delivered to be confident that future reporting will be IIP-compliant and to the required levels of accuracy. The relative weaknesses identified in the interim review have been addressed, and the company is still working to improve further its audit and training procedures.

The review of individual incidents for the 2001 reporting year has demonstrated that the whole process from individual incident through to reporting information to Ofgem is robust and shows very high levels of accuracy. The audit of HV incidents resulted in accuracy levels of 99.4% and 97.2% for HV CI and HV CML respectively, while the audit of LV incidents resulted in accuracy levels of 71.6% and 90.6% for LV CI and LV CML respectively.

A large proportion of the incident reports audited at both HV and LV contained inaccuracies due to the use of an early connectivity model, which the company has now modified with significant improvement in accuracy. It is anticipated that with this new model in place for the whole of the year the audit results for the 2002/2003 reporting year will achieve levels of accuracy consistent with IIP requirements. SSE considers that its systems became fully IIP-compliant with effect from 1 April 2002, and this view has been supported by the audit. The only area where the accuracy was below the level set out in the RIGs was LV CI which have been significantly improved by the new model. This figure also highlights the importance of connectivity model accuracy for LV incidents that involve relatively small customer numbers.

From the questionnaires completed during the audit it was apparent that the customer measurement systems employed are now inherently accurate, with a major model re-population being completed during the 2001 reporting year. The audit of HV incidents shows that with automatic time stamping for all telecontrol operations and a strict regime for recording manual switching operations, and automated generation of incident reports within SIMS (Supply Incident Management System) there is virtually no potential for inaccurate time reporting at HV and EHV.

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. During the reporting year a proportion of the company transferred LV incident reporting to its centralised network management centre with a resulting improvement in the data captured from site at the time of the incident. As with most companies, LV reporting is dependent on field teams to a much greater extent than HV and above, customers affected by part feeder faults being a particular example of total dependence on site generated information.

SSE as a company sets targets for supply restoration performance for its most senior staff and has taken on board the comments made at the Interim Review to ensure that it achieves IIP compliance.

11.2 Introduction

Scottish and Southern Energy (SSE) holds two separate electricity distribution licences, one for the North of Scotland Hydro Electric Area and one for the Southern Electric Area. The company, Scottish and Southern Energy, operates the two licences as far as practicable as one business with Network Management issues being the responsibility of one Senior Manager for both North and South. Information and Incentives Project reporting falls within the remit of the Network Management team.

The Network Management process is based upon two Network Management Centres each with its own Manager and team but using key processes and systems that are common, improving business consistency and enabling the company to provide North – South support in the event of a major system emergency.

This Appendix reports the Audit of the Southern Electric (SSE-South) licence area, which was carried out over five days between 1 July and 10 July 2002.

The SSE-South Network Management Centre is near Portsmouth and is responsible for:

- Customer Call Handling
- Resource Dispatch
- High Voltage System Control
- Regulatory Reporting.

Low voltage network management is normally handled through a depot-based organisation, but all unplanned incidents are managed and reported from the Network Management Centre.

The company uses two key systems, on which it bases all of its operational event recording, and reporting. These systems, for most situations, are the prime information source for the audit trail and there are virtually no prime paperwork systems remaining in the information flow.

The key systems are known by the acronyms ENMAC and SIMS. ENMAC is the Energy Network Management and Control system from G E Harris, which is the tool for monitoring and controlling the HV and EHV networks. SIMS is the Supply Incident Management System, which is a bespoke system developed over a period of almost twenty years in the Scottish licence area and now applied company-wide for the handling of system incidents from customer call inception through to completion of repairs. SIMS automatically generates an incident report (based upon NaFIRS) for every incident, and there is a real time link between ENMAC and SIMS updating the current state of connectivity on the high voltage and above networks.

Call takers, dispatchers and system controllers all have access to the common information on SIMS as do all depot staff involved with supply fault restoration, and maintenance of MPAN and connectivity data.

11.2.1 Progress Since 2001 Interim Review

Janet Berry and Tony Wright of British Power International carried out an interim review of progress towards IIP compliance in September 2001.

The report of that review was generally favourable and identified the progress that the company had made in developing its processes and systems for IIP compliance and the strengths of the systems in use or under development at the time. The outstanding issues at the time were in a development plan and this has now been delivered. The company became fully IIP compliant in all respects by the end of March 2002. The systems were actually in place by the target date of January 2002 but data validation carried on until March resulting in the company restating its IIP compliance date as March 2002.

The only weaknesses identified during the interim review were related to user training and data audits. Since the review the company has made significant improvements in both of these areas.

During the 2001/2002 reporting year audit, the visiting auditors were shown staff training records for SIMS operation. The improved audit procedures were also witnessed. The audit trail ensures that any changes including deletions are tracked, and can be viewed on screen showing the effect of the changes on CI and CML. The audit trail attributes any change to an individual log-in identification to indicate who has made the changes although some individuals do share the same log-in. When an individual incident report is completed it is "locked". Once a record has been locked on the system changes can only be made by two individuals who have special privilege eliminating the need for the super user concept previously used.

Records showing internal audit checks comprising 5% of all HV and LV output files were introduced in September 2001. Any action required was noted but no record was available to show that this action had been taken. There were, however, comprehensive records on file showing any LV reporting errors.

11.3 Audit Process

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

11.3.1 Audit Team

The audit team members were:

- Janet Berry of British Power International
- Bill Slegg of British Power International
- Mike Green of Scottish and Southern Energy
- John Blyth of Scottish and Southern Energy
- Alan Cranstone of Scottish and Southern Energy

Paul Hemsley and Dave Rogers of Scottish and Southern Energy also took part on the first day of the audit.

Other members of Scottish and Southern Energy staff also provided effective support to the audit process.

Prior to the Audit visit in July 2002 the Scottish and Southern Audit Team members received a copy of the questionnaires and the list of incidents to be audited. They extracted all relevant information from the archives of SIMS, ENMAC and other support systems such as the geographic information

system, which is available on-line to users in the South. They also populated the audit workbook with preliminary data. This pre-audit effort reduced the audit time significantly and allowed the team to complete the audit in the time available, concentrating on the content and detail of the reports.

11.3.2 Induction

During the audit the team worked together on the common induction stage, which covered the Scottish licence area as well as the Southern licence Area. The induction covered a summary review of the systems in use, the development since the Interim Review and an update on progress towards IIP compliance. The induction process was completed in a relatively short period of time due to the familiarity with the systems gained by Janet Berry on the first Interim Review. The induction period included a preliminary review of the questionnaires as a basis for updating the BPI team on progress.

Following the induction period the team worked together on a selection of LV and HV incidents to develop a common process which would then be followed for the remaining incidents. After this period the team split into two teams consisting of an SSE team member and a BPI team member. One team concentrated on LV incidents and the other team concentrated on HV incidents. The sample sizes in SSE (South) were one hundred LV incidents and fifty HV and EHV incidents spread across the voltage ranges in use.

11.3.3 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 data to Ofgem. The Template questionnaire thus stands apart from the Audit framework.

11.4 Accuracy of Measurement Systems & Reporting Process

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

(i) MPANs

SSE has a process in place which was described in the interim review carried out in 2001 and which has not changed since.

The company agreed its process for identifying primary traded MPANs with Ofgem in August 2001 and has been maintaining its MPAN count accurately since then. As a result the company still maintains its 100% confidence in its system delivering 100% accuracy on its customer count.

Our check of five randomly selected MPANs confirmed that the process is in place and functioning. The only errors the company has on MPANs are "work in progress" – the small quantity of MPANs in the pipeline not yet recorded on the connectivity model. The company has targets set such that any MPAN must be associated with its NRN within 14 days and there are typically around 100 to 200 MPANs in the work in progress at any one time. A list of non-associated MPANs is produced weekly.

From our review of SSE's processes and our random check of five MPANs, we agree with the company's assertion of 100% for the accuracy of its MPAN count.

(ii) Connectivity Models

The connectivity model used by SSE - Southern Electric was developed based upon the successful system used in Scottish Hydro. The Southern territory has a much higher percentage of urban customers than the Scottish Hydro region and therefore it is a more difficult task to populate the model. Also, with the connectivity model being developed over the last two or three years the option of pulling fuses to check connectivity as was done at Scottish Hydro was not an option.

Population of the connectivity model was carried out in two stages. The first stage used post-code data and an association was made between the geographic centre of the post-code and the nearest distribution substation. Each substation in the model had an individual feeder allocated to each post-code associated with it. This was known to be inaccurate at feeder level but was a quick hit approach to getting reasonable levels of accuracy at substation level. At the time of the interim review in 2001, this first stage model had been completed.

The second stage of populating the connectivity model took a more accurate set of address point data (accurate to a few metres) and associated each property with the nearest cable on mains records. The properties were then transferred to the appropriate real feeders from the "post-code feeders" giving a much higher accuracy, estimated by SSE to be 99.9% at HV and 98.5% at LV. SSE's confidence in the accuracy is gained from the known accuracy of the address point data that has been purchased, sampling, and real updating based on system incidents. The level of inaccuracy remaining is due to the usual difficulties of street ends and corners, twin cables and proximity to substations and link boxes.

The key to the company's connectivity model is the network reference number (NRN). The NRN system, whilst relatively new to the Southern part of the company is a long established system that has been used in the North for almost twenty years. It is a hierarchical system which links customers (Primary Traded MPANs) to the network from which they are supplied, down to LV feeder level from a substation.

The number consists of up to twelve digits for a customer connected to a low voltage network, with the following breakdown.

- first block of digits (four) – identify the primary substation

- second block of digits (three) – identify the feeder from the substation
- third block of digits (three) – identify the transformer on the feeder
- fourth block of digits (two) – identify the LV feeder from the transformer.

So an MPAN with an NRN of 0345 006 195 02 is connected to LV feeder 2 from transformer 195 on HV feeder 6 from primary substation 345.

This approach gives connectivity from the MPAN hierarchically through the network voltage levels to the primary substation. The NRN system does not extend higher than the primary substation level since the network runs interconnected at this level and customers are not generally connected here. An incident impacting upon more than one primary substation would have the customer count taken by summing the customers on the primary substations affected.

Our review of five randomly selected LV feeders highlighted a number of small variances between the GIS mains records and the new connectivity model, however due to the accessibility of geographic records, the visiting auditors were able to make the comparison of connectivity model figures to the geographic record on most of the sample of incidents audited. Through this review, we are satisfied that the company's estimate of 98.5% for the accuracy of its LV connectivity model is reasonable. Table K-1 summarises the review of the five randomly selected feeders.

Table K-1

Feeder reference	GIS Mains Records Number	SIMS connectivity Model Number	Variance	Comment
4905 003 440 02	35	33	2	Still some changes to confirm in latest model
3111 002 100 01	60	60	0	Complex feeder - accurate
1305 006 090 13	13	14	-1	Maybe one metered outbuilding at one property, looks reasonable
2810 002 240 02	79	78	1	New model connectivity to be confirmed
3712 003 240 01	21	25	-4	Suspect double occupancy of some buildings

(iii) Conclusions

OFGEM approved the company's method of identifying customers in August 2001 and a high level of accuracy has been maintained since that time. From the review undertaken, we have a high level of confidence in the company's estimate of 100% for the accuracy of its MPAN count.

The reporting systems in SSE – Southern Electric are highly accurate at both low and high voltage mainly due to the connectivity model that has recently been established following the successful pattern of the connectivity model at SSE – Scottish Hydro. This system cascades connectivity from LV feeder level up through the voltage levels.

The company estimates the accuracy of its connectivity model as 99.9% at HV and 98.5% and LV. The level of inaccuracy at LV is due to the usual difficulties of street ends and corners, twin cables and proximity to substations and link boxes. Despite finding minor variances in customer numbers during our review of five randomly selected feeders and further review of connectivity model accuracy during the audit of incident reports, we are satisfied that the company's estimates for the accuracy of its connectivity model are reasonable.

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

(i) Audit of HV Incidents

A sample of fifty incidents on the HV and EHV systems was selected as representative of the whole year's incidents. These were spread across the system voltages that are operated in SSE-South, 2.7kV, 6.6kV, 11kV and 22kV for HV, 33kV and 66kV at EHV plus 132kV.

Each incident was reviewed from the prime data (ENMAC schedules) through all operational stages looking at restoration stage interruption and restoration times, customer counts from the SIMS system and re-interruption indicators.

The audit highlighted a number of variances in both customer duration and incident duration at HV, including some very large single variances, however these were generally errors in allocating customers to the correct restoration stage within an incident and the overall accuracy of the incident report was not impacted.

The remainder of variances in customer numbers were largely caused by introduction of the new connectivity model.

(ii) Audit of LV Incidents

In total 100 incidents were sampled. SSE audit team members had, in preparation, gathered hard copies of information taken from the SIMS (NaFIRS equivalent) reporting system and transferred the details into the audit workbook.

Each incident was reviewed by looking at restoration stage interruption and restoration times, customer counts from the SIMS system and re-interruption indicators.

Missing restoration stages were a feature of the LV incident reports audited, accounting for nearly half of the total under-reporting variance in customer numbers highlighted by the audit. Ongoing work during the reporting period on completion of the connectivity model was a cause of inaccuracies in reported customer numbers, contributing to nearly a quarter of the variance. A noticeable improvement to the accuracy of customer numbers was seen when the new connectivity model was completed. A range of other reporting errors made up the remainder of the variance in customer numbers.

The audit of LV incidents highlighted inaccuracies in the recording of incident times, with a general trend to over-report incident duration through inaccurate information received from field operatives on restoration times. However, this effect was outweighed in the audit results by under-reporting of customer numbers to give an overall under-reporting CML result for the audited sample.

SSE has recognised the impact that inaccurate time recording can have on its IIP returns and has made significant changes to its processes to improve the accuracy of reporting, including centralising the process on its network management centre, training of call centre staff, and appointing designated staff for completing incident reports.

(iii) Interpretation & Implementation of the Definitions & Guidance from the RIGs

The company automatically includes all system incidents in its measurement and reporting systems. Within SIMS an incident report is created for every event that is reported to the network management centre. Validation routines built into SIMS for compliance with the RIGs determine creation of incident reports. For example, street lighting knock downs, metering faults, key and card meters are recorded and all system incidents affecting primary traded MPANs are included.

The company records start and completion of an incident (unplanned and planned) through its telemetry systems where they are installed, which covers the majority of incidents on HV and EHV systems. The company is extending the cover of its telemetered systems by the installation of additional monitored pole mounted circuit breakers away from the source. The ENMAC system stores accurately (to the second) operating times of monitored devices.

For parts of the system without telemetry and for all low voltage systems the recording of times is dependant upon site information. This is carried out through accurate control regimes at high voltage, with recording of reported times at the network management centre on ENMAC. An exception to this is when devolved control procedures are used and not all operations are reported back, just an overall completion time. Devolved control procedures on high voltage systems are therefore similar to LV reporting in requiring site information to be gathered at the time of the incident.

Re-interruptions and short interruptions are recorded on SIMS. An additional field (known as the re-interruption field) has been added to SIMS incident reports since the interim review and this field is used to indicate whether an interruption was a short interruption, a re-interruption or a reportable incident. Gathering of data for short interruptions is carried out through telemetered devices and through regular manual counts of remote unmonitored pole mounted circuit breakers. The company keeps a running record of all customer interruptions and through the use of the re-interruption field re-interruptions and short interruptions are also recorded in a running register. By use of the Business Objects Reports software re-interruptions and short interruptions reports are produced.

The company manages all pre-arranged incidents (planned supply interruptions) through its network management centres, primarily to ensure that any customer queries can be integrated with supply failure calls by the emergency telephonists, but also to integrate all reports into the SIMS system. Every planned supply interruption is entered into SIMS and the reports for Ofgem are generated by the same process as unplanned incidents. Site staff are aware that all planned supply interruptions have to be notified in advance to the NMC or approval for supply disconnection will not be given other than in emergency situations.

As already discussed, the company made improvements during the reporting year to its systems, particularly to its connectivity model population. Also an ENMAC to SIMS real time link has been added ensuring that customer numbers reported for a restoration stage represent the actual running conditions at the time of the incident and not the normal running conditions if there is a difference.

Other changes to the systems which have improved the accuracy of reporting systems include

improved validation on SIMS input, and mandatory use of group network reference number (NRN) selection to establish numbers involved on High Voltage incidents.

Regarding training, all new starters receive training in the systems in use, and there is continuing business roll out training of IIP reporting and standards through a daily quality control process and feedback to users.

(iv) Conclusions

The reporting systems in Scottish and Southern Electric (Southern Licence) are accurate at both low and high voltage levels. The audit of LV incidents showed a low accuracy result for reporting of CI, but this includes inaccuracies in the old connectivity model used during the year and a noticeable difference in the customer numbers was seen when the new connectivity model was introduced.

Incident management on the HV systems is again rigorous through a centralised HV control process with all times being accurately recorded.

As with all companies, recording of times on the LV system incidents has been less rigorous in the past. SSE has recognised the impact that this can have on its IIP returns and has made significant changes to its processes to improve the accuracy of reporting on times of incidents. It has centralised the process on its network management centre, trained its call centre staff to insist on a greater degree of information from the field and appointed designated staff for completing incident reports. SSE (Southern) should achieve IIP compliant reporting in the 2002/2003 reporting year.

11.5 Overall Impressions

SSE (Southern) has taken on board the requirements of IIP in a professional way, and has modified its systems and processes to ensure IIP compliance. SSE as a group takes supply restoration as a serious corporate issue at the highest level and allocates resources appropriately to deal with this area. In the South the long-standing connectivity model used in the North now forms the basis for the reporting process although the population of the LV connectivity model with MPAN data was initially at a low accuracy level. SSE were aware of this but used the model to develop compliant processes and repopulated the data part way through the reporting year to a much higher level of accuracy. SSE (Southern) has redesigned its LV incident management process to improve information flow during LV incidents.

11.6 Conclusions

Table K-2 presents the results of the 2002 audit of the SSE (Southern) 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 K-2

Stage	Item	Accuracy

Stage 1	MPAN Measurement	100%
Stage 1	LV Connectivity Model	98.5%
Stage 1	HV Connectivity Model	99.9%
Stage 3	LV Incident Reporting Accuracy – CI	78% (under)
Stage 3	LV Incident Reporting Accuracy – CML	91% (under)
Stage 3	HV Incident Reporting Accuracy – CI	99% (under)
Stage 3	HV Incident Reporting Accuracy – CML	97% (over)
Stage 3	Overall Incident Reporting Accuracy – CI	96% (under)
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 significantly modified by complete re-population 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.

11.7 Reporting to Ofgem's Information Template

SSE uses a Software package known as Business Objects, which is a proprietary system designed to extract reports from data base structures. The software is very simple to use compared with some other enquiry packages that are available but does have idiosyncrasies that demand that a user familiar with its features extracts the data. The ease of use does allow cross-checks of data extractions to be made and this was demonstrated during the audit visit, with the results showing a 100% correlation with the Ofgem report.

This Business Objects Software is used as the tool for extracting the reporting data from within the live incident reporting database within the SIMS reporting module (PCNaFIRS equivalent). The SIMS package, as already reported, is the prime database for all system incident data, achieving its inputs from ENMAC and site data for times and from the connectivity model for customer numbers.

A suite of standard Business Objects reports has been developed which is run to prepare the annual Ofgem report. These reports can be run at any time of the reporting year to get a year to date progress report, and have been validated by many cross checks to ensure compliance.

To answer all of the questions in the reporting template the company was able to run each standard search to demonstrate compliance with the requirements of reporting to Ofgem. We were able to confirm all of the figures reported to Ofgem on the template and, importantly, validate the logic behind each search to confirm the data being extracted does comply with the definitions. We have not reported on each question individually since the process was precisely the same for each: run the extract search(es), confirm compliance with the Ofgem return and then to carry out sample ad hoc checks to confirm the logic of the search.

11.8 Recommendations

In cases of temporary restorations on LV, to provide an audit trail for that restoration stage, the additional information field could be updated with restoration date and time. Currently, when the job is finally completed, the restoration date and time shown is of the final repair stage, which is likely to result in the company over reporting on CML, although this was generally not the case for the 2001 reporting year.

The company should continue with its present efforts to improve the record of informative job details

throughout all restoration stages, particularly at LV, by continual improvement techniques that are now in place.

11.9 Learning Points

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

- There are occasions when a customer agrees to stay off supply, due to the practicalities of carrying out repairs, for example working through the night, when the customer is in bed and the repair work would disturb neighbours. The company is of the view that in events such as these (which it acknowledges are small in number) the customer minutes count be stopped until repairs are resumed. There are other similar examples.
- SSE is reporting re-interruptions in accordance with its interpretation of the RIGs and taking the 3 hours from restoration of the last of the customers affected by the incident, i.e., not from when a proportion of customers are restored as is the case with some other distribution companies. Clarification of this is required.
- No audit trail was seen to confirm actual outage durations on planned interruptions. A pre-arranged outage sheet is produced in SIMS indicating the planned date and outage times. Details are received verbally from site and entered in SIMS confirming the actual outage times.
- The effort in preparing for the audit imposes a significant workload on the company, without which the audit could not have been completed in the time available.