

## **Appendix J Scottish and Southern Energy (SSE) – Scottish Hydro**

### **10.1 Summary**

Bill Slegg and Janet Berry audited SSE Scottish Hydro between 15 and 18 July 2002

The 2002 IIP compliance Audit for Scottish and Southern Energy (SSE) – Scottish Hydro 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.

In addition, the review of individual incidents for the 2001 reporting year has demonstrated that the whole process from individual incidents through to report information to Ofgem is robust and has produced a return that shows high levels of accuracy. This includes 100% accuracy at HV and 99% and 90% accuracy of reporting for LV CI and LV CML respectively.

SSE considers that its systems became fully IIP compliant with effect from 1 April 2002, and this view has been supported by this audit.

From the questionnaires completed during the audit it was apparent that the customer measurement systems employed are now inherently accurate, based on a connectivity model that has been in use for almost twenty years. The confidence in the accuracy of the model is demonstrated by the company using it as the basis of notification for planned supply interruptions, risking customer complaints and Guaranteed Standard failures if it were inaccurate. The audit of HV incidents shows that with automatic time stamping for all telecontrol operations and a strict regime for recording manual switching operations, with automated generation of incident reports within SIMS there is virtually no potential for inaccurate time reporting at HV and EHV.

During the year the company completed a transfer of LV incident reporting to its centralised network management centre. The audit of LV incidents highlighted that site information recorded was minimal resulting in a weak audit trail and this issue was acknowledged by the company. As with most companies, LV reporting is dependent on field teams to a much greater extent than at HV and above. For example, reporting the number of customers affected by part-feeder faults is a good example of dependence on field information.

SSE sets targets on 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.

### **10.2 Introduction**

Scottish and Southern Energy (SSE) holds two separate electricity distribution licences, one for the former North of Scotland Hydro Electric Area and one for the former 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 Scottish Hydro (SSE-North) licence area, which was carried out between 15 and 18 July 2002.

The SSE-North Network Management Centre is in Perth 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.

### **10.2.1 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 this review the company has made significant improvements in both of these areas.

During the 2001/2002 reporting period audit, the visiting auditors were shown staff training records for SIMS operation. SSE's 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 CML and CI. 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.

In addition, internal audit checks covering 100% of LV incidents files were introduced in April 2002. These are investigated daily and used as the basis of on job learning and continuous improvement for network management centre staff.

The company started to maintain training records of Call Takers, Fault Dispatchers and Shift Managers in April 2002. Forty-two individual procedures have been drafted, with twenty-two now having been signed off. A skills matrix has been introduced for each team member recording the training received.

### **10.3 Audit Process**

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

#### **10.3.1 Resources**

The audit team members were:

- Janet Berry of British Power International
- Bill Slegg of British Power International
- Mike Green of Scottish and Southern Energy
- Adrian Sims of Scottish and Southern Energy

We were joined on the first day of the audit visit by Richard Clay of Ofgem.

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. The geographic information system is not available on-line to users in the North, and records based data had to be extracted by the mapping team. 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.

### **10.3.2 Induction**

At the start of the audit, a short induction was given to Richard Clay which covered a summary review of the systems in use, the development since the Interim Review and an update on progress towards IIP compliance.

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. To familiarise Richard Clay with the company a brief overview of the questionnaires on accuracy of the MPAN Count and accuracy of the connectivity models was given. The sample sizes in SSE (North) were one hundred LV incidents and sixteen HV and EHV incidents spread across the voltage ranges in use.

### **10.3.3 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.

## **10.4 Accuracy of Measurement Systems & Reporting Process**

### **10.4.1 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 set targets such that any MPAN must be associated with its network reference number (NRN) within 14 days. 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 Model**

SSE’s connectivity model for the Scottish Hydro licence area has been developed over a period of almost twenty years, and the accuracy of data has been gradually enhanced over that period. Much of the Scottish Hydro territory is rural and was populated with very high degrees of accuracy from mains records. The urban area connectivity was initially carried out by reference to mains records and where there was any significant doubt the connectivity checked at the time by actually pulling fuses. This practice has now stopped. Since the establishment of the network model and the NRN (network reference number) system the company has been very disciplined in maintaining the system and keeping accurate connectivity records. Its connectivity model is checked regularly as it is used as the basis for sending out shut down cards. Very few complaints are received in relation to planned shutdowns. Bearing in mind the potential GS penalty payment for each card that is missed, this demonstrates a high level of confidence. The Company had no need to repopulate its connectivity model as a result of IIP requirements.

The connectivity model 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 HV feeder from the primary substation
- third block of digits (three) – identify the distribution transformer on the feeder
- fourth block of digits (two) – identify the LV feeder from the distribution 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 a 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.

The company estimates the accuracy of its connectivity model to be 99.9%. The 0.1% inaccuracy in this figure represents “work in progress”. Our review of five randomly selected LV feeders confirmed the accuracy of the model against geographic records. Table J-1 summarises the selection.

**Table J-1**

<b>Feeder reference</b>	<b>GIS Mains Records Number</b>	<b>SIMS connectivity Model Number</b>	<b>Variance</b>
0217 002 008 01	20	20	0
0406 018 002 05	28	28	0
0055 010 010 01	20	20	0
0003 012 010 01	18	19	+1
0462 021 060 02	67	67	0

The visiting auditors also took the opportunity to check the accuracy of the connectivity model for all of the LV incidents audited and a number of the HV incidents to gain further confidence in the accuracy figures quoted by the company. From this review and the review of five randomly selected feeders we have no reason to disagree with the company's estimate of 99.9% for the accuracy of its connectivity model.

### **(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 Scottish and Southern Electric (Scottish Hydro Licence) are very accurate at both low and high voltage mainly due to the well established connectivity model that has been in use and refined over a period of almost twenty years. This system cascades connectivity from LV feeder level up through the voltage levels. Table J-1 of this report indicates the level of accuracy on the check of LV feeders as being close to 100%. The connectivity model is supported by a robust in-house process for identifying new MPANs and allocating them to feeders within fourteen working days. The visiting auditors witnessed the control processes on the systems, and as a result of the rigour with which they are maintained the only error on the connectivity model is "work in progress". We are satisfied from our review that the company's estimate of 99.9% for the accuracy of its connectivity model is reasonable.

## **10.4.2 Stage 3 of the Audit Framework – Accuracy of the Reporting Process**

### **(i) Audit of HV Incidents**

A sample of sixteen 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-North, 11kV for HV and 33kV at EHV.

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 demonstrated that across sixteen incidents with a total of 24 restoration stages, no inaccuracies were found.

A small number of variances between reported customer numbers and system numbers were encountered during the audit of HV incidents, however all of these were explained to our satisfaction

by the company as relating to either real customer changes or other reasons.

## **(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. The audit of incidents showed that SSE – Scottish Hydro has accurate reporting procedures in place, no doubt assisted by the accurate connectivity model.

A few of the incidents selected for April 2001 showed inconsistencies between the individual job details and corresponding incident reports on SIMS. This was due to a system error at that time, which the company had recognised and rectified for reports dated after April. The audit trail within SIMS was checked which confirmed the reported information.

Other errors in the reporting of customer numbers highlighted by the audit were due manual transcription errors, missing restoration stages, and incorrect identification of feeder phases affected by an incident, however the impact of these errors was generally minor and the audit showed that the accuracy of reporting CI in the audit sample was 99%.

Reporting of incident duration was generally accurate, however in a number of incidents audited incorrect start times were recorded in the fault report. In one incidents, it was not recognised that a feeder phase was off supply, leading to a large CML inaccuracy in the report for that incident. A large proportion of the CML inaccuracy was contained in a small number of incidents and due more to errors in customer numbers than duration errors. The audit showed that accuracy of reporting CML in the audit sample was 90%.

## **(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.

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**

Incident management on the HV systems is rigorous and handled through a centralised HV control process with all times being accurately recorded. Reporting of customer numbers using the connectivity model is highly accurate and the audit confirmed this was an accuracy of the audit sample CI of 100%.

As with all companies, recording of times on the LV system incidents has been less rigorous in the past, with a number of errors highlighted during the audit. 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 - Scottish Hydro should achieve IIP compliant reporting in the 2002 reporting year.

### **10.5 Overall Impressions**

SSE - Scottish Hydro 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 resource appropriately to deal with this area. In the North the long standing connectivity model provided a very good basis for the reporting

process and with some refinements to its LV incident management has processes in place that will ensure robust reporting.

## 10.6 Conclusions

Table J-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 J-2**

<b>Stage</b>	<b>Item</b>	<b>Accuracy</b>
Stage 1	MPAN Measurement	100%
Stage 1	LV Connectivity Model	99.9%
Stage 1	HV Connectivity Model	99.9%
Stage 3	LV Incident Reporting Accuracy – CI	99% (under)
Stage 3	LV Incident Reporting Accuracy – CML	90% (over)
Stage 3	HV Incident Reporting Accuracy – CI	100%
Stage 3	HV Incident Reporting Accuracy – CML	100%
Stage 3	Overall Incident Reporting Accuracy – CI	100%
Stage 3	Overall Incident Reporting Accuracy – CML	99% (over)

## 10.7 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 database 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.

Business Objects is used as the tool for extracting the reporting data from within the live incident reporting database within the SIMS reporting module (PC-NaFIRS 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 cross check 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.

### **10.8 Recommendations**

The company should continue with 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.

### **10.9 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 should be stopped until repairs are resumed. Clarification of this issue is required.
- 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 other distribution companies. Clarification of this issue 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 reporting template does not itemise EHV circuits on a line-by-line basis. In the North of Scotland there are substantial circuit lengths of 33KV (EHV) being operated in a similar way to HV in other distribution companies (i.e. SSE North uses direct transformation from 33KV to LV).
- This may require review before next year's audit to be confident of having the same level of detail for all customer interruptions that is achieved in other companies. At the aggregated level no error is introduced by this approach.
- 132 kV is not reported through the SSE-Scottish Hydro distribution business, it is reported through the transmission licence returns.
- 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.