

**Rail Reporter Project**  
2003 Annual Return  
Final Report Volume 2

August 2003



**Halcrow Group Limited**



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## GLOSSARY

2001	Year ending 31 <sup>st</sup> March 2001 = 2001 reporting year
2002	Year ending 31 <sup>st</sup> March 2002 = 2002 reporting year
2003	Year ending 31 <sup>st</sup> March 2003 = 2003 reporting year
AR	Annual Return
ARM	Asset Reporting Manual
AWS	Automatic Warning System
BMIS	Business Management Information System
CRR	Customer Reasonable Requirement
DA	Delay Attribution
EA	East Anglia
ESR	Emergency Speed Restriction
FRAME	Fault Reporting and Monitoring of Equipment
GCC	Gauge Corner Cracking
GEOGIS	Geography and Infrastructure System
GW	Great Western
HQ	Network Rail Headquarters
IIP	Infrastructure Improvement Programme
LNE	London North Eastern
LOC	Local Output Commitment
LOS	Local Output Statement
IMC	Infrastructure Maintenance Contractor
MID	Midlands
MJS	Major Stations
NMS	Network Management Statement
NR	Network Rail
NW	North West
OFWAT	The Office of Water Services
OHLE	Overhead Line Equipment
ORR	Office of the Rail Regulator
PTE	Passenger Transport Executive
PIPS	Packaging and Investment Planning System
PMCS	Project Management Control System
QBR	Quarterly Business Review
RAR	Rail Asset Register
RCF	Rolling Contact Fatigue
REPE	Regional Electrification and Plant Engineer
RIMINI	Risk Minimisation
S&C	Switches and Crossings
SCMI	Structures Condition Marking Index

SCT	Scotland
SICA	Signalling Infrastructure Condition Assessment
pSICA	Primary SICA
sSICA	Secondary SICA
SF	Severity Factor
SS	Severity Score
STH	Southern
TARDIS	TOPS Ancillary Retrospective Data Information Service
TOC	Train Operating Company
TOPS	Total Operations Processing System
TPWS	Train Protection Warning System
TRUST	Train Running System on TOPS
TSR	Temporary Speed Restriction
UTU	Ultrasonic Testing Unit
WCRM	West Coast Route Modernisation
WON	Weekly Operating Notice

## 6 Track Geometry (M3&M5)

### 6.1 *Audit Scope*

The audit was undertaken to assess the accuracy and confidence in the national Track Geometry data reported in the 2002/03 Annual Return to the Office of the Rail Regulator. The Reporting Team was tasked with assessing Regional compliance with the procedures laid out in the ARM.

The audit was carried out to assess the integrity of data presented in comparison with the Regulatory Targets for National Standard Deviation (SD) data (M3), Speed Band data (M3) and Level 2 Exceedences (M5). The audits for these three measures were combined for the following reasons:

- It was recognised that the personnel involved in collation and reporting of the measures were the same; and
- It was recognised that in terms of assessing trends and issues relating to the management of the track quality, these measures were not independent.

As the collation and reporting of Track Geometry and Level 2 Exceedences data is an HQ function, the audit was undertaken at the HQ level only.

### 6.2 *Audit Report*

#### 6.2.1 *Regulatory Targets*

Regulatory Targets for National SD data are set for four key parameters reflecting the overall track quality in terms of standard deviation from track alignment (vertical and horizontal) across two key wavelengths of 35m and 70m. For 2002/03 the targets set by the Regulator are given in Table 6.1:

	35m Top (Vertical Deviation)			35m Alignment (Horizontal Deviation)			70m Top (Vertical Deviation)			70m Alignment (Horizontal Alignment)		
	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
Standards	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
Regulatory Target	64.6%	90.3%	98.3%	70.9%	91.6%	97.4%	62.5%	92.8%	97.8%	64.7%	91.9%	97.3%

*Table 6.1 Regulatory Targets for National SD Data*

The Regulatory Target for Level 2 Exceedences is for ‘no deterioration from the network total reported for 2000/01’ i.e. 1.820 per track mile.

#### 6.2.2 *Reported Data*

The 2002/03 Annual Return lists a total of twelve Track Geometry SD figures for vertical and horizontal alignments at 35m and 70m wavelengths, with 35m measures encompassing all track and 70m measures for track with a linespeed of 80mph or more. These four parameters are

reported against targets for the cumulative percentage of track within track quality bands defined by the standard deviation of measured results (50%, 90% and 100% of the standard deviation respectively), thus giving an overall measure of track quality and quality distribution.

Table 6.2 below lists the year-end results against the targets and 2001/02 figures.

	35m Top (Vertical Deviation)			35m Alignment (Horizontal Deviation)			70m Top (Vertical Deviation)			70m Alignment (Horizontal Alignment)		
	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
Standards	50%	90%	100%	50%	90%	100%	50%	90%	100%	50%	90%	100%
Regulatory Target	64.6%	90.3%	98.3%	70.9%	91.6%	97.4%	62.5%	92.8%	97.8%	64.7%	91.9%	97.3%
2002/03 Actuals	61.9%	88.9%	97.0%	74.6%	93.6%	96.7%	62.2%	92.1%	95.2%	80.9%	96.2%	97.5%
2002/03 Actuals excl S&C	64.9%	91.0%	97.8%	79.0%	96.3%	98.3%	65.3%	94.1%	96.7%	84.4%	97.7%	98.6%
2001/02 Actuals	62.4%	89.4%	97.1%	73.6%	93.1%	96.3%	61.9%	92.5%	95.6%	80.0%	96.0%	97.4%
2001/02 Actuals excl S&C	65.0%	91.1%	97.9%	77.0%	95.2%	97.6%	64.7%	94.4%	96.9%	83.0%	97.4%	98.4%

     Worse than 2001/02 Actuals           Actuals Better than target

**Table 6.2: 2002/03 National SD results against targets and 2001/02 actuals**

Five of the twelve regulatory targets were exceeded in 2002/03, the same five as reported in the 2001/02 reporting period. The results show a marginal increase in track quality against 2001/02 figures offset by a reduction in performance across five of the SD parameters, highlighted in green.

The 2002/03 Annual Return includes commentary on the disproportionately poor geometry of Switches and Crossings (S&C) on the overall SD data. Table 6.2 shows the actual results for both 2002/03 and 2001/02 with S&C effects excluded from the analysis. Overall 2002/03 track quality data is shown to increase on 2001/02 levels and exceeds ten of the twelve regulatory targets. However five of the SD parameters are shown to be lower than the corresponding figures in 2001/02. It must be noted however that the regulatory targets are based on track quality as a whole which includes plain-line and S&C measurements.

The table below shows both the 2002/03 and 2001/02 actuals against target and against actuals excluding S&C.

	Target	2002/03 Actual	2001/02 Actual	2002/03 excl. S&C	2001/02 excl. S&C
Level 2 Exceedences	1.82	1.179	1.351	0.826	0.997

**Table 6.3 Level 2 Exceedences per track mile**

The figures highlight the differences in reporting plain-line only and plain-line plus S&C data. The number of reported S&C renewals has increased by 87%, which should affect, in part, S&C



geometric defects. This is reflected by the Level 2 exceedences across S&C units only, which have decreased from 7.41 in 2001/02 to 5.63 in 2002/03. We are however aware that the relationship between track renewals, particularly ballast, and geometry is not directly linear.

As stated in our report on the 2001/02 Annual Return, Regional comparisons of Level 2 exceedences per track km make no allowance for traffic volumes or relative maintenance and renewals inputs. Track geometry and exceedence data should be used to identify shortfalls in track maintenance, resources and the track recording process which may be masked by the figures presented in the Annual Return.

### 6.2.3 *Overall Data Quality and Compliance with Procedures*

The procedures demonstrated during the course of the audit were generally in compliance with the Asset Reporting Manual. The audit was divided between the processes used to produce the data presented in the Annual Return and those relating to the data collection of raw track geometry measurements.

The process for the derivation of the Annual Return data was demonstrated to the Reporting Team. This process is intensive requiring the interrogation of both GEOGIS and Network Rail's Track Geometry database. Data feeds detailing SD data against track measuring points are collated, analysed and manipulated into a presentable form. S&C data is filtered out from overall track data to demonstrate its disproportionate effects on overall track quality, however S&C data is included in the published figures.

Serco is responsible for the measurement of track geometry on the network. Track measurements are undertaken against an annual track measurement plan. The frequencies of track inspections are based on track category (CAT1A - CAT 6) and are set out in the Network Rail standards RT/CE/S/103 and 104.

The track measurement plan is updated annually to take into account Regional testing requirements and the current year's timetable and possessions. The plan is dynamic with significant deferral of test days as a result of cancelled possessions, unforeseen possessions and resource availability. On average Serco incurs a 10% delay against the testing programme as a result of these issues.

HQ representatives stressed that although planned testing dates are not always met, almost all track measurements are undertaken against the set frequencies laid out in the company's procedures. The reasons cited for some routes not measured to the minimum frequency requirements were track access problems, operational issues and a lack of resources.

Serco undertakes the calibration of the three track recording vehicles every six months in the presence of Network Rail personnel. The calibration processes are audited by Network Rail and

corrective action measures administered accordingly. Calibration of the vehicles is carried out at all line speed bands from 10 to 125 mph.

The track recording equipment on each of the three vehicles is identical. The vehicles are calibrated to record track measurements within a tolerance of  $\pm 2\%$  of each other. The calibration process undertaken in the 2002/03 reporting period highlighted a recording error with the track recording vehicles. Track twist measurements were found to include errors but were considered to be within the  $\pm 2\%$  tolerance limits. The problem remained unresolved for eight months.

#### 6.2.4 *Key Findings and Conclusions*

This section incorporates our key findings and conclusions based on the audit and supporting information presented to the Reporting Team.

- Network Rail has no transparent means of verifying whether track measurements have been undertaken against the set frequencies for each track category. Recording sessions within the plan are not marked off as complete. Routes are often split into sections and recorded at different time intervals;
- We cannot validate the commentary included under Table 21 of the 2002/03 Annual Return referring to the "...significant increase in the population of track in the higher speed bands due to linespeed increases...". There were no reported linespeed changes in 2002/03 nor could this comment be verified by the HQ Capability Measures champion. Further investigation reveals that this discrepancy may have arisen as result of delays in the reporting of Regional linespeed data during the previous reporting year which were not reflected in the 2001/02 Annual Return;
- The identification of recording errors on one of the track recording vehicles was found to impart a margin of error on both track twist and gauge measurements thereby affecting Level 2 exceedence figures. Network Rail could not calculate the quantum of this error. The error existed for approximately eight months before it was corrected as a result of a report from a consultant employed by Network Rail to discover the cause of the problem. Consequently the Level 2 exceedence figures presented in the 2002/03 Annual Return are subject to error, however Network Rail personnel stated that the error has inflated the figures – this could not be validated by the Reporting Team. There were no errors with the Standard Deviation values as a result of this problem;
- The level of data validation undertaken immediately after the collection of track geometry measurements is minimal. Output from the track recording vehicles is subjected to high-level sense checking before it is uploaded to the Network Rail Track Master mainframe system for subsequent manipulation. The sense checks are

subjective and highly dependent on the knowledge of personnel undertaking them. It must be noted however that the data is scrutinised to a high degree by HQ and in-depth checking of the data at source would result in significant delays to the subsequent data uploading, analysis and manipulation processes undertaken at HQ;

- Data is suppressed if it is identified to be incorrect. Suppression is usually undertaken in cases of equipment errors leading to spurious results or on very low speed track measurements. Data is also suppressed if it has been recorded at the wrong linespeeds or if it is older than 450 days. Subsequently approximately 3-5% of the recorded data is not uploaded to the Network Rail's mainframe systems;
- The data recording process is manually intensive with heavy reliance on the competence of on-train personnel. The recording systems are synchronised manually against mileposts along the line of route. Mileposts are identified visually by on-train personnel, who log and activate the recording systems accordingly. The process is imperative in achieving consistent unit length measurements ( $\frac{1}{8}$  of a mile) for track data. Errors frequently occur during this process with recording runs requiring to be restarted if mileposts are missed or if the recording equipment is not activated in synchronisation with the milepost markers. This leads to a delay in the recording process and limits the number of valid measurements collected;
- Network Rail audits of the track recording process have resulted in the issue of corrective action requests targeting the level of human errors arising during the on-board recording process. There are shortfalls in the level of competent resources available to undertake the recording process. On-board recording personnel require a high level of route knowledge, analytical skill and diligence throughout the duration of the recording process. The process has suffered from a shortage of these skills leading to a shortfall in robust geometry measurements and delays to inspection programmes.

Minor shortcomings were observed in the quality of the data measurement processes with respect to availability of skilled resources, incomplete route inspections against set frequencies laid out in Network Rail's company standards and technical faults with track recording equipment, some or all of which may lead to data recording errors if not resolved.

### **6.3 Recommendations**

Our recommendations are based on our key findings and conclusions above. These are:

- Processes should be developed to help Network Rail verify the extent to which the track inspection plan is completed in order to ensure that all track is inspected to the required standards and delays to the inspection regime may be minimised through on-going monitoring by appropriate HQ personnel;

- Track quality data should be presented against Regional operating and physical characteristics to set in context the figures presented in the Annual Return. Such characteristics should include traffic intensity (passenger and freight), kilometres of route inspected, and maintenance and renewal levels;
- The 2003/04 Annual Return audit programme should include Regional audits to verify the relationship between track quality data and the extent to which it drives maintenance and renewals volumes;
- SD and Level 2 Exceedence data should be presented without the distortions imparted by S&C measurements. It should be noted that whilst the S&C analysis provided by Network Rail and the Reporting Team in this report is indicative only, there remains a need to provide a more accurate reflection of overall track quality which requires more detailed scrutiny at Regional levels.

## 7 Temporary Speed Restrictions (M4)

### 7.1 *Audit Scope*

The audits were undertaken to verify the 2003 Annual Return data for Scotland, LNE, East Anglia and Southern Regions. Compliance with the Asset Reporting Manual was assessed and the source data was examined for a sample of Temporary Speed Restrictions (TSRs).

### 7.2 *Audit Report*

#### 7.2.1 *Annual Return Data*

The reported data and the average severity score (SS) for 2002 and 2003 (year ending 31<sup>st</sup> March) is shown in the table below. The reported data is the cumulative number of TSRs over the reporting year imposed for 4 weeks or more (as stipulated in the ARM) and the SS. The SS is the sum of each TSR's severity factor. The severity factor is determined by the length, duration and extent of the reduction in speed of each TSR. The ARM and Annual Return provide a full explanation and formula. TSR data has only been collected to the current reporting specifications for the last 2 years, thus trend analysis is not possible.

Region	Track			Structures			Earthworks		
	Number	SS	Average SS	Number	SS	Average SS	Number	SS	Average SS
East Anglia 02	127	464.5	3.7	4	6.4	1.6	2	7.3	3.7
East Anglia 03	127	366.7	2.9	4	8.1	2.0	4	6.4	1.6
LNE 02	331	2,390.0	7.2	19	28.9	1.5	19	80.0	4.2
LNE 03	241	1,273.4	5.3	11	41.9	3.8	21	74.8	3.6
Scotland 02	171	2,64.7	1.5	7	1.7	0.2	6	7.4	1.2
Scotland 03	127	3,82.5	3.0	9	15.9	1.8	15	31.2	2.1
Southern 02	57	93.8	1.6	3	109.4	36.5	17	22.4	1.3
Southern 03	55	99.4	1.8	3	1.7	0.6	5	1.4	0.3
All Regions 02	1,354	7,517	5.6	79	208	2.6	99	304	3.1
All Regions 03	1,151	5,757	5.0	59	97	1.6	93	325	3.5

*Table 7.1: TSR Data*

- As stated in the Annual Return, there is no regulatory target for this measure to ensure that there is no disincentive to applying a speed restriction when it is necessary on safety grounds;
- The total number of TSRs across all Regions has reduced from 2002 to 2003 and the SS has reduced for track and structures TSRs but increased for earthworks TSRs;
- In East Anglia Region the number of TSRs reported has risen slightly but the SS and average SS has fallen;
- In LNE Region the number of reported TSRs has dropped by about a quarter and the SS has fallen, but this Region continues to have the highest average SS compared to the other Regions audited;
- In Scotland Region, while the number of TSRs fell, the SS and average SS have risen;
- Overall in Southern Region, the number of reported TSRs, SS and average SS have fallen except in the cases of condition of track SS and the number of structures TSRs.

There have been some increases in TSRs and SSs as described in the table below:

Region	Type of TSR	No./ Severity Score 2002	No./ Severity Score 2003	% Increase	Comments
<b>Number of TSRs</b>					
East Anglia	Earthworks	2	4	100%	Very small number overall.
LNE	Earthworks	19	21	11%	Small increase, small number overall.
Scotland	Earthworks	6	15	150%	Relatively small number. Caused by particularly bad summer weather causing earth slips.
Scotland	Structures	7	9	29%	Small increase, small number overall.
<b>Severity Score</b>					
LNE	Structures	28.9	41.9	45%	Dominated by 2 TSRs accounting for 31.9 of the SS.
Scotland	Earthworks	7.4	31.2	321%	Comparatively low average SS and number. Caused by particularly bad summer weather causing earth slips.
Scotland	Structures	1.7	15.9	813%	Comparatively low average SS and number. Caused by particularly bad summer weather.
Scotland	Track	264.7	382.5	45%	Number of track TSRs decreased by 26%.
Southern	Track	93.8	99.4	6%	Comparatively low average SS and number of track TSRs.

**Table 7.2: Increases in TSRs and Severity Scores**

### 7.2.2 Data Analysis

#### Impact of April 1<sup>st</sup> Cut-Off

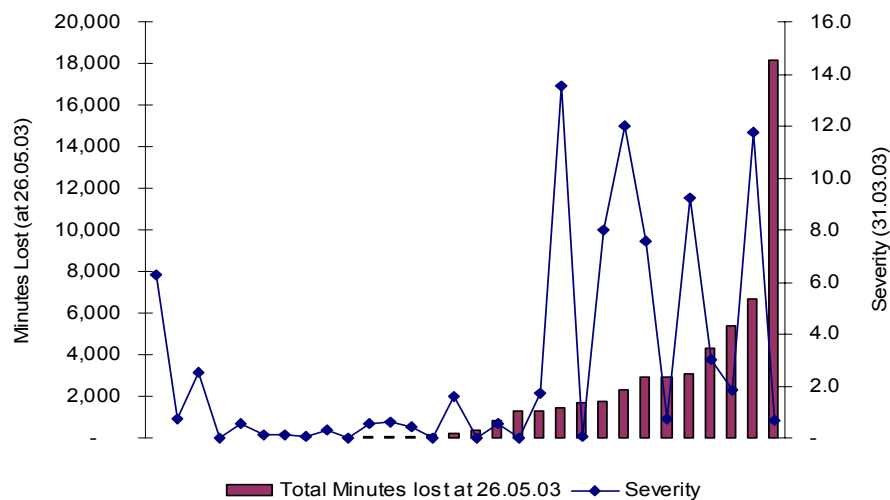
As stated in the ARM, if a TSR is imposed at the start of the reporting year, it is assumed to start on 1<sup>st</sup> April in the reported data. Therefore some TSRs are not counted if they lasted for more than 4 weeks but where those 4 weeks were split between 2 reporting years. The HQ Champion carried out analysis on two Regions as a sample to examine the effect of this. For East Anglia it showed that 3 TSRs with duration of more than 4 weeks were not counted in the 2002 or 2003 Annual Returns. These had a total SS of 0.119 which is 0.03% of the 2003 SS for that Region. In Midland Region 10 TSRs were removed within the first 4 weeks of the year that had a total duration of more than 4 weeks but less than 4 weeks in the 2003 reporting year. These were included in the 2002 but not the 2003 Annual Return. There may be a case for including such TSRs and part of the SS in both of the Annual Returns. This should be considered for future reporting.

For those TSRs imposed before April 1<sup>st</sup>, the SS would be higher if the actual start date were used rather than April 1<sup>st</sup>. Analysis of the effect of this was carried out using data from East

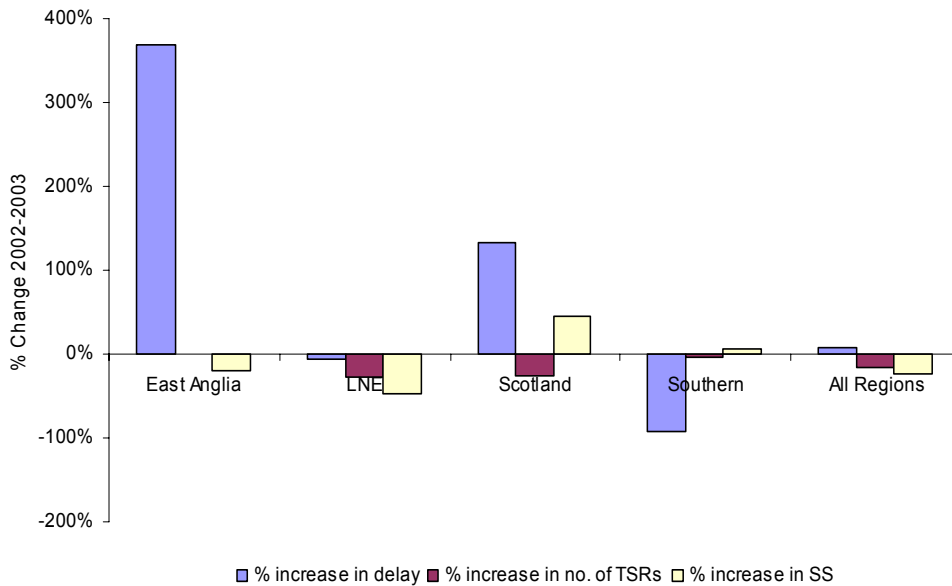
Anglia Region as an example. Using the actual start date to calculate the SS increases the track SS from 372 to 567, that for structures from 8.1 to 9.2 and for earthworks from 6.4 to 9.8, thus it is fairly significant. However the HQ Champion believes that the SS should not be counted from the original start date as there are some long standing TSRs that would have very high severity factors compared to the norm for each Region. This would skew the results for the year in question.

### Severity Score and Operational Performance

The SS does not give any indication of the impact of the TSR on the traffic traversing it or the commercial implications. The following graph was formed using some data provided by Scotland Region showing the amount of delay in minutes caused by some TSRs against the severity factor as reported in the 2003 Annual Return. Although these were taken at different dates due to the data availability, it can clearly be seen that some TSRs have a high severity factor but a low or non-existent impact on traffic and some that cause a large delay have a low SS.







**Figure 7.2: Condition of Track TSRs: Operational Performance and TSR Measure, Changes from 2002 to 2003**

Although it is stated that the effect TSRs have on traffic is not reported as part of the TSR measure because it is included separately in the operational performance data, the performance data in the Annual Return only shows delay due to condition of track TSRs which increased overall from 1,005,580 minutes in 2002 to 1,085,208 minutes in 2003. TSRs imposed due to condition of earthworks, structures or for other reasons are included as part of other delay categories so cannot be explicitly examined. The HQ Champion informed us that although delay minutes attributable to TSRs would demonstrate the effect on the end customer this is already reported upon in the operational performance section and is not the intent of the TSR measure. It was developed to demonstrate if there is deterioration in the asset condition and the SS to indicate how severe the impact is on the asset.

**7.2.3 Asset Reporting Manual Definitions and Procedures**

In our audits we found that the ARM definitions and procedures were generally complied with, although in East Anglia Region the Process Owner and one member of staff carrying out the Data Provider role were not familiar with the ARM. In Scotland, East Anglia and Southern Regions there were localised procedures to supplement the national ones. LNE Region produced local procedures for the management of TSRs although these made no reference to the reporting function.

None of the Regions had the guidance on the TSR reporting spreadsheet (RT/ARM/M467SPI) as stated in the ARM. The HQ audit revealed that these were unfinished working notes.

Reference to these should therefore be removed from the ARM or they should be updated, completed and re-issued; they may be useful for new or cover personnel.

As stated in our 2002 report, the procedure on how to treat cross boundary TSRs is not clear and the audits revealed that differing views remain in each Region as follows:

- Scotland Region did not believe there had been any, but in the event of one occurring the Process Owner would speak to his counterpart in the other Region to discuss how it would be dealt with;
- LNE Region include cross boundary TSRs in their spreadsheet and WON, but the WON number begins with a Regional reference so these can be identified and excluded from the count;
- Southern Region believed that the Region where the *majority of the mileage* of the TSR was would include it in their WON and manage it;
- East Anglia Region believed that the Region in which the *TSR mileage started* would own it.

A consistent reporting procedure for cross boundary TSRs should be produced and implemented as soon as possible.

#### 7.2.4 Resources

The ARM requires that each Region have a Process Owner responsible for the measure and a Data Provider who compiles the standard reporting spreadsheet. There are adequate competent resources in all four Regions. In East Anglia two staff covered the Data Provider role from February 2003 until the time of the audit due to sickness of the normal incumbent. Full explanation for the whole reporting year was therefore not available as the covering staff and the Process Owner could not provide comments on the detailed aspects of the process as carried out by the Data Provider until February.

The Process Owner noted the potential problem that the Data Provider's role would disappear once the Possessions Planning System is in operation, which centralises production of the Weekly Operating Notices for all Regions. This is an issue in all Regions and the reporting function may have to be re-assigned.

#### 7.2.5 Data Accuracy

No assumptions are used and the reported data is complete. The reporting procedure requires that each Region input details into a standard spreadsheet for those TSRs that comply with the specifications set out in the ARM Definitions. Various data sources are used. Southern and East

Anglia Regions populate the reporting spreadsheet manually while LNE and Scotland use other databases to populate it automatically but changes to TSRs have to be input manually.

In LNE, Scotland and Southern Regions a series of checks of the data are carried out. Checks on the Reported data in East Anglia were not as extensive as in other Regions during a period when the Data Provider was ill and the Process Owner did not carry out any checks. The checks that are carried out in the Regions are not rigorous enough to find all errors as some are found during the HQ checking process, and errors were found during the audit when the data was compared to the source data as described below.

The HQ Champion carries out a series of detailed checks on the spreadsheets received from the Regions. The errors found are discussed with the Regions and resolved. Examples of errors found are duplicate entries of TSRs that are then counted more than once and inputting errors, for example line references and mileages. The errors found this year are not materially significant and the HQ Champion estimated that the effect of the errors is normally small giving a 1% or lower change to the number or SS.

Data provided by the Regions during the audits was compared with data provided by HQ (both the data HQ received from the Regions and HQ's corrected data) and any differences could be fully explained. The spreadsheets that East Anglia and LNE Regions sent to HQ contained errors in the formulae which resulted in duplicate entries not being detected and therefore TSRs being counted twice. HQ corrected these errors so there is no effect on the reported data.

HQ has not audited the source data or the source databases in the Regions during the reporting year, but there is an intention to set up Regional audits in the near future.

A new National TSR database is being developed for use in the Regions and this should provide the ability to produce the reported data automatically which will enable the process to be more efficient, more consistent between the Regions and less time consuming. However the development has taken longer to complete than anticipated as the scope has expanded.

#### 7.2.6 *East Anglia Region*

(a) Review of 2002 Report on the Annual Return

The following recommendations were made in our 2002 Report. The actions carried out by Network Rail at the time of the 2003 audits are indicated beneath each recommendation:

Guidance on translating reason imposed codes to reported reason imposed codes should be formalised:

⇒ This has not been done. While conversion is obvious for the majority of cases, this may be useful particularly while personnel who may not have the same knowledge as the Data

Provider, are covering the post. However it is noted that the HQ Champion checks the reasons against the description;

Process Owner to be confirmed and introduce a level of checking:

⇒ The Process Owner has since changed, but no checking has been introduced.

(b) Accuracy and Reliability of Annual Return Data

The source data for a sample of TSRs in the reporting spreadsheet was examined. While for most cases the source data could be found and the spreadsheet was correct, in some instances the data in the spreadsheet was incorrect and there was conflicting evidence or no evidence to confirm what the data should have been. One example had started as an ESR but the input start date was the date it turned into a TSR. In another example the TSR had actually been removed but was reported as still imposed. This TSR had a reported severity factor of 7.5 but inputting the correct end date gives a severity factor of 2.2. The errors found have been corrected in the final version of the Annual Return data.

Thus our audit found there were errors in the spreadsheet and the checks on the spreadsheet were not rigorous enough to identify them. In addition there were ambiguities in the source data.

7.2.7 *LNE Region*

(a) Review of 2002 Report on the Annual Return

In our report on the 2002 Annual Return we stated that there was no formal sign off procedure with engineers for the reason-imposed codes. Our audits in May 2003 indicated that this is still the case. However, while the Reporting Team believe that this should be formalised, the current system is unlikely to yield incorrect coding as competent staff apply for TSRs and ESRs and give appropriate reasons.

(b) Accuracy and Reliability of Annual Return Data

Again, the source data for a sample of TSRs in the reporting spreadsheet for 2003 was examined. In one instance the start date was incorrect but only by one day. Although in most cases the source data could be supplied and the spreadsheet was correct, it was difficult to find and data had been archived if the original start date was before 1<sup>st</sup> April 2002. In these instances, therefore, the start date source data could not be checked against the spreadsheet and verified.

7.2.8 *Scotland Region*

(a) Review of Processes Used and Issues

As was the case in the 2002 audit a helpful pack of information was tabled by the Process Owner at the meeting containing information on the reported data, local and national procedures and also information about the management of TSRs in Scotland which demonstrated the good practice of the Infrastructure Speed Removal Team (ISRT).

There have been particular checking mechanisms introduced to try to ensure the accuracy of the reported data. Particularly noteworthy is the random 20% cross check of the auditable trail for TSR documentation and a check of the audit trail for all TSRs with an SS of more than 3. These checks are not carried out in any other Region. However some minor errors were found in the Reporting spreadsheet for a sample of data investigated.

(b) Accuracy and Reliability of Annual Return Data

The audit trail from the reporting spreadsheet to the source paperwork was investigated for a sample of TSRs to be included in the 2003 Annual Return. The source data could be produced and audits indicated that the majority of information was correct for most of the sample. We did find some minor discrepancies although these do not materially affect the reported data and any errors found during the audit were corrected for the final version of the Annual Return data.

7.2.9 *Southern Region*

(a) Review of Processes Used and Issues

There is inefficiency in the Region as there are two people who input TSR information into databases and spreadsheets but neither of these provide the total amount of data necessary for the reporting spreadsheet thus it is populated separately.

Under Org 1 the post of the person who produces the ESR spreadsheet will no longer exist. This is a cause for concern as the spreadsheet is used as one of the checks of the reported data which is part of the source data necessary for a complete audit trail.

(b) Accuracy and Reliability of Annual Return Data

The audit trail from the reporting spreadsheet to the source paperwork was investigated for a sample of the TSRs included in the 2003 Annual Return.

The following findings were noted but these do not materially affect the overall reported data:

- For more than half of the sample the end date evidence could not be produced and it is likely that there was verbal notification with no written record;
- The mileage for one entry into the spreadsheet was incorrect resulting in a reported severity factor of 0.458 when it should have been 0.183 with the correct mileage, although this error was corrected in the final version of the Annual Return data.

#### 7.2.10 *Key Conclusions*

- Overall there has been a reduction in the TSRs and severity reported between 2002 and 2003 although there have been some minor increases in some areas;
- There is general compliance with the ARM;
- The methods used to collect and include the data in the reporting spreadsheet vary but all data required by the ARM is reported. The development of the new National TSR database will enable more efficient and consistent reporting;
- Although checks at HQ are likely to identify most errors in the data provided by the Regions and any remaining errors are unlikely to have a significant effect on the data, the checking processes at the Regions do not pick up all errors and there were instances when the spreadsheet did not match the source data and where the source data could not be provided;
- While the measure does not show the effect of TSRs on the passengers in terms of delay and the importance to the industry as a whole, this is shown in the operational performance section of the AR. The reported TSR measure gives a proxy for the condition of the assets, with the SS showing how severe the impact is on the asset capability. Over time the measure should indicate any material deterioration in the condition of the assets. However, some of the Regions consider that there would be more meaning to the measure if it reflected the effect on the traffic affected by it;
- LNE, Scotland and Southern Regions provided information on the initiatives and processes used in the Regions to manage TSRs, but no use is made of the reported data in any of the Regions visited for the management of TSRs because the measure is designed as a proxy for asset condition rather than a monitor of the number of TSRs. This raises questions regarding the usefulness of the measure and the efficiency of the time used. Reports on the total number of TSRs imposed for over 48 hours for any reason (rather than just condition of track, structures and earthworks) are used for management purposes.

### 7.3 *Recommendations*

- It is recommended that a review of checking processes in the Regions is carried out as errors were found at HQ and in the Regional data when compared to the source data;
- Regions should ensure the availability of source data so that a full audit trail is available;
- Southern and East Anglia Regions should investigate the possibility of populating the reporting spreadsheet automatically using the IIP database to make the process more efficient if this is possible (it is used in LNE and Scotland Regions with manual updates of changes to TSRs). This will not be necessary if the implementation of the new Network Rail Speed Restriction Database occurs in the near future as it will enable the TSR reporting process to become more efficient as the measure will be a by-product of the database;
- Southern Region Data Provider to ensure that where personnel will change under Org 1 the current level of checks and source information is maintained;
- A consistent reporting procedure for cross boundary TSRs should be produced and implemented as soon as possible;
- Reference to the guidance on the TSR reporting spreadsheet (RT/ARM/M467SPI) should be removed from the ARM or it should be updated, completed and re-issued;
- We recommend TSRs and a proportion of the SS that exceed 4 weeks in total duration but are removed within the first 4 weeks of the reporting year be included in the Annual Return. These TSRs would not be included under the current definition.

## 8 Bridge Condition Index (M8)

### 8.1 *Audit Scope*

The 2003 audits focused on the completeness, accuracy and reliability of the data being produced for the Bridge Condition Index section of the 2003 AR. The audits also reviewed issues raised during our 2002 audits. Site visits were carried out in LNE and Southern Regions to observe bridge examiners marking structures for the Structures Condition Marking Index (SCMI).

Audits were conducted in Eastern, Scotland and Southern Regions and included the Structures Examinations Contractors. The East Anglia part of Eastern Region operated separately from the LNE section, with different Examinations Contractors, and therefore separate audits were undertaken for each.

### 8.2 *Audit Report*

#### 8.2.1 *Reported Data*

The bridge condition index grades in the AR are derived from an SCMI examination of each bridge which gives a score from 1 to 100 which is then converted into the condition grade. The SCMI examination is carried out on site and then the scores are entered into the SCMI database from which the AR data is collated. At present only under- and over-bridges are required to be assessed using SCMI and contained in the AR. All of the bridges to be included in the AR must be assessed within a 6-year period. As detailed in Section 8.2.2 below, the assessments carried out to date are currently behind this schedule.

In the 2003 AR 4,255 results are shown for 2002/03 together with the 2,436 results presented in the 2002 AR for 2000/01 and 2001/02. Of these 4,255 results 1,280 were 'backlog' from 2001/02 and 2,975 were results from 2002/03. The backlog comprises those results that should have been presented in the 2002 AR but were not, either because the marking had not been carried out or because the marking had not been input into the SCMI database at the time of the 2002 AR production.

The average condition grade for the bridges included in the AR to date is 2.0. However, at present even if all scheduled examinations were carried out and input into the database, only one third of the bridges on the network would have an SCMI score. Not all of those assessments scheduled have taken place and been entered into the database and there are various shortcomings in the data as discussed in this report. Therefore current use or analysis of the bridge condition index data in the AR should be treated with caution.

The regulatory target is for "no deterioration from a baseline average condition grade which will be established once a sufficient sample is achieved". As the number of bridges assessed to date



is small in relation to the whole population, no baseline average condition has yet been agreed between Network Rail and the ORR.

The SCMI data is presented in 5 condition grades in the 2003 AR. In our 2002 report we stated our opinion that the use of 5 grades coarsens the data and we suggested that a greater number of bands be used. We note that it is Network Rail HQ's intention to open a debate to include the Rail Reporters about what the future form should be. Analysis of the distribution of the 2002/03 scores shows that the use of more than 5 grades and adjustment of the band width, together with graphical or pictorial representation of the results would provide more transparent findings and would be beneficial in future reporting. For example:

- The number of SCMI scores in the 95 to 100 range is surprisingly high;
- Over 40% of one Region's results lie within a single 5-point range in the 1 to 100 scale.

These findings cannot be analysed further without more detailed information being available.

We compared the SCMI database to each Region's submission of their 2003 AR data to HQ. In East Anglia and LNE Regions this comparison showed discrepancies between the numbers in each band. Around ten of the results for LNE Region and around 5 in East Anglia Region were in a different band. The Regions were unable to resolve this discrepancy and the results were not altered for the 2003 AR, although the difference is minor. In Scotland and Southern Regions our results were the same as the Region's submission to HQ.

#### 8.2.2 *Progress of Assessments and Reporting*

The schedule of assessments is based on a historic programme which appears to have a spread of types of structure, materials and locations each year. There is nothing to suggest a bias of type or size of structure in any year's task list but only a detailed analysis of the lists would prove this conclusively.

The table and pie charts below summarise the status of SCMI data results. They were compiled using the formal submission from each Region to HQ, other information provided during the Regional audits and the data in the SCMI database in each Region at the time of production of the 2003 AR. Clarification of various figures received from East Anglia Region was required following the audit and the data below includes this clarification information received post audit. Subsequently East Anglia Region revised their submission to HQ. The changes made in East Anglia altered the task list total and backlog for 2001/02 and thus there are some differences between the table and pie charts below and the Region's latest records.

The results provided by East Anglia contained 2 fewer SCMI results compared with the figures reported in the AR. The Reporting Team believes this may be due to the 2001/02 backlog.

The table below shows the percentage of SCMI examinations that are actually in the SCMI database compared to the number of examinations that were scheduled for 2001/02 and 2002/03 and for the whole 6-year period. This shows that the Regions are behind the schedule.

Year	No. Scheduled for SCMI Assessment	No. of SCMI Scores in Database	% of Scheduled in Database
East Anglia			
2001-2002	544	244	45%
2002-2003	793	277	35%
Total 2001-2003	1,337	521	39%
Total 2001-2006	3365	521	15%
LNE			
2001-2002	770	330	43%
2002-2003	1,049	256	24%
Total 2001-2003	1,819	586	32%
Total 2001-2006	4423	586	13%
Scotland			
2001-2002	630	549	87%
2002-2003	708	490	69%
Total 2001-2003	1,338	1,039	78%
Total 2001-2006	Data not available		
Southern			
2001-2002	987	487	49%
2002-2003	924	746	81%
Total 2001-2003	1,911	1,233	65%
Total 2001-2006	9200	1,233	13%

*Table 8.1: Status of SCMI Examinations and Processed Results*

A further breakdown is presented in the following pie charts:

Status at 2003 Annual Return  
 Total No of Examinations=847 (793 from 02/03, 54 carried forward from 01/02)

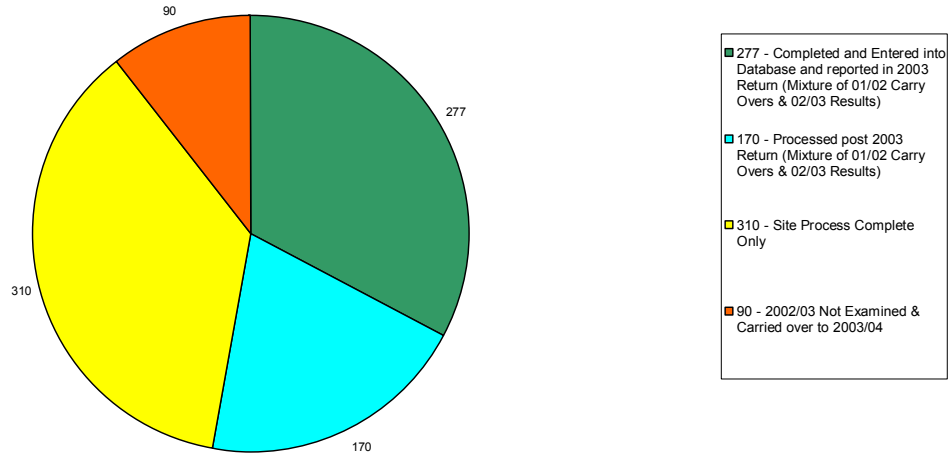


Figure 8.1: East Anglia Region SCMI Results 2002/03

Status at 2003 Annual Return  
 Total No of Examinations=544

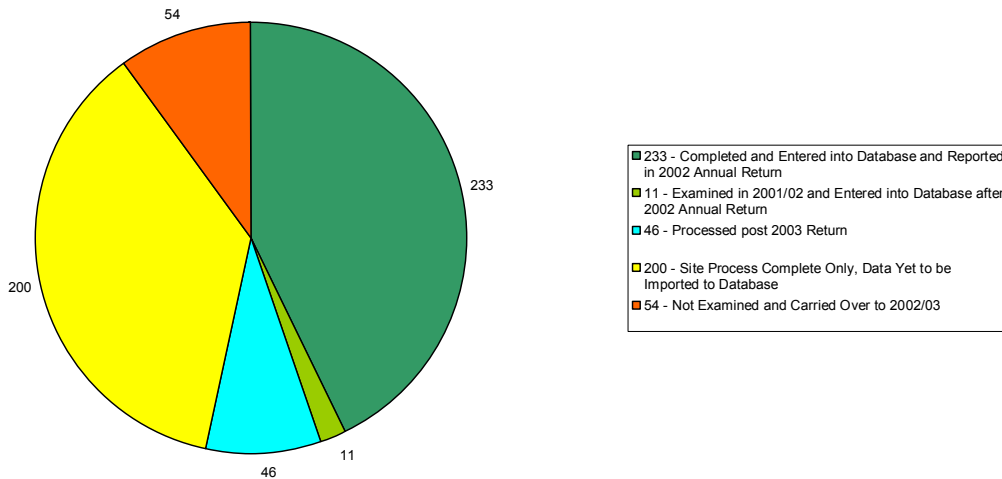


Figure 8.2: East Anglia Region SCMI Results 2001/02

Status at 2003 Annual Return  
 Total No of Examinations=1365 (1049 from 02/03, 316 carried forward from 01/02)

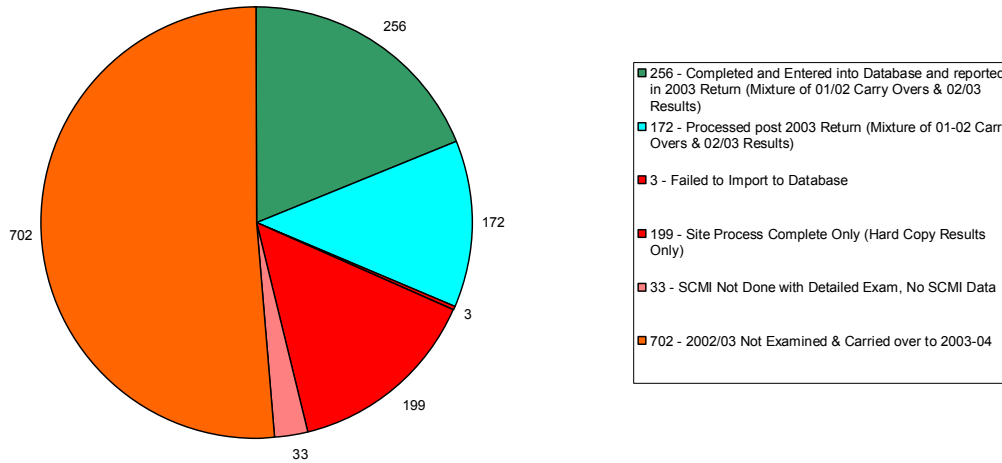


Figure 8.3: LNE Region SCMI Results 2002/03

Status at 2003 Annual Return  
 Total No of Examinations=770

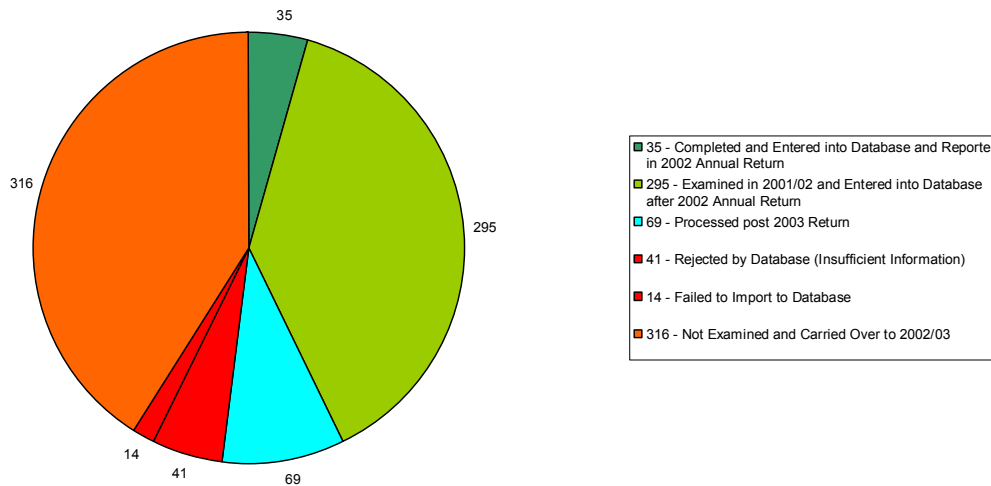


Figure 8.4: LNE Region SCMI Results 2001/02

Status at 2003 Annual Return  
 Total No of Examinations=886 (708 from 02/03, 178 carried forward from 01/02)

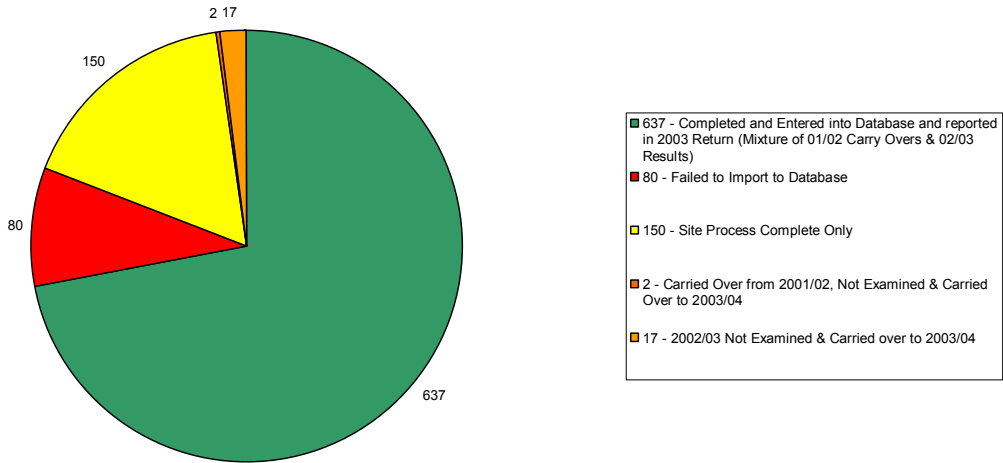


Figure 8.5: Scotland Region SCMI Results 2002/03

Status at 2003 Annual Return  
 Total No of Examinations=630

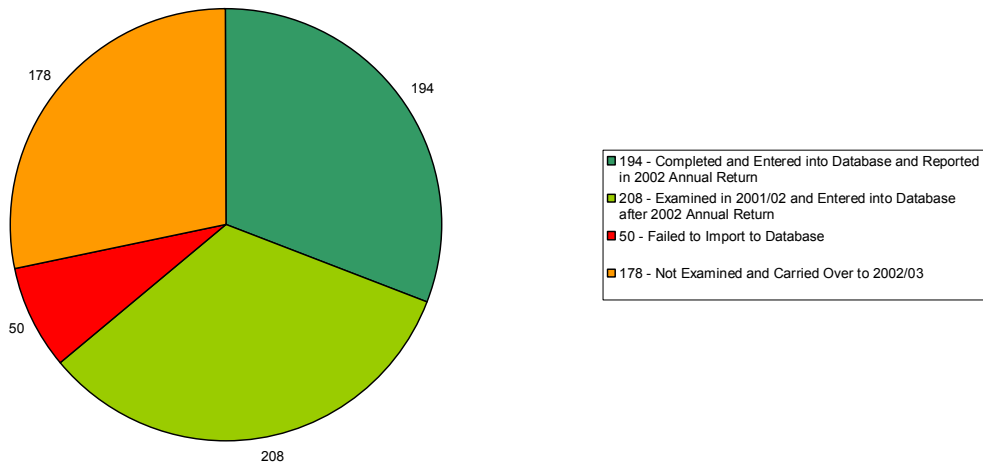


Figure 8.6: Scotland Region SCMI Results 2001/02

Status at 2003 Annual Return  
 Total No of Examinations=1302 (924 from 02/03, 378 carried forward from 01/02)

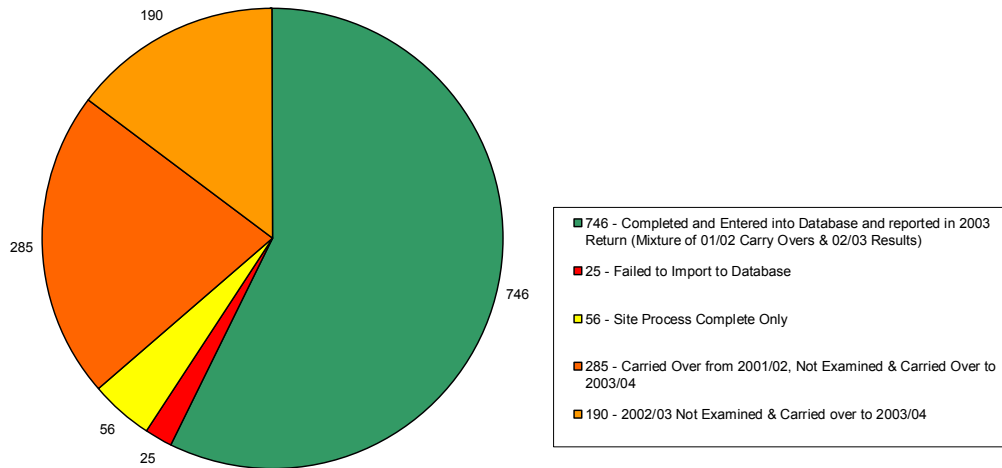


Figure 8.7: Southern Region SCMI Results 2002/03

Status at 2003 Annual Return  
 Total No of Examinations=987

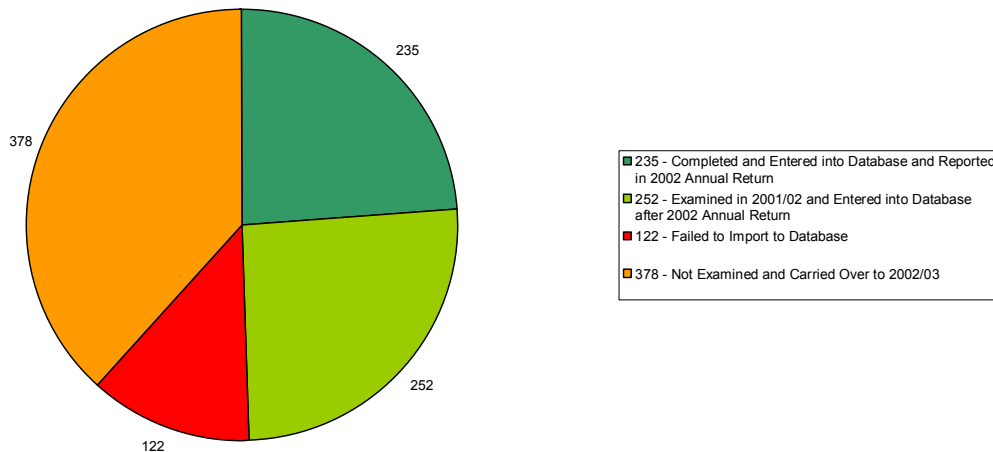


Figure 8.8: Southern Region SCMI Results 2001/02

The pie charts show that there are a large number of scheduled examinations which have not been carried out or have been carried out but not input into the database and thus not reported. This due to:

- Issues of access to the bridge site;
- Poor organisation and lack of resources on the part of the Examinations Contractor;
- Problems with importing results into the database, in some cases because of structure numbering discrepancies, in other cases the database rejects records if errors have not been corrected. There are significant quantities of these in all Regions;
- There are considerable numbers of examinations carried out in 2002/03 where only the site process has been completed. In East Anglia this applies to 2001/02 also. Of more concern are the large numbers of examinations in LNE where the SCMI site process is complete but only a hard copy of the results is available;
- Miscellaneous issues e.g. specialist resources are required.

There is a considerable time lag, of over a year, before a complete set of results starts to emerge. The problem is evident in all Regions although some perform better than others. The following measures could be put into place to rectify this:

- Investigation into the possibility of delaying the year end cut-off date;
- Smoothing out the peaks in the examination task lists; the Regions are endeavouring to address this issue where it is a problem;
- The Examinations Contractor's teams need to be increased in size;
- Possessions need to be made available where these are the cause of the problem.

Whilst not reported in the AR, our audits found that the interpretation of backlog of SCMI results, contained in the summary sheets completed by the Regions for submission to HQ, differed between Regions. A consistent definition should be adopted in future years.

(a) East Anglia Region Progress

In East Anglia around 10% of SCMI examinations were carried over from 2001/02 to 2002/03 and a similar percentage will carry over to 2003/04. At the time of the audit the status of the SCMI examinations scheduled and the numbers actually in the database could not be ascertained by Network Rail or the Examinations Contractor, although they were reconciled following the audit. Large numbers of SCMI examinations are reported as complete on site but have not been entered into the database and an explanation of the reasons was not available during the audit. Two hundred of the examinations carried out in 2001/02 have not been input into the database some 12 months on from the year-end.

(b) LNE Region Progress

In LNE Region 316 examinations, or 41% of the total number scheduled for the year, were carried over from 2001/02 to 2002/03 because possessions were not available and there was a

lack of examination resources. In 2002/03, 702 examinations were carried over to 2003/04 and for 199 of those examined, only paper copies of the site scoring were available with no electronic format to input into the SCMI database. At the time of the audit the status of examinations could not be ascertained and a reconciliation post audit had to be undertaken by the Examinations Contractor and Network Rail.

We found that there is a significant variation in the number of scheduled SCMI examinations from year to year. Network Rail are trying to smooth the peaks.

The status at the end of the year in LNE Region demonstrates that the SCMI examinations should have been better organised and that they were under-resourced by the Examinations Contractor.

(c) Scotland Region Progress

In Scotland Region the carry over of SCMI examinations from 2001/02 to 2002/03 was significant at 178 or 30% of the schedule for the year. The majority of the SCMI examinations scheduled for 2001/02 have now been undertaken. The following issues remain with the 2002/03 SCMI results:

- About 20% have not been received by Network Rail;
- 17% have been assessed on site but the results have not been processed;
- 3% have not been examined; and
- A further 80 or 11% for the year did not import into the database.

(d) Southern Region Progress

Our audit established that 35-40% of scheduled examinations each year in Southern Region are carried over to the following year because of the lack of possessions or problems of access to tenanted arches. A significant number of results, 12% in 2001/02, cannot be imported into the database because of numbering discrepancies. This could and should be resolved by renumbering. There is some variation in the number of SCMI examinations scheduled each year. We recommend that this is addressed as otherwise there will be a 30% increase in the number required in 2005/06.

In Southern Region the SCMI task list total includes some subways classified as under-bridges which should not currently be reported in the AR. Southern Region should remove these assessments from the scheduled number.

8.2.3 *Compliance with the Asset Reporting Manual*

The ARM is generally complied with except in the following instances:



- There is only limited on-site re-scoring of structures by Network Rail: this should be a regular occurrence and is essential to ensure consistent application of the SCMI process and accurate and reliable results;
- SCMI scores are not entered into RAR. However, entering the data into RAR does not improve SCMI. We had previously stated that entry of SCMI scores into GEOGIS or the Regional Structures databases would be more beneficial. We therefore recommend that the requirement be removed from the ARM;
- There is no feedback of data from HQ to the Regions on trends in SCMI on a period basis.

#### 8.2.4 *Local Procedures*

##### (a) Network Rail

Local procedures within Network Rail that describe the process for handling examinations and SCMI data had improved only slightly since the 2002 audits. These procedures are important as working and reference documents so that all involved know what the processes are. Work on such procedures had started in Scotland but was in its early stages and we recommend that this be completed. There are no local procedures in East Anglia Region, but the requirement has been identified and procedures will be developed based on the LNE model. In Southern Region the updating identified in our 2002 audits had not yet taken place. The local procedures in LNE Region had been updated to incorporate our 2002 recommendations, and only some minor modifications were suggested during this audit.

The work identified is important and we recommend that it should be carried out as soon as possible.

##### (b) Examination Contractors

Our 2002 audits identified shortcomings in East Anglia and LNE Regions' Contractor's procedures that describe the examination process and SCMI. We found that this issue had not been addressed in the interim period. The examination contracts in LNE and East Anglia Regions expired on 31<sup>st</sup> March 2003 therefore Network Rail should communicate the shortcomings to the incoming Contractors.

Recommendations made during the 2002 audits regarding the Examinations Contractor's procedures in Scotland and Southern Regions had been implemented and there are now no major concerns with their procedures.

#### 8.2.5 *Resources*

In our 2002 report we raised concerns regarding the Network Rail staffing levels in Southern, Scotland and East Anglia Regions.

In Southern Region our concern regarded the workload of the 'signing off engineers'. Recent changes have improved this situation although it was a problem for the whole of the reporting year.

Although in Scotland and East Anglia Regions the staff allocation to structures maintenance in the recent reorganisation (Org 1) is a realistic number for the task in hand, two posts are vacant in Scotland and seem likely to remain so: in East Anglia several posts are vacant and resources are down to minimal levels. Both Regions have been significantly understaffed during the 2002/03 year. Filling the vacant posts should be a priority.

In LNE Region Network Rail staffing was at an acceptable level at the time of the audit.

There is a resource issue concerning the Contractor's examinations teams. If they were increased in size it would be possible to reduce the data lag and the number of examinations carried over to subsequent years.

A named individual should occupy the post of Examining Engineer at the Scotland Region Examinations Contractor. Currently the post is vacant and the role is being undertaken by the former Examining Engineer from the 2001/02 contract. The former Examining Engineer was proposed by the Examinations Contractor for the post but Network Rail have decided not to approve such an appointment. This is relevant in the 2003/04 year and affects 2003/04 examinations and work carried over from the 2002/02 and 2002/03 years.

#### 8.2.6 *Accuracy and Reliability of SCMI Data*

SCMI is a process that requires a number of examination teams to produce sketches and mark structures on site for subsequent input to a database. The process relies on the examiner's correct interpretation of the SCMI manual for the many configurations of structures encountered. To deliver an accurate and reliable result the process requires:

- All involved i.e. examiners, examining engineer, structures maintenance engineers, to have the basic training and competency requirements for their role;
- Checks to be carried out to give confidence in individual SCMI scores;
- Technical support to be available to those involved;
- The electronic tool which processes the score data to deliver an accurate score on a 1 to 100 scale based on the data that was input.

The following sections of the report discuss these requirements and Network Rail's ability to fulfil them.

#### 8.2.7 *Training and Competency Requirements*

The basic training and competency requirements are:

- Examiners must be adequately trained;
- Examiners must demonstrate competence in SCMI;
- The Examining Engineer must be adequately trained in SCMI and hold the appropriate competence level \*;
- The Network Rail staff involved in processing, reviewing and auditing must have adequate training in SCMI and hold the appropriate competence level\*;
- There is a documented Competence Management System complying with RT/CE/S/047 “Standards of Competence for Examination of Structures”.

\*Competence is defined in the Network Rail Standard RT/CE/S/047, “Standards of Competence for Examination of Structures”.

We found that efforts had been made to give training in SCMI and to carry out competence assessments by both the Examinations Contractors and Network Rail since our 2002 audit, although in some areas the coverage is patchy and further effort is required on developing competency management systems. In most cases the situation had improved since our 2002 audit six months ago but in LNE and East Anglia Regions, where the Examinations Contractor had lost the contract from April 2003, there had been no improvement. Further work is required in all Regions.

Our audit revealed some issues in aligning the Units of competence in the current version of Standard RT/CE/S/047 (Issue 2, February 2001) with actual roles. The standard requires that a competency level is achieved but the format of the standard creates problems in the following cases:

- Unit 2 does not allow an Examining Engineer who delegates much of the routine work, or a Manager, to demonstrate competence because they do not carry out these duties all the time;
- Units 9 & 10 (SCMI) are appropriate for staff such as the Examining Engineer and Network Rail staff who review or re-score examination reports. However demonstrating competence is difficult in such cases because the Standard has been written for bridge examiners who are using SCMI on a day to day basis;
- Unit 1 is the only Unit applicable for Network Rail Assistant Structures Maintenance Engineers, but it is not possible for them all to demonstrate competence because the Unit does not always align satisfactorily with their duties.

We recommend that Network Rail pursue modifications to the standard, as appropriate, to resolve these matters.

(a) East Anglia Region Training and Competency

Since our 2002 audits, the two Structures Maintenance Engineers in East Anglia Region have successfully undertaken competence assessments in Unit 1. However the Assistant Structures Maintenance Engineer had not been successful, which reflects the insufficient alignment of the competency with duties. SCMI training had already been undertaken.

A documented competence management system does not yet exist in East Anglia Region but progress is being made towards developing one using the LNE document as a model. There are also various outstanding competency issues with the Examinations Contractor including lack of a competency management system, a lack of certification and competency assessments not yet being undertaken.

(b) LNE Region Training and Competency

In LNE Region the Network Rail Competency Management System requires some relatively minor information to be added but was generally satisfactory. Some training and competency assessment shortcomings were noted – a number of staff need to undertake Unit 1 competency assessment and SCMI training.

As with East Anglia, problems had arisen in LNE Region regarding competency assessments where Unit 1 did not align satisfactorily with the duties of Assistant Structures Maintenance Engineers.

The Contractor in LNE Region continued to demonstrate some shortcomings with regard to a competency management system. In addition there is no assessment for hired resources and insufficient SCMI training and appropriate competence assessments for a significant number of examiners.

(c) Scotland Region Training and Competency

In Scotland Region competency assessments of Network Rail staff have taken place since our 2002 audits or are planned. SCMI training is required for one Structures Maintenance Engineer which would then allow SCMI site re-scoring checks to commence. A documented competency management system should be created to record and control training and competency issues.

The Examinations Contractor in Scotland Region still does not have a competency management system as reported in our 2002 audits. A system should be created. SCMI training and competency assessments are required for some key staff. A number of other issues arising were noted.

(d) Southern Region Training and Competency

In Network Rail Southern Region some errors and uncertainties were found in the records of competency and training. These should be corrected and the existing documents developed into a competency management system. As recorded in our 2002 report the Examinations

Contractor had a Competency Management System in place. Issues that required resolving were related to alignment of the Units in RT/CE/S/047 to individual's duties.

#### 8.2.8 *Checks Of Individual SCMI Scores*

Confidence in the results of SCMI can only be obtained from thorough routine checks on the data and separate scoring of selected structures. If the work of all examiners is checked and the results, particularly from the separate scorings, show only minor differences from the examiner's work then there would be confidence in the overall results. Each Region is responsible for the accuracy of their data. Data is collated at HQ but not separately checked.

The checks required by the ARM are:

- Checking by the Examining Engineer during the desk review of the examination and SCMI report;
- Visits by Network Rail to the site to re-score the structure.

Other checks that can take place are:

- Routine checking by Network Rail's Structures Maintenance Engineer during the review of the examination and SCMI report;
- Sample checks by Examinations Contractor with or without site re-scoring during routine audits;
- The annual Holmes Davies audits commissioned by Network Rail where 'SCMI experts' visit the site and re-score around 25 to 30 structures in each Region which have already been examined by the Examinations Contractor.

##### (a) Desk Reviews

Desk reviews of SCMI on individual structures by the Examining Engineers generally took place at the time of their review of the detailed examination report in all Regions. However, the extent of East Anglia's Examining Engineer's review of SCMI of individual reports could not be ascertained in the 2002 or 2003 audits. Desk reviews of SCMI by Network Rail Engineers took place in some Regions but not all. Rigorous desk reviews on SCMI by Network Rail, if carried out in all Regions, would help to monitor SCMI accuracy.

##### (b) Re-scoring and Other Checks

LNE and East Anglia Regions each carried out a single general audit of the activities of the Examinations Contractor, which included visiting sites to re-score SCMI, but routine re-scoring is not carried out. The results showed errors in the sketching and scoring of the structures. These general audits of the activities of the Examinations Contractor have not taken place in Southern or Scotland Regions. It is recommended that they take place in these Regions as they provide Network Rail with a useful guide to how the Contractor is performing.

Out of the four Regions audited, only in Southern did Network Rail routinely visit sites each period to re-score structures as required by the ARM. The visits had started in December 2002, part way through the 2002/03 year. The format of the audits was satisfactory. LNE, East Anglia and Scotland Regions did not carry out routine re-scoring and this is a matter for concern.

In Southern Region, the re-scoring results showed that there are significant numbers of inaccuracies in labelling and scoring and also cases of examiners misunderstanding guidelines in the SCMI handbook regarding the use of the SCMI system. Specific recommendations about the follow up to the audit have been given elsewhere. The results of the re-scoring were passed to the Examinations Contractor but a more rigid follow through of the emerging issues is required. The results of Southern Region's re-scoring are supported by the findings of the Holmes Davies audit where an auditor re-scored 169 bridges across all Regions. Significant differences in labelling and scoring were found, with over 60% of the final scores differing by more than  $\pm 3$ .

Site re-scoring is the only real routine check that Network Rail has on accuracy of SCMI scores. We consider it essential that Network Rail undertakes regular site re-scoring in all Regions and that the results are fed back to the Examinations Contractor and diligently followed through to correct the errors and to prevent a recurrence. It is important that the re-scoring should aim to cover the work of all examiners.

The accuracy and reliability of the SCMI results is low, based on the above evidence.

#### 8.2.9 *Technical Support*

Our audits and experience of SCMI, including observation of the process on site, have led us to the view that basic training and competency assessment are not sufficient to enable the examiners and others to accurately implement SCMI. In addition it requires continuous support to the examiners in the field, the Examinations Contractor and Network Rail staff involved in the technical aspects of SCMI. Such support requires the utilisation of personnel with detailed knowledge of how structures should be labelled and how the severity and extent of defects should be marked so that active steps can be taken to improve the accuracy of SCMI labelling and marking. This is an urgent requirement and we recommend that Network Rail lead this initiative and drive it through proactively. We note from the HQ audit that it is Network Rail's intention to introduce a small team of 5 to 6 people to provide support to the 7 Regions in SCMI matters, and this should be in place 3 months following the audit which was held in June 2003.

In Southern Region the Examinations Contractor has taken advantage of the opportunity to recruit an extra resource with SCMI experience to provide support to the examiners using SCMI. This is a welcome move but does not alter the observations above.

#### 8.2.10 *The SCMI Electronic Tool*

Network Rail provides the SCMI electronic tool to each Region for processing SCMI scoring sheets into a database of predetermined format. The SCMI tool format is fixed and cannot be modified at Regional level. We commented on the tool and its algorithm in our 2002 report and in a separate report as part of our reporting work on Network Rail's Asset Register.

#### 8.2.11 *Data Processes*

We found that the handling of the SCMI data was reasonably well controlled except for the following cases where the practice was not satisfactory and should be improved:

- (a) East Anglia Region
- In East Anglia Region the SCMI tool and database has been held and operated by the Examinations Contractor from the start. There is almost complete detachment of Network Rail from the SCMI process. During the audit the status of those SCMI examinations not already in the database could not be ascertained. The operation of the SCMI database by the Examination Contractor is undesirable because it results in Network Rail knowing little about the true state of SCMI matters;
  - The management of the SCMI data in East Anglia Region was based on an individual's personal system, not recorded or known to anyone else. Although unprocessed SCMI data was being backed up, processed data was not. In our opinion the process was poorly controlled.
- (b) LNE Region
- At the LNE Region audit the status of examinations not already in the database could not be ascertained and a reconciliation post audit had to be carried out by the Examinations Contractor and Network Rail to derive the progress against the schedule of examinations;
  - Some bridges that had undergone detailed examinations had no SCMI data. There were large numbers of SCMI reports where only the hard copy format of the completed scoring sheets was available from the contractor. It was clear that the SCMI data was not being handled by the Examinations Contractor in a proper manner;
  - It emerged that, in an effort to complete the results for the end of the contract, the LNE Region Examinations Contractor had created SCMI scorings recently in the office using the detailed examination report by personnel other than the examiners. This practice is not an acceptable way of producing an SCMI report – the intention is that it is marked on site. Network Rail, post audit, identified 33 such SCMI results, which they have decided not to accept, but some others already processed remain to

be identified. LNE have subsequently advised that, when identified, these others will be subject to a detailed site audit for verification.

(c) All Regions

- The format of the SCMI database results in it not being possible to identify which SCMI results in the database belong to a particular year's task list because the SCMI database records only the date of the SCMI examination on site and not the task list year. Thus it is difficult to identify what is achieved as a successful database entry against the task list. It would be helpful if a modification could be made. We note that Network Rail HQ are considering adding another "column" to the database to allow this task list information to be included;
- It should be noted that neither the Examinations Contractor nor the bridge examiners see the resulting score from any SCMI marking. In our 2002 Report we recommended that greater dissemination of results to the examiners would be beneficial. The Network Rail HQ Champion advised that HQ will issue SCMI results to the Regions for distribution to those involved in SCMI examinations;
- We found that it is common practice in some areas for SCMI marking to be done by the examiner once he has left the site, using his detailed examination findings. The accuracy of SCMI will be diminished where such practice occurs. All Regions should ensure that SCMI is actually marked on site.

8.2.12 *Significance of the Bridge Condition Index (SCMI) to Network Rail's Management of Structures and Development of the Measure*

Network Rail do not analyse SCMI data or use it for any purpose currently other than including the results in the Annual Return. At present its coverage would be only one third of bridges even if all of the 2001/02 and 2002/03 results were in the database.

The detailed examination reports will continue to be used to manage individual structures, but as the coverage of the network extends over time then it will be possible to use SCMI for monitoring trends or looking more closely at groups of structures. It is intended that SCMI be used for populations of structures rather than individual structures. The comments we made in our 2002 report should be noted; that understanding the complete situation with any structure relies on knowing its condition and its structural adequacy. SCMI does not determine structural adequacy.

The emphasis should be on continuing to populate the SCMI database promptly and with accurate data, but the Regions should start to explore the significance of the data they are compiling.



### 8.2.13 Conclusions

While Network Rail are significantly behind the scheduled programme of SCMI assessments and there are problems with the data, Network Rail staff are endeavouring to do as much as is feasible given the difficulties with the task and resource constraints. Even if the Regions were on target with the SCMI examinations the 2003 AR would only contain results for one third of the bridge population that is supposed to have an SCMI assessment.

The mix of bridges sampled so far gives a spread of types, materials and sizes.

The presentation of the data in the AR into 5 bands hides patterns and the distribution of the results over the SCMI 1-100 score range.

Due to the small number of results contained in the 2003 AR and the shortcomings with the data collected so far, the data could not be used reliably to monitor the condition of the assets.

The shortcomings that give low confidence in the accuracy and reliability of the data presented in the 2003 AR are as follows:

- There is a severe concern regarding the lack of checks on the accuracy of individual SCMI scores, particularly the re-scoring of SCMI examinations;
- There is a lack of technical support to all of those involved in the SCMI reporting process, which we regard as essential for accurate results;
- At the time of our audits Network Rail and the Contractors did not always have a good grasp of the status of the SCMI scores. This is a particular issue in East Anglia Region where the Contractor has always held the SCMI tool and database;
- The ARM is not complied with in the following respects although only the lack of re-scoring is a cause for concern with regard to the reliability of the data:
  - There is only limited on-site re-scoring of structures by Network Rail which is essential to ensure data accuracy and consistency of application of the SCMI tool;
  - SCMI scores are not entered into RAR although this is of little value; and
  - There is no feedback of data from HQ to the Regions on trends in SCMI on a period basis;
- There are training and competency shortcomings both with the Contractor's staff and in all Regions;
- There are resource problems in all Regions except LNE and in the Examinations Contractor in all Regions. These constraints have an influence on what is achieved in SCMI.

### 8.3 *Recommendations*

In many areas there had been positive action by Network Rail and the Examinations Contractors to the recommendations that we made in our 2002 AR Report on the Bridge Condition Index.

We make the following recommendations:

- There is an urgent need to provide continuous support in SCMI to all involved but particularly to the examiners in the field to improve the accuracy of SCMI labelling and marking. This requires personnel experienced in SCMI. The lead needs to be taken by Network Rail and driven through proactively by them;
- The size of the Contractor's examination teams should be increased;
- Access to structures via possessions etc. must be improved in order to produce up to date results and remove the excessive numbers of 'carried over' examinations;
- The Regions need to effectively tackle those examinations where the data has been rejected by the database;
- All Regions should ensure that the SCMI scoring process actually takes place at the bridge site;
- Regular site re-scoring should be undertaken by Network Rail in all Regions and the results fed back to the Examinations Contractor and diligently followed through. It is important that the re-scoring should aim to cover the work of all examiners somewhere in the cycle;
- General audits of the activities of the Examinations Contractor by Network Rail should take place in all Regions: to date they have taken place in East Anglia and LNE but not in Southern or Scotland Regions;
- Routine desk reviews of SCMI should be carried out by Network Rail as part of the review of the detailed examinations report;
- In East Anglia and Scotland Regions the Network Rail staff positions allocated in the reorganisation (Org 1) which are vacant need to be filled as a matter of urgency;
- In East Anglia Region the SCMI tool and database has been held and operated by the Examinations Contractor from the start. There is a detachment of Network Rail from the SCMI process. This is undesirable and should be changed;

- The emphasis on the development of SCMI should be on continuing to populate the database promptly and with accurate data but the Regions should start to explore the significance of the data they are compiling;
- Different presentation of the data in the AR should be considered. More bands and adjustment of the bandwidths, together with graphical or pictorial representation of the results would be beneficial;
- The local procedures that describe the process for Network Rail for examinations and SCMI need to be created or improved as soon as possible in Southern, East Anglia and Scotland Regions. In Southern Region an update revision is required. In Scotland and East Anglia these need to be created. Shortcomings in the Examinations Contractor's related procedures in LNE and East Anglia, identified in our 2002 Audits, had not been updated. Because the contract has now expired little can be expected but Network Rail must communicate what is required by way of updated procedures to the new Contractors;
- A consistent definition for reporting the SCMI backlog to HQ should be derived;
- We recommend that Network Rail pursue modifications to the competency standard RT/CE/S/047 so that the Units within it align properly with all the roles of Network Rail and Examinations Contractor's personnel in the examinations process;
- In areas of competency assessments and training the coverage is patchy and further efforts are required in all Regions. Further work is needed to create a Competency Management System in some Regions;
- The format of the SCMI database should be modified to include the task list year against individual entries to aid tracking of data and progress;
- Data handling issues required attention in LNE and East Anglia Regions, although most of these were under the control of the outgoing Examinations Contractors and may therefore not be resolved;
- Consideration should be given to revising the Asset Reporting Manual to remove the requirement to input SCMI data to RAR.

## 9 Signalling Failures (M9)

### 9.1 *Audit Scope*

The audit was undertaken to assess the accuracy and reliability of the signal failure data to be published in the 2003 Annual Return for East Anglia, LNE, Scotland and Southern Regions. Analysis of the data and comparisons with the operational performance data were carried out where possible.

### 9.2 *Audit Report*

#### 9.2.1 *The Process*

The process observed had not changed since our audit of the 2002 Annual Return and our audits indicated that the Regions were compliant with the ARM except for the following aspects:

- Incidents are not split into bands of those causing 1-5 and 6-10 minutes delay. It was stated in our 2002 Report that this is not practical and therefore the procedures should be updated to reflect this;
- There is not always reconciliation with FRAME, the IMCs' fault recording system, to ensure correct attribution. This only occurs by exception and the majority of incidents are not necessarily reconciled.

It should be noted that while IMCs cannot re-attribute any delay which has been attributed to them back to Network Rail or to a TOC, they can re-attribute delays between delay categories for which they are responsible. These categories include for example overhead line failure/third rail defects, animals on the line, signal failure, points failure etc. Thus if a delay is initially allocated by Delay Attribution Clerks in Network Rail to one of these codes, the IMC can re-attribute it to one of the other codes for which they are responsible. The reason for this is that the initial assessment by the Delay Attribution Clerk may be investigated by the IMC and found to be the incorrect cause of the delay. It should thus be re-attributed.

However, there is no particular checking mechanism by Network Rail to ensure that the signalling failures measure has only those delays attributed to it that should be. There are two mechanisms that may prevent incorrect re-attribution, although they do not exclusively prevent it or find it:

- Network Rail staff check delay attribution in various areas to ensure it is correctly attributed. For example the performance department make various checks, as may managers who are responsible for a particular asset type, and from the audits of electrification failures we found that electrification engineers check that all of the delay

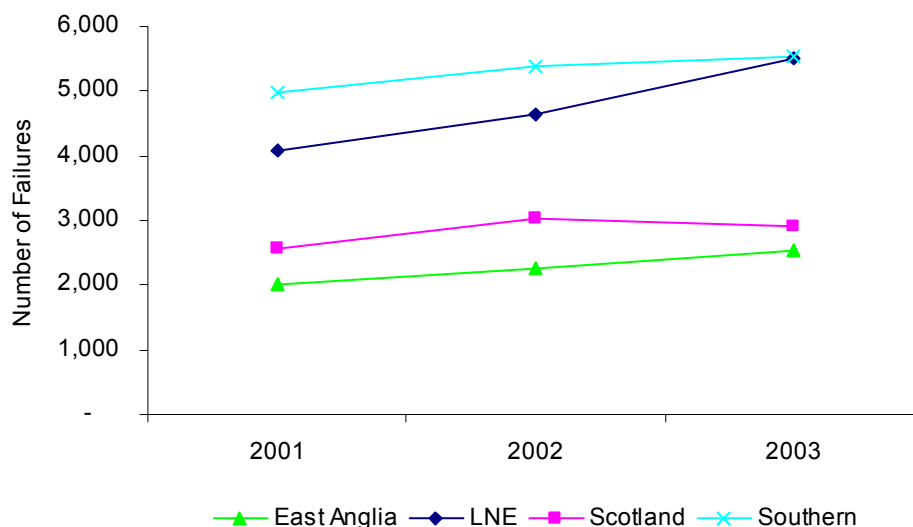
attributed to electrification is correct. However, there is not an equivalent check of the signalling failures;

- There is an auditable trail of all changes to delay attribution for every incident and therefore investigation is possible. However, investigation into an incident and changes made to attribution would only be carried out by exception and not for all incidents.

Although there is no evidence to suggest that the results have been altered incorrectly, questions remain over the reliability of the data and of Network Rail’s control of it.

### 9.2.2 Trends

No data was officially available at the time of the Regional audits. We were subsequently provided with the data in the 2003 Annual Return. The number of signal failures causing a cumulative delay of more than 10 minutes per incident as reported in the Annual Return increased between 2001 and 2003. The total number of failures increased from 25,106 in 2001 to 27,905 in 2002, and to 29,077 in 2003. There has been an increase in all Regions for which we are responsible except Scotland Region, as can be seen by the following figure:



**Figure 9.1: Number of Signalling Failures Reported**

The delay attributed to signal failures (those causing a delay of 3 minutes or more as reported in the operational performance section of the Annual Return) has increased between 2002 and 2003. The largest increase between 2002 and 2003 was 71% in LNE Region. Delays caused by signalling increased in East Anglia Region by 13%, in Scotland Region by 23% and in Southern Region by 13%. Delays caused by Signalling Failures comprised 29% of all delay in East Anglia Region, 27% in LNE Region, 24% in Scotland Region and 33% in Southern Region.

The categories of delay that contribute to the signal failures measure are as follows:

- Points failures;
- Level crossing failures;
- Signal failures;
- Track circuit failures;
- Signalling system and power supply failures;
- Other signalling equipment failures;
- Cable faults (signalling and telecomms);
- Change of aspects - no fault found;
- Track circuit failures due to leaf fall.

Of these, there was an increase in all types in all Regions between 2002 and 2003 except for the following where delays decreased:

- Signalling system and power supply failures for East Anglia and Southern Regions;
- Cable faults for East Anglia, LNE and Southern Regions;
- Change of aspects for LNE Region; and
- Track circuit failures due to leaf fall in Scotland Region.

There is significant variation in the changes in delay for different categories. For example in East Anglia Region ‘change of aspects – no fault found’ has increased by 369%, ‘signal failures’ have increased by 24%, ‘other signal equipment failures’ have increased by 98% while ‘cable faults (signalling and telecomms)’ have decreased by 42%. There are similar variations in other Regions.

In Southern Region we were notified that track circuit failures were reduced as a result of fitting a new type of track circuit rail connection, although the data in the Annual Return shows that the minutes of delay attributed to this have increased from 339,418 minutes in 2002 to 383,749 in 2003. We may expect to observe a decrease in delay minutes next year once the effect of the new equipment can be realised.

HQ showed the Reporting Team a graph which was produced using national FRAME data showing a correlation between the increase in signal failures and the installation programme of TPWS. All Regions had observed that failures due to AWS and TPWS had increased. Some correlation would be expected as the TPWS programme increases the population of equipment available to fail in addition to the initial “bathtub curve” effect associated with the introduction of new equipment.

Unfortunately, as the performance and failures data was not available at the time of the audit, it was not possible to question the Regions about the causes of the increases and decreases in particular categories. However, subsequent to the audits, the Reporting Team requested that the

Regions provide some reasons for the changes. Eastern Region stated that some of the increases were due to summer weather problems and that they have concerns regarding the standards of maintenance, which the signal and track engineers will be looking into in the 2004 reporting year. In addition Eastern Region stated that in the 2003 Reporting year they did not have sufficient staff to investigate and dispute attribution to signal failures and therefore there may be failures attributed to signalling that should not be. This will be rectified in 2004 as investigation will take place. Eastern Region also cite the reason of increased traffic as a reason for the increase as the knock-on effect of each delay is increased.

Scotland Region stated that the number of faults has not significantly increased but the response time has remained static or increased. The increase in the number of trains has also had an effect. Points failures have increased due to the standard of track maintenance. Level crossing failures have increased due to misuse by road users and the signal failures category has increased due to problems with foliage and lamp failures which occurred due to a backlog of maintenance and the cancellation of some renewals. Southern Region stated that there was a higher increase in the delay per incident than the number of incidents. Southern Region affirm that they have targeted reductions in all infrastructure failure KPIs through fully resourced and funded plans and therefore this rise should be a short term feature which can be expected to improve.

### 9.2.3 *Conclusions*

There has been an overall increase in signal failures from 2001 to 2003. The delay attributed to the categories that comprise signal failures has also increased overall, although there are significant variations in the changes from 2002 to 2003 between the different categories. These variations raise questions regarding the stability of the delay attribution system.

As stated in our 2002 report, the measure does not allow for comparisons between Regions as there is no allowance or normalisation for Regional differences in characteristics, number of assets and traffic.

While all Regions are broadly compliant with the Asset Reporting Manual, there is not necessarily a final reconciliation with FRAME. There may also be instances of IMCs re-attributing delay between codes for which they are responsible without full knowledge or control by Network Rail which could affect this measure.

### 9.3 *Recommendations*

As stated in our report on the 2002 Annual Return we make the following recommendations:

- Data should be presented in a format that allows comparison between the Regions, normalising for populations of equipment and traffic levels;
- The Asset Reporting Manual should be updated to reflect that Regions do not split failures into those causing 1-5 minutes and 6-10 minutes of delays respectively as this is not practical.

In addition it is recommended that:

- There is a final reconciliation between FRAME and delay attribution;
- There is investigation into the significant variations of changes between 2002 and 2003 in the categories that comprise the signal failures measure;
- Checking of IMC changes to delay attribution should be introduced.



## 10 Signalling Asset Condition (M10)

### 10.1 *Audit Scope*

The 2003 audit was undertaken to assess the reliability and accuracy of the data that populates the 2003 Annual Return. The emphasis of the Regional investigations was:

- To ensure that the data prepared in the Regions is accurate and based on well established processes supported by factual evidence;
- To establish whether development or improvements in the processes covering data collection, verification or presentation have occurred during the time since the audits of the 2002 Annual Return;
- To assess the Signalling Infrastructure Condition Assessment (SICA) tools and to investigate potential inconsistencies and shortcomings that may affect the quality of the data.

The SICA tool is used to obtain the condition assessment scores presented in the Annual Return. The SICA assessment scores are based on the estimated residual life of the equipment calculated within the tool using the practitioner's choice of given answers to given questions about the equipment. More than one version of the SICA tool is in use. Primary SICA (pSICA) and secondary SICA (sSICA) are used and are intended to be reported in the Annual Return. In addition there are other locally developed versions of SICA such as that used in Eastern Region. Generally pSICA is a quick assessment giving a rough score and sSICA is a more detailed assessment called for if pSICA indicates a short residual life. However sSICA is more time and resource consuming.

Having completed the initial audit in the designated time period, it was necessary to revisit some Regions due to lack of Network Rail staff availability and in order to ensure that the audit objectives were achieved.

### 10.2 *Audit Report*

#### 10.2.1 *Introduction*

In our report on the 2002 Annual Return we noted that there were differing views across the Regions regarding the reliability and value of output of SICA assessments, some believing it to be pessimistic while some staff regarded it as optimistic. In order to understand this difference of opinion, site visits were arranged as part of the Regional audits to view practitioners carrying out SICA assessments and to query their individual approaches.

We carried out a limited review and comparison of the pSICA and sSICA tools prior to the audits, which raised the following points:

- There is scope for diverse interpretation of the questions in SICA by different practitioners;
- There are some areas where certain information, regarded by the Reporting Team as essential to the process, is not required by the tool;
- Important observations which could have a major impact on the residual life of an installation can only be inserted into the tool in the “Comments” sections and these are not reflected in the overall score.

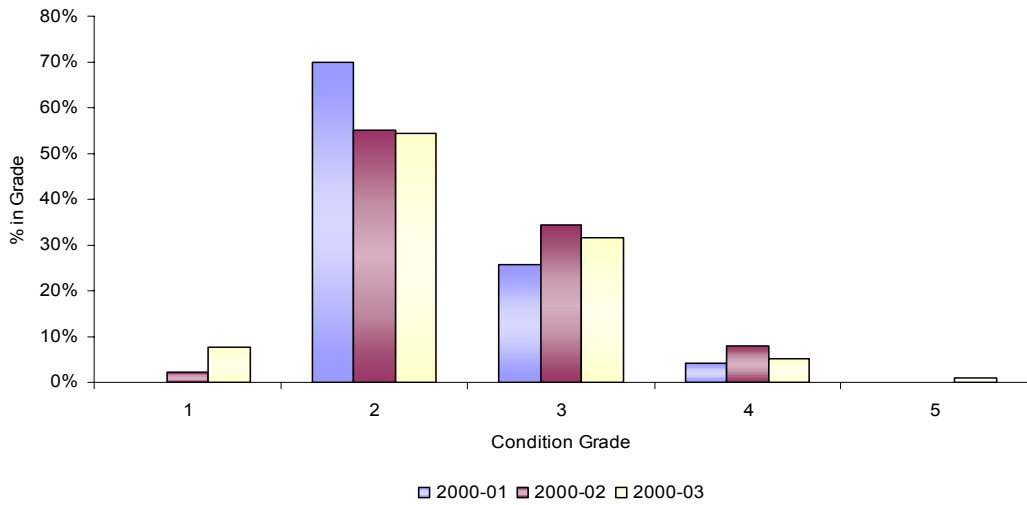
#### 10.2.2 *Data Analysis*

##### (a) Data Presented in the Annual Return

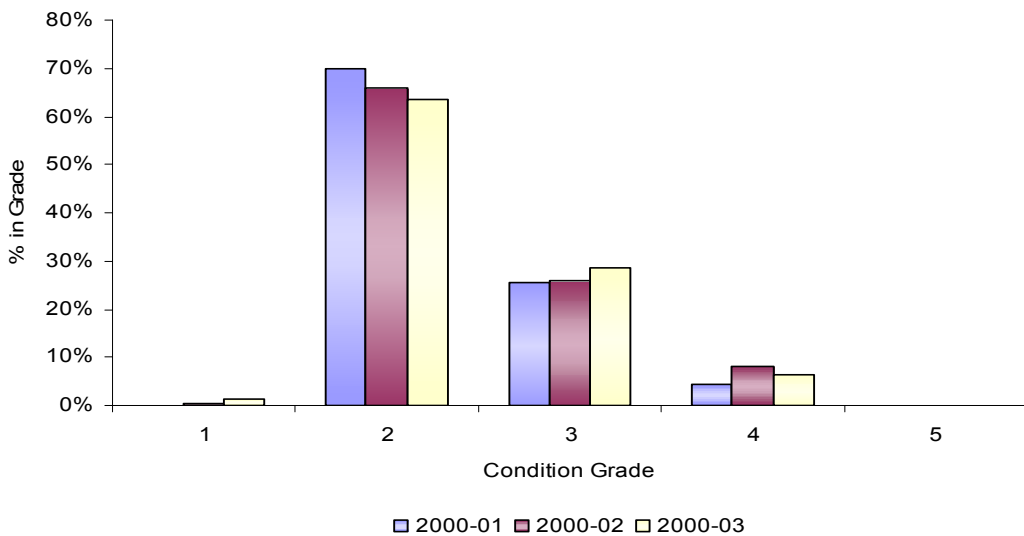
The SICA assessments included in the Annual Return should be pSICA and sSICA assessments as stipulated in the ARM. The 2003 Annual Return includes a table of just pSICA and sSICA assessments and a separate table of all types of assessment including local assessments carried out in some Regions other than pSICA and sSICA. In our 2002 report we recommended that all types of assessment should be presented in the AR to give a fuller picture of the asset condition and we therefore welcome this. However, it should be noted that different tools may give different outputs and we recommend that outputs be presented separately. We also recommend that investigation into the differences in the tool’s output and the possibility of normalisation of the tools is undertaken.

Figure 10.1 shows all types of assessment and Figure 10.2 presents p and s SICA assessments only over the 3 years for which data is included in the Annual Return for all Regions.

Condition grade 1 indicates good condition with a longer residual life (of 20 years or more) and grade 5 represents the worst condition estimated to be at the end of its life. The average condition grade for 2000-02 results is 2.48 for all assessments and higher at 2.42 for p and s SICA only. For 2000-03 it is 2.38 for all assessments but lower for just p and s SICA at 2.40. It should be noted that presenting more than one type of SICA assessment together and the potential inconsistencies in application may have an effect on the numbers presented together here, therefore they should not be relied upon as giving a representative and consistent view of the condition of the network. The inconsistencies in application of the tool and other shortcomings of the condition assessments are discussed below.



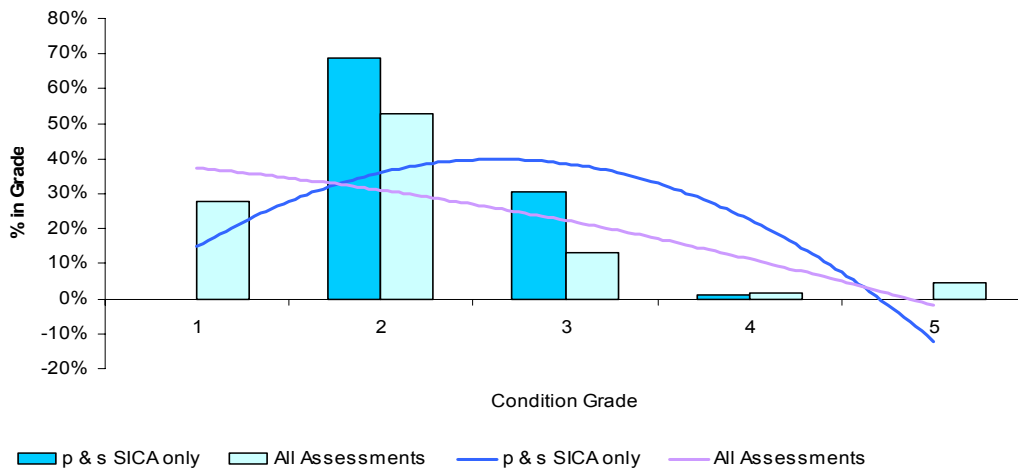
*Figure 10.1: Signalling Assessment, All Types, % in Each Grade*



*Figure 10.2: Signalling Assessment, p and s SICA only, % in Each Grade*

(b) LNE Region p and s SICA Compared to All Assessments

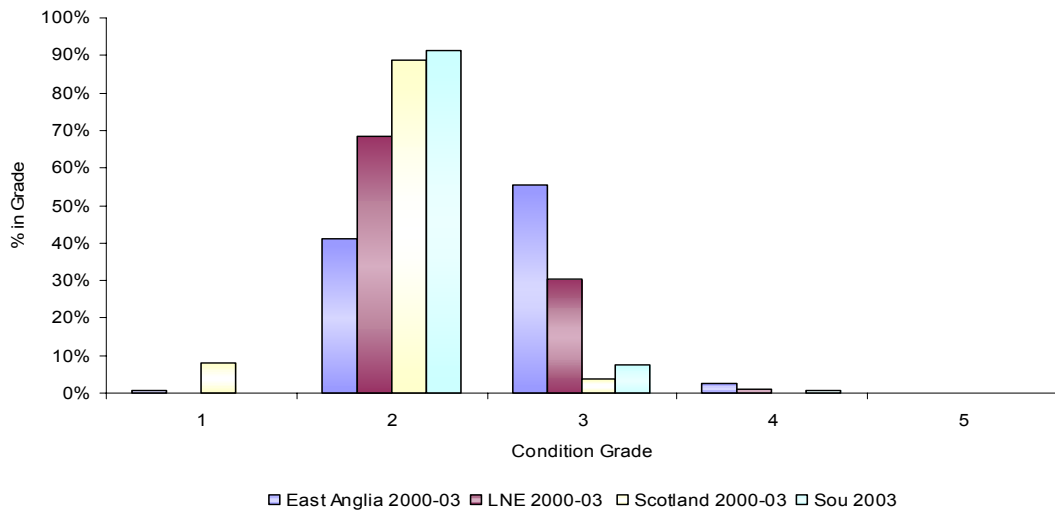
The following figure presents the results from p and s SICA assessments only against all types of assessment in LNE Region for 2000-03 as an example, as LNE undertook other types of assessment. The average condition grade improves from 2.33 with just p and s SICA to 2.02 when the regional assessments are included, and the figure shows that the skew is towards the better grades when all assessments are included. This demonstrates the possibilities for different results being obtained from different types of condition assessment.



**Figure 10.3: LNE Region 2000-03, p & s SICA assessments compared to all assessments**

(c) Regional Comparisons

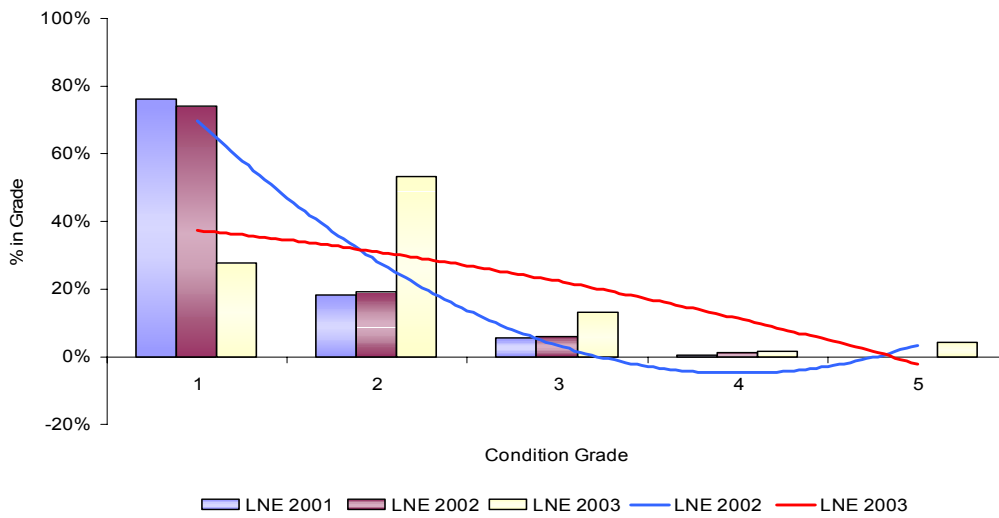
Figure 10.4 below presents a Regional comparison of p and s SICA assessments only for 2000-03. The figure indicates that the results for Southern, Scotland and LNE Regions are skewed towards condition grade 2 whereas the condition grades for East Anglia are skewed towards grade 3. However, these differences may not demonstrate differences in asset condition between the Regions as the numbers are affected by potential inconsistencies in the application of the condition assessments.



**Figure 10.4: Region Signalling Assessments, p & s SICA Only**

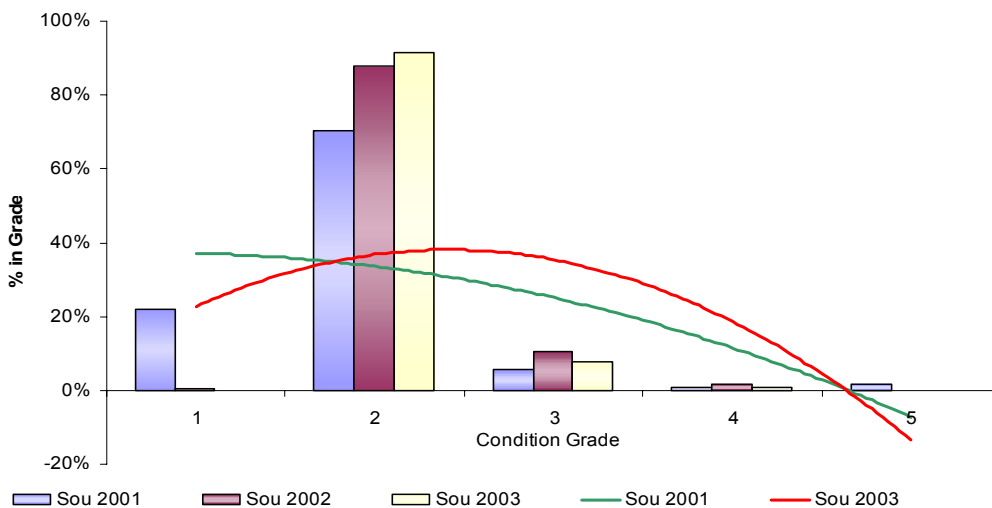
(d) Trends

Over the 3 years that the assessments have been reported, the proportions in each grade are broadly similar in East Anglia and Scotland Regions. However, in LNE Region there has been a significant increase in the proportion of results in condition grade 2 for the 2000-03 results compared to the 2000-01 and 2000-02 results and an increase in grade 3 with a decrease to zero in grade 1. This has the effect of changing the skew from the direction of the high grade 1 for 2000-01 towards the lower grades for 2000-03 as shown in Figure 10.5. It should be noted that the data presented in this figure for LNE Region includes all assessments, not just p and s SICA, as from the data provided it was not possible to present p and s SICA assessments alone for each of the 3 years.



**Figure 10.5: LNE Region Signalling Condition Assessments**

In Southern Region there is a similar phenomenon with the results from 2000-01 compared to 2000-03 although it is less pronounced as shown by the following Figure 10.6 which includes p and s SICA assessments only:



**Figure 10.6: Southern Region Signalling Condition Assessments, p & s SICA Only**

Once again, while these figures give an indication of condition, they should be treated with caution as the changing results may reflect the instability of the application of the tools and the different tools used rather than changes in the condition of the asset.

#### 10.2.3 *Compliance with Procedures and Progress in Assessments*

The Asset Reporting Manual is generally complied with although there are the following exceptions:

- There remains an absence of internal checking and quality control at all levels to ensure a uniform application of the tool and approach to condition assessment although some peer reviews are carried out. This observation was also stated in our 2002 Report. LNE Region confirmed that audits will be commencing once the further Regional reorganisation is complete;
- The results are not input into RAR. This is due to disparate technologies and thus this requirement should be removed from the procedures.

The ARM states that 100% of interlockings in service have to be assessed by either a primary SICA or secondary SICA assessment by March 2006. The Regions are on target for completion by this date as all stated during the audits that they have completed an assessment for all of their interlockings. However there is some confusion in the Regions regarding the grouping of interlockings. Some interlockings have been grouped together for SICA assessments but should have been assessed separately, thus more assessments are required to complete the total number. There is also some confusion regarding the treatment of level crossings. The SICA assessment for a level crossing is much less detailed than that of an interlocking, but some level crossings contain equipment as complex as interlockings and therefore the simple level crossing SICA assessment would not suffice. In some cases therefore, level crossings should be reassessed using the SICA assessment for interlockings in addition to that for level crossings alone.

#### 10.2.4 *East Anglia Region SICA Assessments*

The site visit in this Region comprised a review of a fairly recent sSICA examination of a mechanical signalbox.

East Anglia Region had solved their resource issues by engaging a Consultancy who employed signal engineers to carry out the SICA examinations.

In all Regions a sample of the equipment is examined for the SICA assessments for larger installations. In LNE Region the Consultant decides the sample by analysing the history of the installation and FRAME, the IMCs' fault recording system. From this analysis they produce a list of certain items of equipment that must be assessed and instruct the practitioner to select

another two items of the same type: this is intended to comprise a balanced result of the average condition of the installation.

The site assessments are carried out in LNE Region using sSICA which is then converted into a pSICA output. Our audits indicated that the residual life output was similar to that based on observation and expert judgement alone, both at 15 years. However, it cannot be guaranteed that the pSICA results arrived at using this method would be the same as if the pSICA tool was applied directly. Detailed analysis would be required to investigate the differences.

The Consultant's report was very comprehensive with photographs of assets and a comparison of the residual life output by SICA and the residual life estimated using a judgemental examination of the same features. The report also contained recommendations for life extension on an element-by-element basis. The Network Rail Signal Engineer carries out a review and sense check of the Consultant's assessments.

#### 10.2.5 *LNE Region SICA Assessments*

In LNE Region the practitioner decides which sample of the equipment to assess using his own judgement and knowledge of the installation. Although slightly subjective it is intended that the results are representative of the average condition of the installation, as far as the tool allows.

We attended a pSICA examination of a small relay room in LNE Region with the practitioner. We queried the interpretations the practitioner placed on various questions, the extent of examination, the selection of items for sampling, and his approach generally. The practitioner expressed similar concerns to us regarding the omission of certain questions and the meaning of others. He had concerns, which were demonstrable by adjusting scores, as to how insensitive the tool was to certain elements of data.

The pSICA output score for the site visited was "green plus" which was clearly inappropriate having viewed the site. The site (Sincil Bank RR) appeared to be on the low side of "average condition". It appeared that the life of this installation would, in reality, be determined by the life of the casing containing the equipment (the Relocatable Equipment Building (REB)), not by the equipment itself. This is not indicated by the pSICA assessment.

#### 10.2.6 *Scotland Region SICA Assessments*

In Scotland Region the practitioner decides the sample of the equipment to assess using his own judgement and knowledge of the installation. This implies that the results are representative of the average condition of the installation, as far as the tool allows.

We reviewed the assessment for Glasgow Central Station Relay Room, which is typical of a major installation using obsolete equipment which is in poor condition, having had its life extended as far as possible. At over 40 years old, it is 10 to 15 years older than its design life.



We did not observe a SICA examination taking place but were able to discuss the report of the pSICA assessment that was carried out during the previous year, on site with a senior engineer.

In this case there appeared to be an optimistic bias in the pSICA tool as this ageing installation was given a result of ‘Yellow, subject to life extension of red items’. Some of these ‘red items’ which were more than half of the listed items within the tool, could be conceivably renewed. However, in our opinion, the main rack wiring in this installation could not be safely and sensibly renewed and was in a poor (“prohibited”) condition. We therefore believe that there should be a feature in the tool where the condition of critical items would override other measures in determining the remaining life of the asset. We consider the lack of this feature a serious flaw in the tool which undermines confidence in the outputs.

We also oversaw a practitioner undertaking a pSICA assessment of a forty-year-old relay room on Cathcart signalling centre area at Neilston. This exercise revealed a number of further issues regarding the manner in which questions are framed within the pSICA tool which leads to pessimistic results if they are answered exactly as they are worded, which is not necessarily how the practitioner would himself judge the residual life.

The possible answers available for selection by the practitioner regarding whether the wiring meets the current standard are misleading due to recent changes in EU legislation in relation to legacy British Railway standards and historic worldwide safety standards. We consider that unless such changes render the equipment unsafe, this is an anomaly that has no effect on the residual life of the installation, and should be separated from more important safety deficiencies.

For this examination the source records in the National Records Group (NRG) office were assessed as well as the site records by the practitioner. Although we believe that this should always be carried out because accurate records are an important element in the continuing safety of an installation, we saw no evidence of this happening in other Regions. Practitioners must record whether source records are fully up to date and accurate as well as the site records.

The practitioner raised the point that the assessment should include all outside locations and cable routes which has not been the case at other sites that we have visited.

Vital caveats to the assessment scores, which are contained in the “Notes” columns in the pSICA tool, are not taken into account when the tool calculates the overall assessment score.

#### 10.2.7 *Southern Region SICA Assessments*

In Southern Region the practitioner decides on the sample to assess by choosing a section of the equipment that overlaps with that assessed in the previous assessment. The intention is that the results may be compared with the previous assessment to ascertain whether any deterioration (particularly wire degradation) has taken place since the last assessment.

The Reporting Team were taken to visit two installations with an experienced SICA examiner. Again, the questions in the pSICA tool were worded in such a way that the practitioner is forced to give extreme assessments rather than using a graduated set of possibilities which actually exist.

#### 10.2.8 *Conclusions*

There is no correlation between the expected life determined through SICA and renewals expenditure on a national basis, although LNE Region try to relate the asset life found using their localised more comprehensive assessments to their Renewals Plan.

Currently the signalling condition measure is unlikely to show the true residual life of the signalling assets and may give a misleading impression.

This is due to the following reasons:

- The SICA assessment scores are subject to caveats that renewals to extend the life of some elements are undertaken. This assumption has the following flaws:
  - These caveats are not taken into account in the calculation of the overall score;
  - Some elements cannot practically be renewed in isolation;
  - None of these caveats are visible in the Annual Return data.
- The questions that form the SICA tools and the answers it gives to choose from are insufficiently precise to allow consistency of interpretation between different practitioners, their managers and different Regions. This is largely the result of the tool requiring only one answer to assess, in some cases, two or three elements which may be of differing condition. Such questions should be separated to permit answers for each individual element;
- Some elements that affect the life of an asset are not assessed as part of the SICA assessments;
- A number of disparate elements are accumulated into one score for a signalbox or interlocking area which hides potentially different residual lives for different elements.

Our observations of SICA assessments in the Southern, LNE and East Anglia Regions generally supported the view that the system is more likely to show an optimistic residual life. However, in Scotland Region the practitioner noted that where the questions are interpreted very literally, and this arrives at the output 'unacceptable' but the true condition is in reality 'acceptable', the Scotland Region practitioner is likely to act with caution and input 'unacceptable'. This caution provides a reason behind the tool giving pessimistic results in some instances.

The ARM is generally complied with although no audits are carried out of the Regions or by the Regions to ensure consistency. This is a fundamental flaw.

The choice of the sample of equipment to be assessed within larger interlockings is not necessarily random or systematic. The equipment sampled is generally selected on the basis of age, condition, and time since last assessment or by the practitioner's judgement of what would represent the average condition. There is also a bias towards assessments of the outside equipment which is easier to access. The RIMINI safety rules make some parts harder to access which will affect the sample chosen. Thus the sample chosen may not show the average condition of the installation.

There is a further concern that this measure relies to some extent on the practitioner's experience and detailed knowledge of the assets. There does not appear to be any formal mechanism in place to ensure that this expertise be passed on to middle and lower levels of personnel in order to retain it within Network Rail once the experienced engineers retire or leave the company.

### **10.3 Recommendations**

- (a) The Process:
  - (i) Elements are currently aggregated into an overall assessment for each installation. However, we recommend that consideration be given to grouping elements by generic type for given geographical areas as doing so could give more realistic outputs. The tool has the capability to do this: in essence this would result in sub-measures within the condition measure;
  - (ii) Internal audit of the SICA assessments should be undertaken to check for accuracy and for consistency across Regions and practitioners as stated in the ARM;
  - (iii) The requirement in the ARM to input the results into RAR should be removed as it is not practical due to disparate technologies.
- (b) The Tools
  - (i) We recommend that the questions and answers within the SICA tools be reviewed to ensure precise wording that does not allow for different interpretations;
  - (ii) In both p and s SICA tools there are notable omissions which have an effect on the residual life. For example the housing of the equipment is not assessed, the life of which may determine the life of everything inside it. It is recommended that the tools be reviewed to ensure they assess all necessary items;

- (iii) It is recommended that in both the pSICA and sSICA tools, questions are split to refer to individual elements;
- (iv) There are cases where the residual life quoted by SICA is subject to life extension of certain elements. However in some cases this is not possible, thus the score is flawed. We recommend that the tool be adapted to take into account critical items as deciding factors in determining the remaining life;
- (v) We recommend a detailed investigation into the different SICA tools currently in use, to determine the differences in output and the possibilities of normalising the different outputs so that they are comparative;
- (vi) We recommend that the tool output flags any comments added in the Notes columns that have an effect on the remaining life, as these are not included in the calculation of the assessment score. This could take the form of a supplementary question referring to comments which have been made;
- (vii) The output in decimal fractions of years gives an untrue impression of the accuracy of the system and the output should be expressed in integers, possibly prefaced by the word “Approximately”;
- (viii) We recommend that the results from different SICA tools are presented separately in the Annual Return.

We understand that the original developers of the SICA tools are reviewing the tool, and we recommend that our findings are taken into consideration in this process.

# 11 Electrification Failures Causing Train Delay (M11&M12) and Electrification Condition (M13-16)

## 11.1 *Audit Scope*

The audit was undertaken in Eastern, Scotland and Southern Regions to assess the accuracy and confidence in the various Electrification measures reported upon in the 2003 Annual Return to the Office of the Rail Regulator.

The audits comprised:

- Interviews with the Network Rail HQ Champion responsible for the collation of the Annual Return data;
- Interviews with the relevant Regional personnel responsible for application of the processes and reporting information; and
- Site visits to observe the condition assessment process.

## 11.2 *Audit Report*

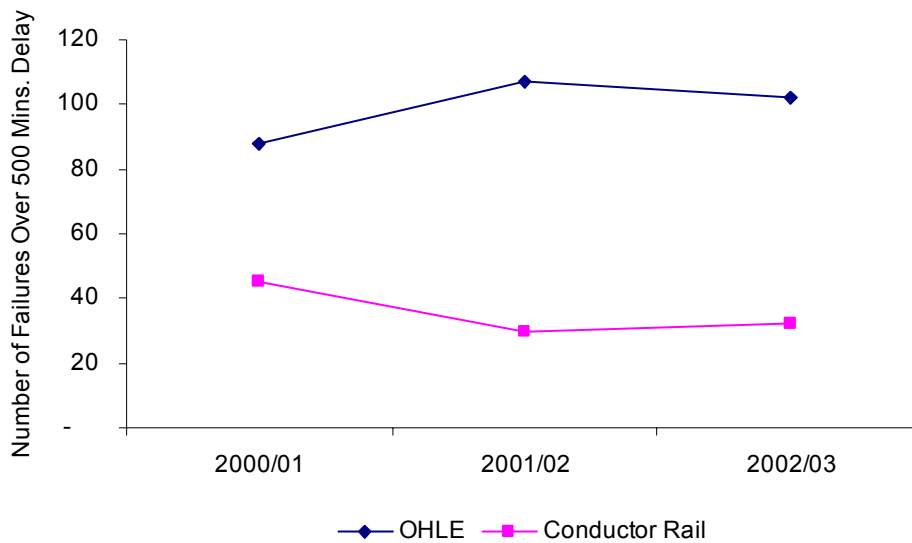
### 11.2.1 *Overall Compliance with the Asset Reporting Manual*

The Reporting Team found that the Regions were generally compliant with the procedures set out in the ARM, although the continuing lack of internal and external audit of the measures is a cause for concern. Network Rail are aware of this both at HQ and Region level, and we have been assured that corrective action measures will be implemented in the 2003/04 reporting year.

### 11.2.2 *Reported Electrification Failure Data*

The numbers of electrification failures that cause over 500 minutes of delay are reported separately in the Annual Return for Overhead Line Equipment (OHLE) and Conductor Rail.

Figure 11.1 overleaf shows the number of failures causing 500 minutes delay or more for 2000/01, 2001/02 and 2002/03:



**Figure 11.1: Electrification Failures**

The Regulatory Target for electrification failures reported in the AR is for “no deterioration from the number of incidents reported in 2000/01”. There is a statistical tolerance set at  $\pm 28\%$  of the target for OHLE systems and at  $\pm 47\%$  of the target for conductor rail systems.

Although the total number of OHLE failures in 2002/03 has exceeded the regulatory target of 88, the number is within the tolerance of the target. Applying  $\pm 28\%$  to the target of 88 gives an upper limit of 113, and thus the increase is absorbed in this statistical ‘noise’. However, the large tolerances permitted allow large increases in failures (a 16% rise between 2000/01 and 2002/03 in OHLE failures) to remain within the regulatory target.

Total delay minutes attributed to electrification in the category of ‘Overhead line/Third rail faults’ reported in the operational performance section of the AR decreased from 403,513 minutes in 2001/02 to 371,948 minutes in 2002/03 or from 0.09 to 0.08 minutes per 100 train km.

The total number of incidents in the ‘Overhead line/Third rail faults’ category reported in the operational performance section has decreased by 22% between 2001/02 and 2002/03 whereas conductor rail and OHLE incidents causing delay of 500 minutes or more have only decreased by 2%.

### 11.2.3 Electrification Failures Key Conclusions

We provide here our key conclusions regarding electrification failure data:

- Our audits have revealed that the electrification failure data is well managed within the electrification departments. Each failure reported in the Annual Return is checked to

ensure it has been correctly attributed and the Reporting Team attribute a high degree of confidence in the accuracy and reliability of the reported numbers of failures;

- As there is no standardised method or procedure for the gathering of the electrification failures data in the electrification departments in each Region, there is no consistent level of information to support these figures or to enable trend analysis across all Regions;
- Failures due to plant and machinery are not reported upon in the Annual Return. We recommend that they are included in future years as plant and machinery failures could contribute significantly to delay;
- It should be noted that the use of delay minutes in itself is a poor indicator of the condition of the equipment as two identical incidents of equal severity on two separate days could cause either no delay or a substantial impact, depending upon the time and location of the failure.

#### 11.2.4 *Reported Electrification Condition Data*

Electrification Condition data is reported in the AR separately for the following types of equipment:

- AC Traction Feeder Stations and Track Sectioning Points (M13);
- DC Traction Substations (M14);
- AC Traction Contact Systems (M15); and
- DC Traction Contact Systems (M16).

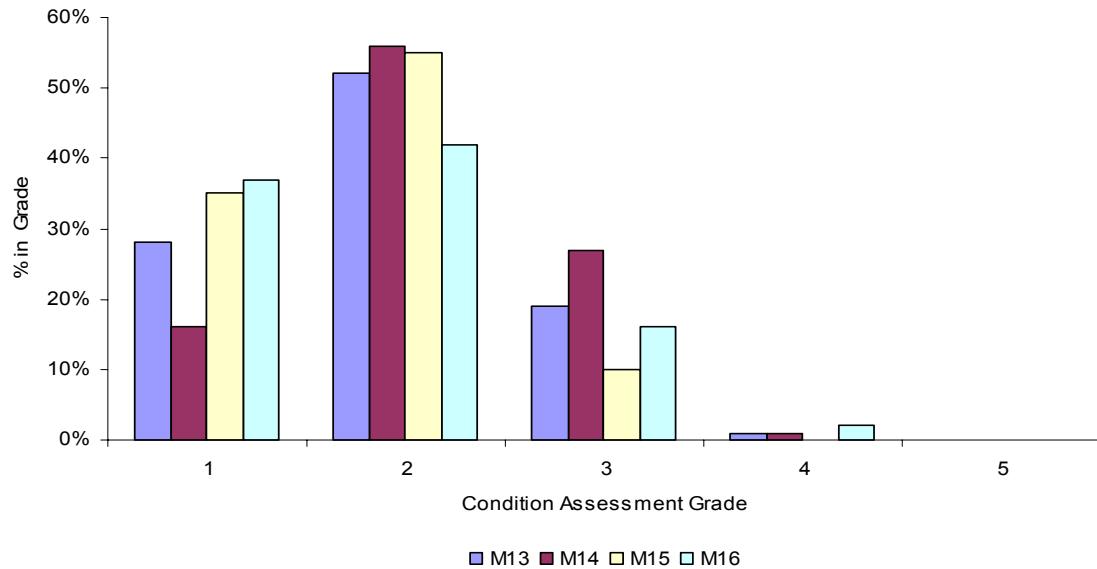
The Annual Return records the percentage of equipment in each of 5 condition grades, grade 1 representing good condition and grade 5 representing poor condition.

The condition grade is arrived at using an on-site inspection regime taking the following factors into account:

- The age;
- The robustness of design;
- Maintenance and refurbishment history;
- Operational performance of the major components for the substations;
- Contact wire thickness of the OHLE; and
- A visual inspection of the components and general equipment condition and physical wear alone for the conductor rail.

The assessment outputs are input into a spreadsheet which automatically calculates a score on the scale.

The following figure shows the percentage of assessments in each condition grade for all Regions for each of the four measures.



**Figure 11.2: Electrification Condition Assessments**

This demonstrates that the results are skewed towards condition grade 2. For the M14 measure, DC Traction Substations, a lower proportion of the equipment is assigned condition grade 1 compared to the other measures and more equipment is assigned grade 3.

The following table shows the average condition grade for each of the measures for each Region. These grades were derived from the numbers which were collated into national totals to populate the 2003 Annual Return.

Region	M13	M14	M15	M16
East Anglia	2.17	2.20	1.83	N/A
LNE	1.51	2.50	1.47	N/A
Scotland	1.84	N/A	1.52	N/A
Southern	N/A	2.13	N/A	1.80
National Total	1.93	2.13	1.75	1.77

NB: 1 = good condition, 5 = poor condition

N/A = either there is no significant amount of this type of equipment in the Region or the amount is small and the equipment has not yet been assessed.

**Table 11.1: Average Condition Grades**



It should be noted that the proportion of each type of equipment, and therefore the sample size, varies significantly between the Regions. For example for M14 Southern Region has 358 pieces of equipment compared to 32 in North West Region, 11 in Midland Region, 2 in LNE and 5 in East Anglia.

Following the submission by Network Rail of the 2003 Annual Return, the numbers for measure M14, DC Traction Substation, were revised due to an error. These errors have been corrected in the final version of the Annual Return which is posted on Network Rail's website. The effect of the alteration was to decrease the average condition grades from 2.04 to 2.13 for Southern Region and reduce the National total from 2.05 to 2.13.

The regulatory target is for "no deterioration from a baseline average condition grade which will be established once a sufficient sample is achieved" as stated in the Annual Return. No target has yet been set for the electrification condition measures. There is currently too little reported data for this measure to give any meaningful indication of trends, as any single major issue will not be 'smoothed' sufficiently to prevent it causing distortion. However, the Reporting Team did consider that more use could be made of historic databases, particularly for OHLE data, where these are still available.

All equipment must be assessed over the 5-year control period. In instances where the equipment has not been assessed to date, an assessment score is estimated and included in the AR. The estimate is calculated using a pro rata allocation of the scores of the assessments actually carried out on the same type of equipment in that Region. Analysis was carried out, using measure M13 for an example, on the effect of including estimates and it was found that this gives slightly different results, but the effect is marginal and therefore not a cause for concern.

The following table shows the total number of assets to be assessed in each Region for M13 and M14 over the 5-year control period, the percentage of assets that were scheduled to be assessed for inclusion in the 2003 Annual Return (3 years into the 5-year period) and the percentage that actually have been assessed.

Measure & Region	Total number to be assessed over 5 years	% Scheduled to be complete by 2002/03 (year 3)	Actual % complete by 2002/03
M13			
East Anglia	72	53%	46%
LNE	70	54%	44%
Scotland	39	54%	51%
Southern	2	50%	0%
M14			
East Anglia	5	60%	40%
LNE	2	50%	100%
Scotland	0	N/A	N/A
Southern	358	60%	59%

**Table 11.2: Percentage of Assets Assessed to Date**

As shown in Table 11.2 each of the Regions are very slightly behind schedule apart from LNE for M14.

The target for the AC contact systems measure (M15) is to assess just 20% of all of the assets over the control period. Twelve percent had been assessed by the end of 2002/03. It is assumed that this small sample will be representative of the whole of the network, based on the presumption that consecutive tension lengths of the same design and traffic load are expected to be of similar condition. However, this presumption is questionable as it is not apparent that the sampling regime takes into consideration various external influences, for example poor track condition, local pollution, vandalism, different maintainers and weather anomalies, which would affect the condition.

For M16 SC Traction Contact System, there is no overall or yearly target for the amount of conductor rail gauging information required. The contractor carries out gauging on a 10 yearly cycle.

#### 11.2.5 *Electrification Condition Key Conclusions*

We present here our key conclusions from our electrification condition audits and analysis:

- The ARM procedures are generally being complied with but there is no particular mechanism to ensure consistency between condition assessments which are potentially subjective in nature;

- Our audits concluded that the quality of the results obtained from the condition assessments is adequate but this is due to the quality and experience of the staff concerned and supporting information rather than prescribed by the procedures themselves;
- Condition scores are based purely on visual inspections with some supporting evidence from the IMC. The assessment is not necessarily a comprehensive view of the condition of the equipment and is a snapshot in time ignoring previous failure and maintenance history;
- The method used by the IMC to measure the contact wear appears to be flawed, as we understand that the measurements are made at the mid-point of every 10<sup>th</sup> tension length. To give a true picture, the measurements should be taken at more frequent intervals and at registration points because this is where the most wear occurs. These wire measurements are used as part of the condition assessment;
- The use of conductor rail wear as a condition criterion is simplistic and does not identify the condition of cables and accessories critical to its satisfactory performance;
- We are concerned that the loading of the equipment does not appear to be used as part of the measure, which is relevant to the “fitness for purpose” of the equipment in relation to its condition;
- Plant is not reported upon in the Annual Return. While we believe that it should be included as it is an important element of the electrification equipment, a measure should be designed that is of value to the business and to the management of the assets rather than to be used solely for reporting purposes. This view was raised during our Regional audits. We recommend that investigation into this takes place;
- Track paralleling huts, which are an integral part of the power supply system and the high voltage cables that provide the substations with the power to run the trains, are excluded from the condition measurement assessment.

We provide below the detailed findings from our audits undertaken at HQ and in each of the Regions. As the measures are subject to similar processes and procedures we have grouped them together for the purpose of this report.

#### 11.2.6 *Network Rail HQ*

Electrification failure data is collated at HQ using performance data and the collated data is submitted to the Regions periodically to be checked against the Regional records, amended accordingly and approved. Some Regions did not carry out these checks periodically but carried

out a single check at the year-end. HQ engages in daily dialogue with the Regions in order to remain aware of current failure information.

HQ is confident that although the Regions employ different methods for recording failure data the Regional data corresponds with that produced at HQ. The team who collate the Annual Return also carry out checks and have some dialogue with the Regions. The electrification staff do not check the minutes attributed to the failures and rely fully on data from the operational performance department.

#### 11.2.7 *Eastern Region*

The Region operated as a single Region for the reporting year but is now being split to operate as East Anglia and LNE Regions separately.

##### (a) *Current Regional Issues*

From our audits we identified the following issues in Eastern Region:

- It is difficult to predict equipment lifetimes as there is currently no 'concrete' data that demonstrates rates of contact wire erosion. The reason for this is because the equipment in Eastern Region has not yet reached the end of its first lifetime. This issue, coupled with the restrictions in conducting detailed assessments of equipment condition due to resource and site access constraints, results in difficulties in renewals programming;
- An area of concern to the Reporting Team is that painting of structures is no longer carried out in Eastern Region and there is evidence that the effect of the resultant accelerated corrosion is now causing some structures to be reviewed for replacement. A risk assessment should be carried out regarding this matter. If the effect propagates over the system the implications for the cost of replacement of the structures, which is the major cost issue for any new electrification scheme, could be significant. However the major issue regarding current electrification structures is foundation degeneration;
- There are still a number of Booster Transformer problems but these are mainly due to casing corrosion on a particularly problematic type which are now being replaced and there are only 2 or 3 examples remaining in service. The replacement of oil filled switchgear also remains an issue, but the severe casing corrosion on the SMOS equipment is currently a greater priority.

##### (b) *Electrification Failures*

The ARM procedures are generally complied with in Eastern Region but little analysis is carried out upon failure data and it is not generally used to drive renewals.

There has been an increase in the number of OHLE failures in East Anglia from 14 in 2001/02 to 24 in 2002/03. This is merely a return to the levels of 2000/01. The major issue in East Anglia is the age of the equipment and the current level of contact wire wear. In LNE Region the number of failures has fallen to 18 from 23 in 2001/02 although the number has not returned to the low level of 12 in 2000/01.

A Region-wide on-line reporting system, 'Compass', contains all failure data and is used by the Region to check the Annual Return data which is collated at HQ but approved in the Regions. In East Anglia Region the data was not checked periodically. It was only checked at the end of the year but as there were only 24 failures, this is not a cause for concern. The Compass system has been used in East Anglia since 1994. LNE began to use it in January 2003 but previously relied on paper records based on the Duty Controller's 0700 Regional operations reports. It is expected that the use of Compass will improve the quality and consistency of the reported data.

For delays of around 500 minutes, the delay attribution is checked. For delays of more than 500 minutes the Region assumes that the delay attribution is correct. If the electrification engineers consider that an incident has been incorrectly attributed to electrification they dispute the matter with the performance team to ensure the attribution is corrected. Because the electrification engineers investigate each incident, the Reporting Team attribute a high degree of confidence in the numbers in the Annual Return.

(c) Electrification Condition Assessments

The ARM procedures are being complied with however there was no internal audit programme to ensure consistency, the set programme of assessments prescribed by HQ was not followed, and the required number of assessments was not carried out. The programme devised by HQ is designed to cover all types of equipment in a range of locations, based not just on type but also on installation date and evolution, in order to arrive at a sample which is representative of the Region's asset condition. In East Anglia this task list is unworkable because the Region does not have sufficient resources and has had problems with compliance with the RIMINI requirements which have prohibited their access to sites. East Anglia Region therefore devised a different programme which covers alternative locations, although the required number of assessments was not carried out. The location chosen is dependent on gaining access safely and on where the assessments would be most time efficient. The assessments are most time efficient if they are carried out just before a maintenance programme is due to start because the engineer can assess the maintenance requirements of the IMC at the same time as carrying out the condition assessment. This implies that the score may be low compared to the overall condition of the whole Region as equipment that requires maintenance is more likely to be assessed and is likely to be in worse condition than the average.

The Contact Systems Engineers carry out the condition assessments of OHLE, and input them into the spreadsheet that calculates the condition score. The spreadsheets are sent to HQ both electronically and in paper format signed by the REPE. The REPE briefly reviews the score but

does not carry out any detailed checks. Copies of all assessment reports are stored in the Region. HQ personnel collate the data for the AR submission.

In Eastern Region there is little DC equipment (M14 & M16) to assess such that it is insignificant. The Region was found to have complied with the ARM procedures.

No analysis is carried out on the condition assessment data in Eastern Region because there are resource and time constraints. The condition assessments carried out for the Annual Return in their current form are not generally used in the Region to contribute to the overall knowledge and the stewardship of the assets.

No systems were used by Network Rail in Eastern Region for monitoring condition prior to the introduction of the reporting measures and Network Rail were reliant on the maintenance contractor who was the source of information and would make suggestions for renewals. This limited Network Rail's ability to properly assess required renewals volumes.

In Eastern Region there remains a considerable reliance on the IMC to maintain data regarding the equipment condition, although the new IMC contracts should facilitate improved information within Network Rail.

The condition assessments presented in the Annual Return are not used as part of the renewals planning process in Eastern Region. The contact wire thickness and defects (the number of which can be generated from MIMS) and knowledge of the equipment drive the renewals programmes. For the West Anglia section of the Eastern Region network, Network Rail based the renewals plan on an assessment of the life expectancy of each tension length found by measuring the contact wire thickness. Those with an estimated life of less than 5 years were renewed. The c2c route is currently being assessed but there was no assessment for the Great Eastern section at the time of the audit except the feedback from the maintenance contractor.

The Reporting Team was present during a condition assessment on site. The assessment was carried out by the Contact Systems Engineer using a comprehensive survey which gave detailed information about component condition based on observation and extensive experience. This would not have been possible if the assessment was carried out by a less experienced engineer, or one who had a less intimate knowledge of the equipment and its behaviour. The condition assessment system then dictates that judgements are made to score the equipment in a number of categories, reducing the information to a series of 'guesstimates' to give an overall reflection of the equipment condition.

### 11.2.8 *Scotland Region*

#### (a) Current Regional Issues

During our audits we discussed the following Regional issues:

- There are ongoing problems with the Mk II OHLE and its replacement which at present is being delayed but is currently subject to a study;
- Problems remain with the longitudinal cracking of porcelain insulators, which is thought to be a long-term manifestation of manual handling problems and could date back to installation;
- Bi-metallic fittings such as spill taps are causing some problems as is tracking over of insulators caused by salt contamination due to seawater over-wash;
- The Contact Systems Engineer indicated that there were questions regarding the longevity of polymeric insulators, but in his experience these were exceptionally reliable components which have created no problems in the Scottish Region;
- Principal distribution equipment issues were described as follows:
  - K11 Switchgear renewals:

There are 5 sites left in service following replacement with Siemens GIS equipment in Carstairs & Coatbridge. By August 2003 only 3 will remain in service which along with WCML Phase II's replacement of 2 further sites leaves just one remaining site for replacement in 2005/06;
  - SMOX equipment failures and unreliable performance due to corrosion have been largely solved as 3 out of 4 affected sites were replaced over the past year and the remaining site at Currie is due to be replaced under WCML Phase II;
  - There are issues with SMOS equipment paint but this is not currently causing corrosion as cases are galvanised, and mechanism faults (Drive Pin washer mods) are being progressed with 17 out of 63 units remaining to be modified, which will be completed this year;
  - With regard to Cathcart Circle Booster Transformer renewals, 63 are being replaced due to internal deterioration, details of which are documented by oil sample reports.

(b) Electrification Failures

The Region is compliant with the ARM procedures.

In 2002/03 there were 7 OHLE failure incidents causing over 500 minutes delay for Scotland Region compared to 10 in the previous year and 11 in the year preceding that.

Data for failures is collected from several sources:

- Network Rail Production Control logs;
- Electrical Control Room (ECR) reports; and
- IMC incident reports.

The Contact Systems Engineer enters these incidents, regardless of the amount of resulting delay, into a comprehensive spreadsheet along with details such as unit numbers. This spreadsheet is used for investigation or for dispute of attribution and as a cross reference to check the Annual Return data prepared by HQ. Overall inter-Regional and year on year analysis is carried out at HQ but there are no regular meetings or forums for the Contact Systems Engineers.

(c) Electrification Condition Assessments

Data collection processes had not changed since our previous audits and the Region is generally compliant with the ARM procedures. We noted, however, that there was a lack of internal audits to ensure consistency although the REPE accompanies the Contact Systems Engineer on some assessment site visits to oversee them.

There is no DC equipment in operation in Scotland Region therefore measures M14 and M16 do not apply.

The documentation for the 2003 Annual Return from both the OHLE and Distribution departments was examined and was not only complete but was also supplemented by a considerable amount of supporting information from the IMC. The Reporting Team witnessed a substation condition assessment and this was carried out in compliance with the procedure. Overall the quality of the data and adherence to set procedures was regarded by the Reporting Team to be high.

The programme of locations for the condition assessments was not governed by the maintenance cycle as was the case in LNE and East Anglia Regions, and Scotland Region endeavour to use the schedule provided by HQ. However, on occasion, issues of access present a constraint which results in variations but these are not considered to have a significant effect on the results. The Region was required to carry out condition assessments of 64 tension lengths in 2002/03 and the number actually conducted was 68. The engineer carries out an



assessment using his own checklist and a form to denote faults and then later populates the electronic condition assessment checklist in the office using his notes.

Network Rail staff do not regard the reported condition grades to be representative of the overall condition of the equipment, although the weighting of the score sheet or how it affects the result had not been analysed in the Region. No feedback is received by the Region from HQ, nor are there any inter-Regional meetings to ensure a consistency of approach.

There was an opinion in the Region that a detailed database similar to the old BR 'data-flex' system, which actually breaks the equipment into its major component groups, would give a better picture of failures and condition than the current system does. It was noted by the Contact Systems Engineer that the current assessments make no examination of the special environment of tunnels.

#### 11.2.9 *Southern Region*

##### (a) *Electrification Failures*

There is only a very short length of OHLE installed in Southern Region (9km), and there were no OHLE failures causing delay of more than 500 minutes in 2002/03 or 2001/02, and only 1 in 2000/01.

There were 30 failures in conductor rail causing delays of 500 minutes or more in 2002/03. This is a slight increase from the level of 28 in 2001/02 but the totals from both years are a decrease from 42 in 2000/01.

The source for the electrification failure data is the Control log which is checked by the Electrification and Plant (E&P) Engineer to ensure that electrification is the correct cause of the incidents. He refers to the Electrical Control Rooms, IMC records and local information in order to do this. A rigorous assessment is made by the E&P department before acceptance that any incident was caused by E&P thus ensuring a high level of confidence in the cause of the incident.

The delay minutes data provided by the operational performance team is relied upon for each incident and is not verified further.

No internal or external audits of the data are recorded. However, the Reporting Team considered that a good level of confidence can be placed on the reported numbers due to the high level of management accountability applied to each of these incidents and the management review carried out by the E&P Engineer before agreeing with the attribution.

##### (b) *Electrification Condition Assessments*

Our audit confirmed that the ARM procedures were generally complied with but that no significant internal auditing was taking place. However, each condition assessment was reviewed

before submission to HQ to ensure that it did not conflict with the general understanding of the REPE and his staff of the asset condition.

AC traction feeder station and track sectioning point equipment (M13) is only present in two locations in Southern Region. Assessments of these have not yet taken place and will be carried out in the two remaining years of the 5-year period, thus this measure was not audited. In addition, owing to the short length of AC traction contact system (M15) equipment installed in the Region this measure was not included in the audit.

DC traction substation (M14) condition assessment information is obtained from site inspections, which are carried out by members of the Network Rail E&P team or by a number of external auditors, together with information from equipment tests. The availability of spares is also included in the assessment. From the sample of completed forms inspected a total of three Network Rail staff and two external auditors were identified as carrying out the condition assessment surveys.

Electronic copies of the completed M14 condition assessment reports are sent to HQ where the data is summarised for the Annual Return and then checked and accepted by the REPE.

No checks were apparent that confirmed the accuracy of the data entry into the computerised system nor of the computer programme itself. Reassessment of data would only be carried out if there were a significant anomaly in the individual or summarised results.

The samples of equipment to be assessed for the M14 measure are chosen each year to reflect the type and age group of all of the equipment, thus it is expected that the overall results would not significantly change as the number of assessed locations increases. However, the ease of access and the availability of auditors influence the locations chosen and timing of the audits throughout the year. By the end of the five-year review period, all substation locations will have been assessed.

The condition assessments for the M14 measure are not directly used to decide renewal strategy or expenditure but are a useful guide to areas of concern. The main drivers for renewal are based on maintenance issues, defect sheets and the equipment condition testing referred to above.

This DC traction contact system condition measure (M16) is based on new and historic conductor rail wear measurements and is equivalent to a 75% sample with historic results being modified to reflect expected wear since the actual measurement was made.

For the M16 measure records are retained by the IMC and are not specifically audited although Network Rail Regional staff carry out a 'health check' before submitting the data to HQ. The Region do carry out an "end product check" which is designed to check on the maintenance

operations of the IMC although this includes less than 1% of the population for wear measurements but an assessment of overall condition is made on up to 10% of the totals each year. This process has been altered to a surveillance check for the current year and is to be changed again next year. This new system of condition assessment may give a better measurement of condition than using the conductor rail wear criteria.

The conductor rail wear measurements historically feed into the conductor rail renewal programme but the level of renewal is only approximately 10% of that required by the measurement results.

The Reporting Team carried out site visits to substations to analyse the condition assessments. The visits indicated that the condition grades allocated by the original assessing engineer were either supported or were slightly lower than the assessment of the Reporting Team. However, the major concern with the method is that using an average score for a large number of individual pieces of equipment and the inclusion of the building fabric results in condition levels not truly reflective of the worst equipment at each site. The use of defects such as spares availability, which does not immediately affect performance or condition, had a significant effect on the overall condition score even though the individual equipment was performing adequately.

### **11.3 Recommendations**

It is recommended that:

- There is more internal audit and checking of condition assessments to ensure consistency within and across the Regions;
- The failure measures are expanded to include other types of equipment;
- Various modifications are made to the condition assessments to ensure that all elements affecting the condition are assessed and that all information available is used, including the following examples:
  - Investigation should take place into the inclusion of Plant condition assessments in the Annual Return;
  - Assessments should be extended to include all of the asset, cables and switches to the extent that this information could be used more widely and, furthermore, to give some guidance as to the actual capacity of the systems;
  - Track paralleling huts should be included in the condition measure;
  - A separate measure should be introduced for the high voltage cable system;

- The complex substation scoring system should be reviewed and simplified to allow specific equipment issues to be properly reflected in the overall condition assessment;
- Assessments should take account of loading;
- Greater use should be made of the results of condition monitoring tests and other information available in the Regions;
- The condition of the building fabric should be subject to a separate measurement process so that individual equipment issues are not hidden;
- The conductor rail condition assessment should include criteria other than rail wear.

## 12 Station Condition Index (M17)

### 12.1 *Audit Scope*

Audits were undertaken in Eastern, Scotland and Southern Regions to assess the Station Condition data presented in the 2003 Annual Return. The audit consisted of an interview held in each Region with the Process Owner and at HQ with the HQ Champion. The following areas were discussed as part of the audit:

- Changes which had occurred to the inspection and data collection processes for the 2003 Annual Return;
- The number of inspections carried out by the Region;
- The extent of Regional and HQ checking and auditing;
- Programme; and
- Suggestions for improving the measure in the future.

The average scores for all stations were obtained from HQ, and full scores for the inspected stations were requested from each Region.

The initial scores provided were examined, with some anomalies being identified and reported to the HQ Champion. These were subsequently corrected and the scores for major stations also added.

### 12.2 *Audit Report*

In our report on the 2002 Annual Return, several shortcomings were identified concerning the scores for different assets and stations being unweighted, skewed up and down, truncated, and rounded at various stages. The 2002 audit carried out by Faithful and Gould also identified shortcomings in the inspection process. There have been no changes since last year to any of the processes for collecting data, so these comments remain valid.

No changes have been made to the Asset Reporting Manual Procedures for the 2003 Annual Return. However, the contracts for carrying out the inspections have been re-tendered and new consultants appointed. These are now independent of the contractors involved in carrying out asset replacement works.

The new contracts were let under the new quinquennial arrangements on the basis that data would be collected using handheld computers, with hardware supplied by the consultants and software by Network Rail. However, the software was not available when required, and is now expected to be ready for training purposes by September 2003. The inspections were therefore carried out using the same methods as last year.

Our audits indicated that although all interviewees reported that the ARM Procedures were followed, there was no evidence of checking by some Regions as noted below and no audit by HQ of the data collected.

Our audits found reservations that many of the assets assessed for the measure are not the responsibility of Network Rail but should be maintained by the TOCs under the terms of their lease agreements. However, when shortcomings are identified, process owners are often unable to enforce these terms due to the complex commercial circumstances governing the operation of the entire network.

#### *12.2.1 Eastern Region*

A new inspection consultant has been appointed. The results provided by the inspection consultant have not been checked by the Region. The reason for this, we were informed, was that the inspections were carried out late because of the delay to the handheld computer software. A copy of the inspection data was requested but not supplied by the Region.

#### *12.2.2 Scotland Region*

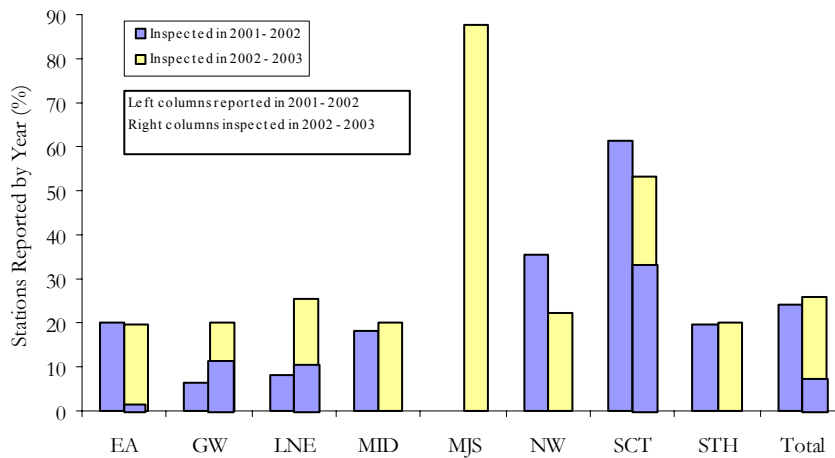
A new inspection consultant has been appointed. The inspection results had been checked by the Region, with particular emphasis at the beginning of the process in order to ensure consistency of scoring. The Region had identified discrepancies in approximately 12.5% of the stations inspected, including the scope of the inspections not being in agreement with the station lease plans, and inappropriate scores being given to platforms in rural locations. These were corrected by the consultant and the results were resubmitted. The Region supplied a copy of the inspection data.

#### *12.2.3 Southern Region*

A new inspection consultant has been appointed. The Region has not checked the inspection results, but the new consultant reported many errors in the base data such as areas and types of platforms. The Region supplied a copy of the inspection data summary.

#### *12.2.4 Data Analysis*

The 2003 Return contains inspection data from 647 stations representing 26% of the network total. However, the data for 190 (7.6%) of the stations was collected as part of last year's process but not presented in the 2002 Annual Return. The distribution of inspections carried out by each Region over the last 2 years is as follows:



**Figure 12.1: Percentage of Stations Inspected**

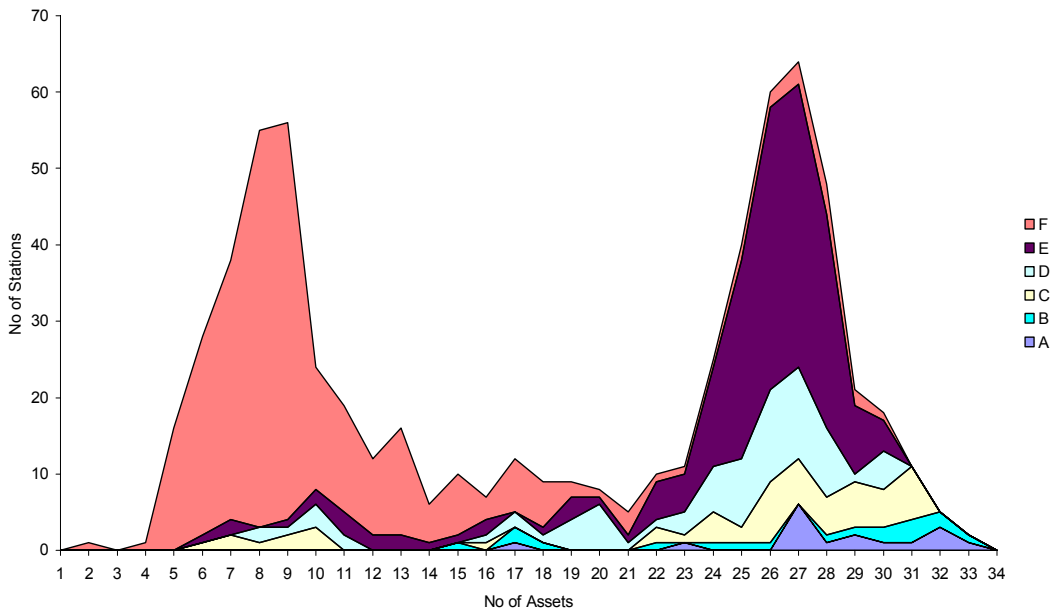
This demonstrates the difference between the numbers of inspections carried out by Regions over the last 2 years compared to the 20% required by the procedure.

The regulatory target for the Station Condition Index is to maintain the average condition grade at 2.2. The average condition grade for all stations over all years to date is 2.25. The average for the 2002/03 inspections is 2.26 and for the 2001/02 inspections it was slightly lower at 2.28. The following table shows the average condition grades for the Regions:

Region	2002/03 Average condition grade	All years average condition grade	Above or below network average for all years	Above or below regulatory target
All Stations	2.26	2.25	Below	Below
East Anglia	2.10	2.13	Above	Above
LNE	2.25	2.24	Equal	Below
Scotland	2.19	2.20	Above	Above
Southern	2.71	2.49	Below	Below

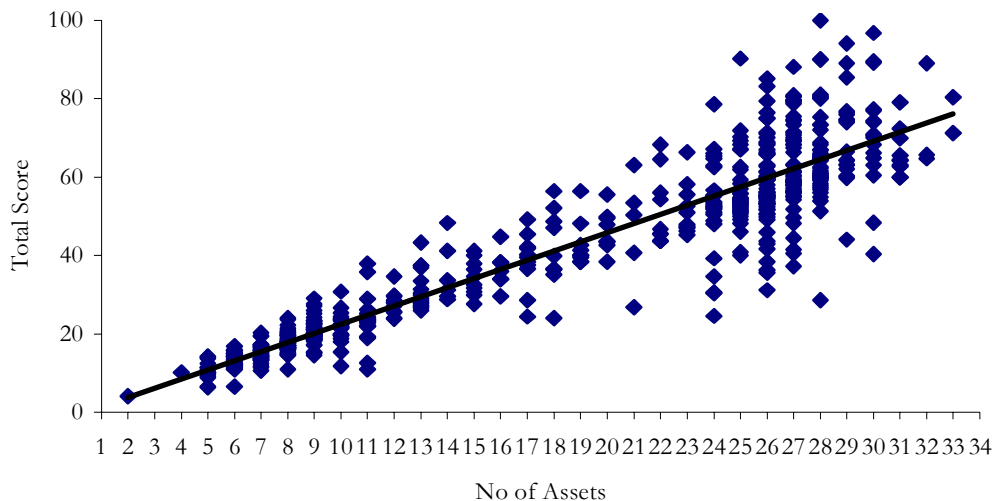
**Table 12.1: Average Station Condition Grades**

The distribution of the number of stations inspected compared to their category rating (A-F) and the number of asset types that they possess is as follows:



*Figure 12.2: Station Category vs. Number of Assets*

As would be expected, this shows a large proportion of category F stations having comparatively few asset types whereas category A and B stations have the highest number. It also demonstrates two large peaks which are dominated by significantly different types of stations. In the overall score, all stations have equal weighting, and this could lead to a skewing of the average score due to the dominance of category E and F stations. The distribution of total score per station against number of assets was therefore plotted as follows:



*Figure 12.3: Total Score vs. Number of Assets*



Fortunately Figure 12.3 indicates that the scores for the range of asset types are reasonably symmetrical about the average, thereby indicating that no significant skewing should result. However, it does emphasise the large variation in the total score per station, suggesting that it might be appropriate to weight the scores accordingly.

Despite its shortcomings, the score remains a reasonable comparative indicator of station condition but only when viewed over a medium to long timescale.

#### *12.2.5 Significance of the Measure*

The data required to calculate this measure is potentially very useful to the management of the process of maintaining and planning the renewal of station assets. There appears to be a genuine desire by all parties interviewed in the Regions and at HQ to improve the data collection process in order to improve its accuracy and usefulness for this purpose. The introduction of the new quinquennial system feeding into MIMS for Operational Property should assist greatly to facilitate this.

Once the residual lives of assets are determined and recorded, the process of converting them into a score is merely a mathematical exercise which should not be an onerous task. Providing the scoring system is devised accordingly, the measure should therefore be a relevant indicator of station condition but is unlikely to be directly significant to the management, maintenance and renewal of the network.

#### *12.2.6 Development of the Measure*

The process for introducing the quinquennial system is now well advanced and should lead to improvements in data collection. However, the score calculation process could be improved such that it is more useful to the various parties and representative of the entire system.

The major disadvantage to this is that, depending upon the changes made, it might not be possible to back calculate scores for previous years thus losing comparative data. However, various options exist for making some changes which could be back calculated. Alternatively, the data could be weighted to produce scores which are relevant in different ways, for example for forecast expenditure requirements or passenger appreciation.

### **12.3 Recommendations**

- The views of ORR and Network Rail on the practicalities of the above development options need to be obtained;
- If possible make the score more relevant to show, for example, spending required and passenger benefit;

- More emphasis should be placed on ensuring that a reasonably representative (by Region and station category) 20% sample inspection programme per annum is carried out;
- Checking and auditing of inspections data needs to be improved.

## 13 Station Facility Score (M18)

### 13.1 *Audit Scope*

Audits were undertaken in Eastern, Scotland and Southern Region in order to assess the Station Facility Score data presented in the 2003 Annual Return. The audit consisted of an interview held in each Region with the Process Owner and at HQ with the HQ Champion. Changes which had occurred to the inspection and data collection processes for the 2003 Annual Return were discussed in the audits along with the programme, the extent of Regional and HQ checking and auditing, and any suggestions for improving the measure in the future. The scores for stations within the Scotland, Eastern and Southern Regions were obtained from HQ. Scotland and Southern Regions also provided a copy of scores for their Region.

### 13.2 *Audit Report*

In our report on the 2002 Annual Return, the Stations Facilities Index was found to be weak in many respects. These comments remain valid.

No changes have been made to the Asset Reporting Manual Procedures for the 2003 Return. There had again been no checking of scores by staff from HQ visiting a random selection of stations, and the Regions were still collecting data using different methods (see below) although the HQ Champion was unaware of this.

The HQ Champion attributes a low priority to seeking improvements to the scoring system in order to improve its relevance, with the view being expressed that the measure was defined by ORR and is of no use to Network Rail. Improvements in the data collection method are being sought by HQ, but these depend entirely upon utilising the handheld computers currently being developed for the new quinquennial system feeding into MIMS for Operational Property. Given the advanced state of development of the software for this system, and the apparent lack of detailed input to its design by the HQ Champion, it will be surprising if the goal is achieved.

The Regions continue to administer the collection of data in a diligent manner albeit with a sense of frustration at its lack of relevance, and the inclusion of non-functioning key facilities such as locked toilets. This is usually due to the operation of such facilities being the responsibility of TOCs who keep them locked in order to save costs. A view was expressed that this is a matter for the SRA to resolve.

#### 13.2.1 *Eastern Region*

LNE and East Anglia Regions collected their data using different methods during the 2003 Reporting year and continue to do so. EA Region uses the method in the ARM Procedure of collecting data from Account Surveyors, Facility owners, etc and re-inspecting approximately 20% of its stations each year whereas LNE relies almost entirely on the data collection system

with no planned re-inspection programme. A copy of the score data was requested and supplied by LNE but not by EA.

#### *13.2.2 Scotland Region*

Data is collected primarily by processing changes notified via the data collection system, with some uncontrolled checking by feedback from station visits but no planned re-inspection programme. Data is now stored in Excel spreadsheets rather than Access files. This is an improvement as the Region is now able to see the calculation of the scores, and for the first time was able to submit actual scores to HQ rather than signing off scores supplied by HQ with no back-up information concerning their calculation. A copy of the score data was supplied by the Region.

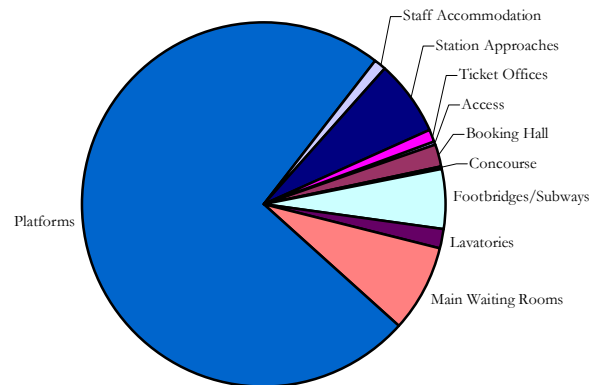
#### *13.2.3 Southern Region*

Data is collected primarily using a planned re-inspection programme covering approximately 20% of the stations each year, in addition to processing changes notified via the data collection system. No formal checking was carried out but discrepancies were discovered where only basic data had been entered when the database was first set up. A copy of the score data was supplied by the Region.

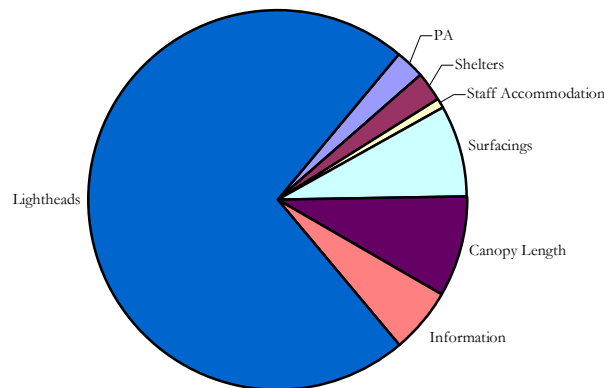
#### *13.2.4 Data Analysis*

The results obtained for Scotland, Eastern and Southern Regions again highlight the disproportionate dominance of certain types of facilities making up the total score. The overall distribution of facilities is shown below together with the distribution of facilities contained within the Platforms description.

These figures demonstrate that for the Regions studied, the scores for Platforms comprised 74% of the total, rising to over 76% in East Anglia, of which 72% related solely to lighthoods. Over 53% of the score therefore derives from just one type of facility despite it being noted that lighthoods are counted even if they have no electrical connection.



**Figure 13.1: 2003 Station Facility Index – Scotland, Eastern and Southern Regions**



**Figure 13.2: 2003 Station Facility Score, Platforms – Scotland, Eastern and Southern Regions**

**13.2.5 Significance of the Measure**

Whilst some of the data required to calculate this measure is potentially useful to the management of station facilities, the scoring system (as opposed to the data collection) is highly arbitrary in nature in the opinion of the Reporting Team, and totally ignores the quality, condition and usefulness of the facilities counted. There is no weighting of the scores to reflect the vastly different nature of the facilities being counted, or to take account of their cost and benefit. For instance, the presence or not of disabled access or a car park scores only 1 or 0, the

same as one lighthead, and CCTV is only scored for category A – D stations whereas it provides a major benefit to unmanned category E and F stations.

There is also no benchmark within this score to reflect what facilities might be expected to be provided at different types of stations, what is physically possible within the constraints, and hence to identify what gap currently exists.

Facilities are also counted which are outside the control of Network Rail such as markings on roads that may be under the control of the Local Authority.

#### *13.2.6 Development of the Measure*

This measure could probably be made meaningful but only following a complete review of its purpose and the way in which it is calculated. It should then be possible to amend the scoring system and recalculate the scores for previous years for comparison purposes. Unless this happens, the measure risks remaining a largely irrelevant chore to those involved with it.

### **13.3 Recommendations**

- The detailed views of ORR and Network Rail on the purpose of the measure need to be obtained so that improvements can be considered;
- Consider making the score more relevant, for example by identifying and removing shortfalls and introducing weightings linked to cost and passenger benefit;
- Remove the counting of redundant and/or locked facilities. This may require consideration of the terms of station leases so that TOCs have defined responsibilities for making facilities available at certain times;
- If the measure is developed to become more worthwhile, the checking and auditing procedure needs to be improved;
- HQ should improve the transparency to the Regions of the score calculation, for example by changing to Excel from the current Access forms used.

## 14 Activity Volumes (M20-M27)

### 14.1 *Audit Scope*

The 2003 audit was undertaken to assess the accuracy and confidence in the Activity Volumes figures presented in the 2002/03 Annual Return. Activity volumes are presented as a measure of the level of renewals activity undertaken during the 2002/03 reporting period by Network Rail across the following broad asset categories:

- Track, comprising renewals volumes for Rails, Sleepers, Ballast, and Switches and Crossings (S&C);
- Signalling; and
- Structures, comprising Bridges, Culverts and Retaining Walls.

We have undertaken a broad assessment of each of the asset categories for Eastern (comprising East Anglia (EA) and London North Eastern (LNE)), Scotland and Southern Regions. In line with the Regulator's requirements, we have focused our analysis on Track based activity volumes.

### 14.2 *Audit Report*

#### 14.2.1 *Regulatory Targets*

There are no direct Regulatory Targets for Activity Volumes however in the long term we expect there to be a link between activity volumes and operational performance.

#### 14.2.2 *Reported Data*

Network Rail Regions report individually on the volume of renewal activity against each of the asset categories. The 2002/03 Annual Return features the presentation of two new renewals measures, namely Culverts and Retaining Walls. The AR also provides a breakdown of Ballast fully and partially renewed during the reporting period.

In the 2002/03 Annual Return a network total of 1,010km was reported for Rail Renewals, 666km for Sleepers, 665km for Ballast and 172km for Signalling Renewals. The graphs below show the year on year rail, sleepers and ballast renewal levels by Region.

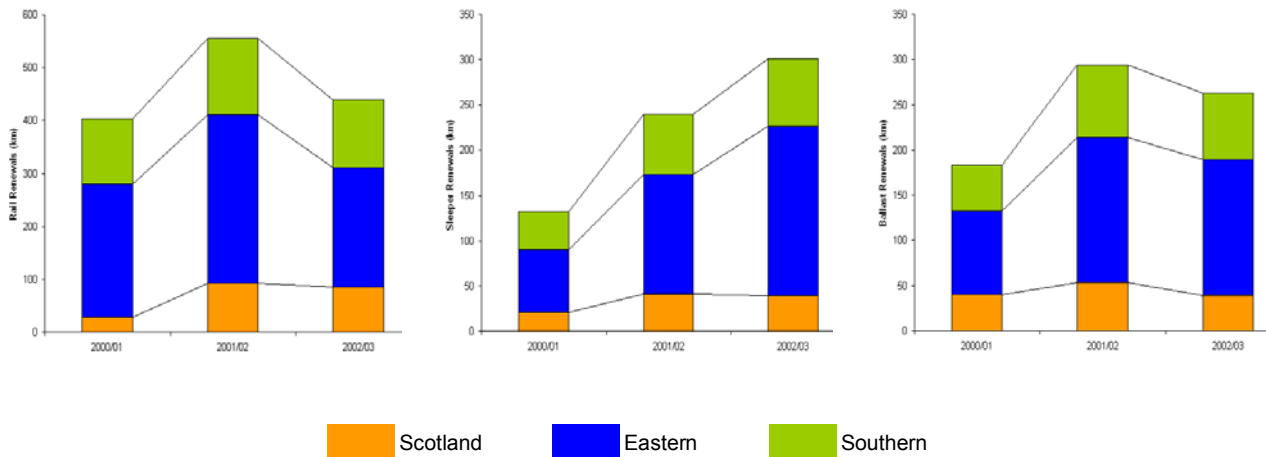


Figure 14.1: Year on Year Track Renewals

The level of track (rail, ballast and sleepers) renewals has generally reduced from the 2001/02 high that followed the Hatfield incident. Consequently track renewal expenditure has also decreased in line with activity levels, except in Southern Region which reported a 5.5% decrease in track activity on 2001/02 figures but a 33.8% increase in track expenditure as shown below:

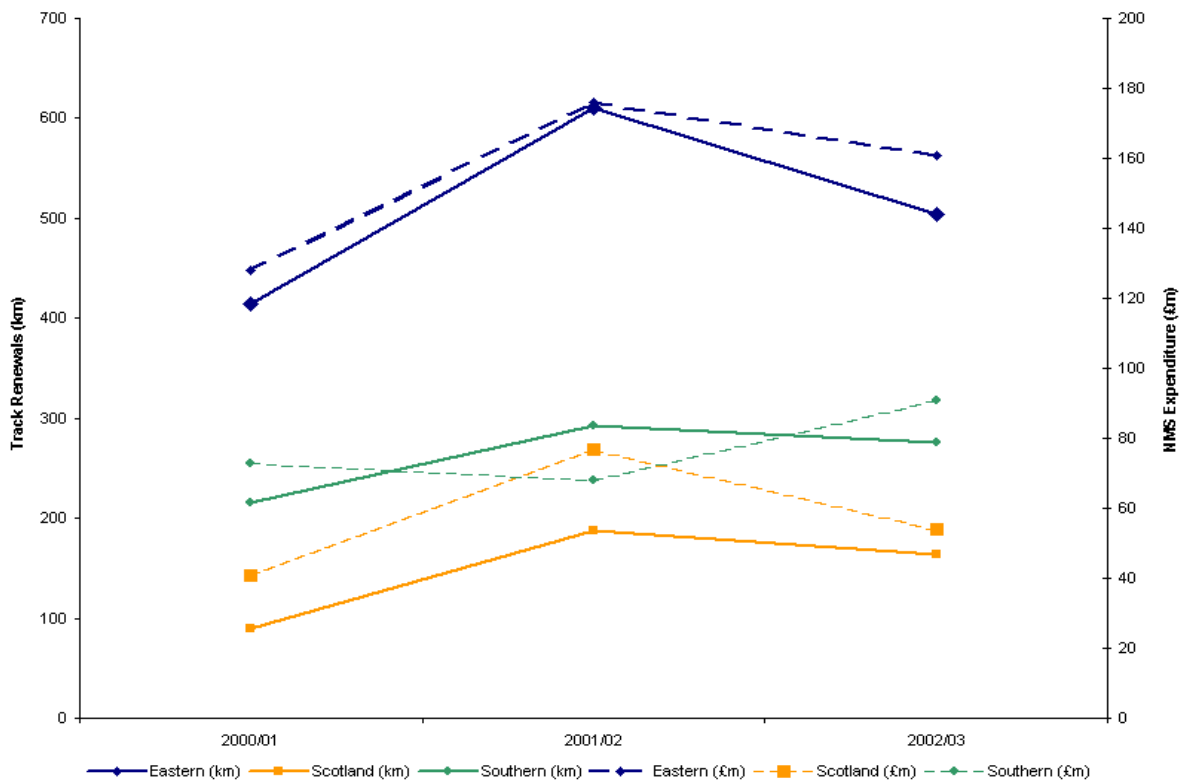
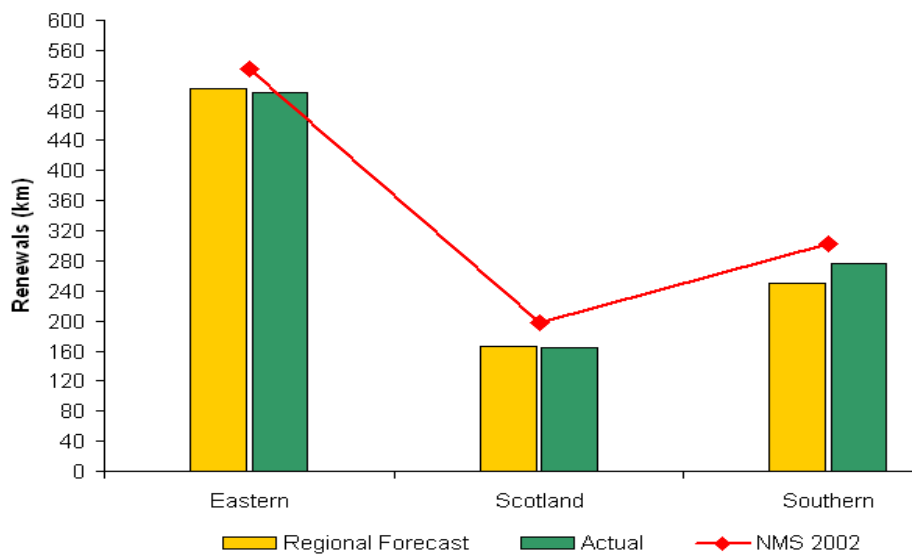


Figure 14.2: Track Renewals (excl. S&C) and NMS Expenditure



In the 2002/03 reporting period a network total of 254 S&C units were renewed (an increase of 87% on 2001/02), 97 Bridge spans (an 115% increase on 2001/02) and 49 Culverts. The level of Retaining Walls renewals amounted to 1208m<sup>2</sup>, this being reported for the first time in the Annual Return.

The Annual Return presents actual renewals figures for Track against the NMS 2002 forecasts. It must be noted that the NMS 2002 forecast figures are not the same as Regional forecasts. The NMS 2002 forecasts include HQ overlays derived on the basis of projected additional expenditure by route not previously accounted for at the Regional level. The graph below shows the Regional NMS Forecasts against the actual volumes reported.



**Figure 14.3: Total Track Renewals**

The graph shows that actuals reported within the Regions are comparable to the forecasts set at the Regional level signifying a better Regional performance against Regional targets than indicated in the Annual Return.

#### 14.2.3 Overall Data Quality and Compliance with Procedures

The audits undertaken concluded that the Regions comply with the ARM requirements however in some instances individuals demonstrated limited awareness of both local and national procedures. This occurred in instances where staff were either new to their role or were employed by Network Rail on a temporary basis.

Our audit report on the 2001/02 Annual Return recommended more extensive sampling and analysis of Regional data in order to establish a robust audit trail for the activity volumes figures presented in the Annual Return. This was heavily dependant on the form, consistency and quality of the data presented to the Reporting Team by the Regions.

A key objective of these audits was to establish a robust audit trail between actual and forecast volumes figures. Furthermore the Reporting Team sought, where possible, to reconcile activity volumes with reported NMS expenditure. This could not be achieved for all Regions.

In many instances the Reporting Team had to refer to a number of data sources to verify actual or forecast renewals volumes when the actual figures realised at the end of the reporting period should be consistent in all data sources.

Overall the processes for the derivation of the activity workbanks (a portfolio of renewals projects to be delivered during the reporting year) for all renewals measures were broadly consistent across the Regions. Workbanks are set at the beginning of each reporting period and monitored on a monthly and quarterly basis. Although the year end actuals recorded are broadly consistent with Regional targets, the process is dynamic, with significant changes occurring to workbanks as a result of project deferrals, deletions and new projects being added as a result of reactionary or unforeseen works e.g. emergency re-railing.

We had considerable difficulty in determining the actual movements of projects in the workbanks during the year relative to the published volumes. This data was not held in an easily accessible or relevant form for analysis purposes.

Scotland Region was the only Region to demonstrate a coherent trail of documentation in both hard and soft copy form for sufficient analysis to allow conclusions to be drawn. Southern Region demonstrated a satisfactory understanding of all key issues however the validation of the reported track activity volumes led to a total of three different data sources being presented to the Reporting Team, each of which offered a different set of figures for track activity volumes, albeit within  $\pm 10\%$  of the actuals reported in the Annual Return.

Eastern Region, split for reporting purposes between East Anglia (EA) and London North Eastern (LNE), provided supporting data which varied in quality between its two constituent Regions. EA Regional representatives were able to provide to the Reporting Team with a greater amount of coherent supporting documentation than LNE Region.

#### 14.2.4 *Region Specific Findings*

##### (a) Eastern Region

The amalgamation of EA and LNE Regions for the 2002/03 reporting period led to a consolidation in reporting lines for all activity volumes. Management and reporting of each measure was controlled centrally in York. EA Region reported renewals data on a monthly basis to York.

The Reporting Team undertook audits on track renewals in both EA and LNE regions. Structures and Signalling volumes audits were held in York only.

Overall, for all renewal categories, Eastern Region demonstrated a higher degree of proactive management and understanding of the requirements of the reporting process than other Regions. All personnel displayed a good working knowledge of the renewals workbanks and were proactive in identifying limitations to the present reporting system. However this was offset by the lack of workbank data for track renewals.

Track renewals workbanks are derived in accordance with the processes set out in the ARM, the level of adherence being in line with that found in other Regions. The Region displayed a greater degree of proactive management of the track renewals workbanks through the monthly and quarterly business review processes in place.

Based on the high level information provided to the Reporting Team we confirm that the 2002/03 renewals totals of 226km, 128km and 150km for rail, sleepers and ballast renewals concur with the supporting information provided by the Region.

We cannot however validate the reported S&C renewals figure of 20 for LNE. There is a discrepancy between data held within the track delivery team in York and the signed-off renewals return sheets from each of the Region's four contract areas, showing the number of S&C units renewed to be 31 – all within EA.

The Region provided good supporting data for the validation of its bridge renewals figures, reported at 36 spans for both EA and LNE. Nil returns were reported for both culverts and retaining walls. We confirm that the renewals figures presented in the 2002/03 Annual Return concur with supporting documentation.

A nil return was presented for Signalling renewals against a reported NMS Signalling spend of £104m. Supporting documentation on the actual level of signalling activity was provided for LNE Region only.

(b) Scotland Region

The Reporting Team do not recognise the 2002/03 NMS forecast figures presented for rail renewals (82km) in the 2002/03 Annual Return. This figure cannot be reconciled with Regional data.

We provide below a breakdown of the corresponding forecast figures published in the 2002/03 NMS against the actual figures reported in this year's Annual Return.

2002/03 NMS Forecast					
	HQ Overlay	WCRM	Regional Forecast	NMS 2002/03	Actual 2002/03
<b>Rail (km)</b>	14	9	69	91	86
<b>Sleepers (km)</b>	0	11	41	52	40
<b>Ballast (km)</b>	0	11	43	54	43
<b>S&amp;C (Nr)</b>	0	8	0	8	1

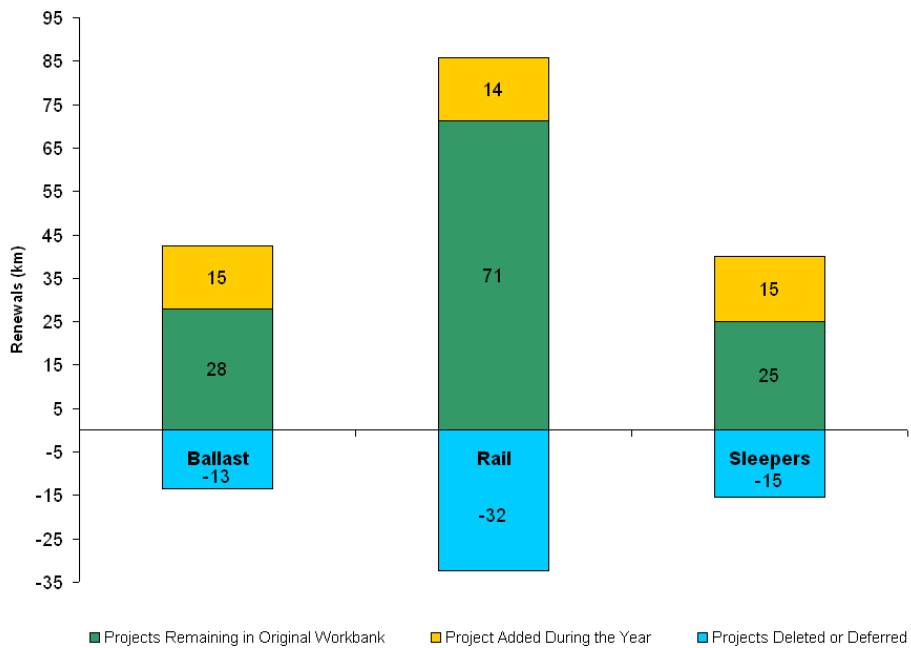
*Table 14.1: Scotland Region breakdown of NMS 2002/03 Forecasts*

The table shows the variances between the Regional forecasts and those published in the NMS. Regional forecasts derived by the Track Delivery teams are “loaded” with additional overlays (HQ and WCRM) to form the published NMS figure. These additions are carried out at Network Rail HQ only.

Furthermore it is evident from our findings on both the 2001/02 and 2002/03 Annual Returns that Network Rail staff responsible for the delivery of activity volumes are not presented with this breakdown of overlays, which explains why they do not recognise the forecast figures in the NMS.

Scotland Region demonstrated clearly the management processes in place for track renewals. Documentation provided to the Reporting Team supports the figures presented in the Annual Return. Given the nature of the data, variances and some data discrepancies were found between data sources however the Reporting Team are confident the reported figures for track renewals are within  $\pm 2\%$  of information held in the supporting documentation.

It is clear from the information provided by the Region that the management of the activity workbank is a dynamic process susceptible to significant movements in individual project performance. Workbanks change considerably and frequently over the reporting period. Many projects forecast for completion during the year are deferred or deleted as a result of planning problems, resource constraints or the addition of new projects undertaken in reaction to problems arising on the network. The graph below highlights this issue:

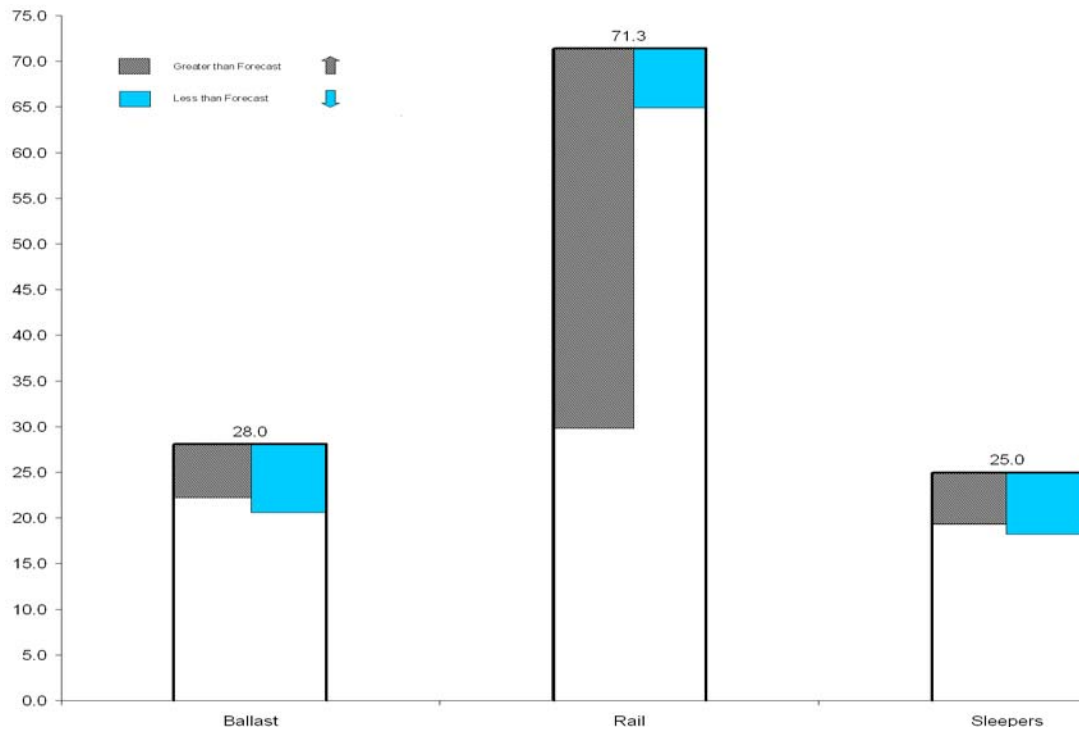


**Figure 14.4: Scotland Region Track Workbank Variations**

The graph shows the year end results broken down into the level of track renewals deleted or deferred from the original workbank used to derive the Regional NMS 2002/03 forecasts, projects added during the reporting year and those projects originally forecast and remaining in the workbank at the end of the year.

In summary a total of 124.3km of track renewals (rail, ballast, sleepers) were carried out in 2002/03 (excluding new projects added during the year), yielding a variance of 32.4km above the original forecast for those particular projects.

The key cause for this variance was an increase in the amount of Rolling Contact Fatigue (RCF) re-railing works previously not included in the forecasts. This is illustrated in Figure 14.5 below which shows the overall variances for rail, ballast and sleeper projects against original project forecasts.



**Figure 14.5: Changes in Renewals volumes for all original track projects**

The analysis above is limited to overall renewals rather than individual project performance. A similar analysis on the latter would allow a more in depth assessment of the Region’s ability to manage its workbank against forecast figures effectively.

All significant changes to projects within the workbank are channelled through a change control process underwritten by a change control procedure developed jointly by Scotland Region and the IMC. Change control requests were not viewed by the Reporting Team however we are of the understanding that forms exist for every change to the track workbank.

Similar management processes exist in the Region for the reporting of Structures and Signalling renewals. For Bridges, Culverts and Retaining Walls the Region has a reported a total of 4, 13 and 390m<sup>2</sup> renewed respectively during the year. A significant proportion of the Structures renewals were undertaken in response to emergency flooding works. The Region reported a nil return for Signalling Renewals.

The reported structures and signalling renewals volumes do not reflect the actual levels of activity undertaken during 2002/03. For example, the total spend authorised on the signalling projects completed in 2002/03 amounted to £44m. The Region reports a signalling renewal expenditure of £32m in Section 5 of the 2002/03 Annual Return. The number of bridge spans

renewed gives no clear indication of the size or cost of each renewal. For example, the forecast spend on the four spans reported in the Annual Return ranges from £390k for the smallest activity to £2.46m for the largest.

(c) Southern Region

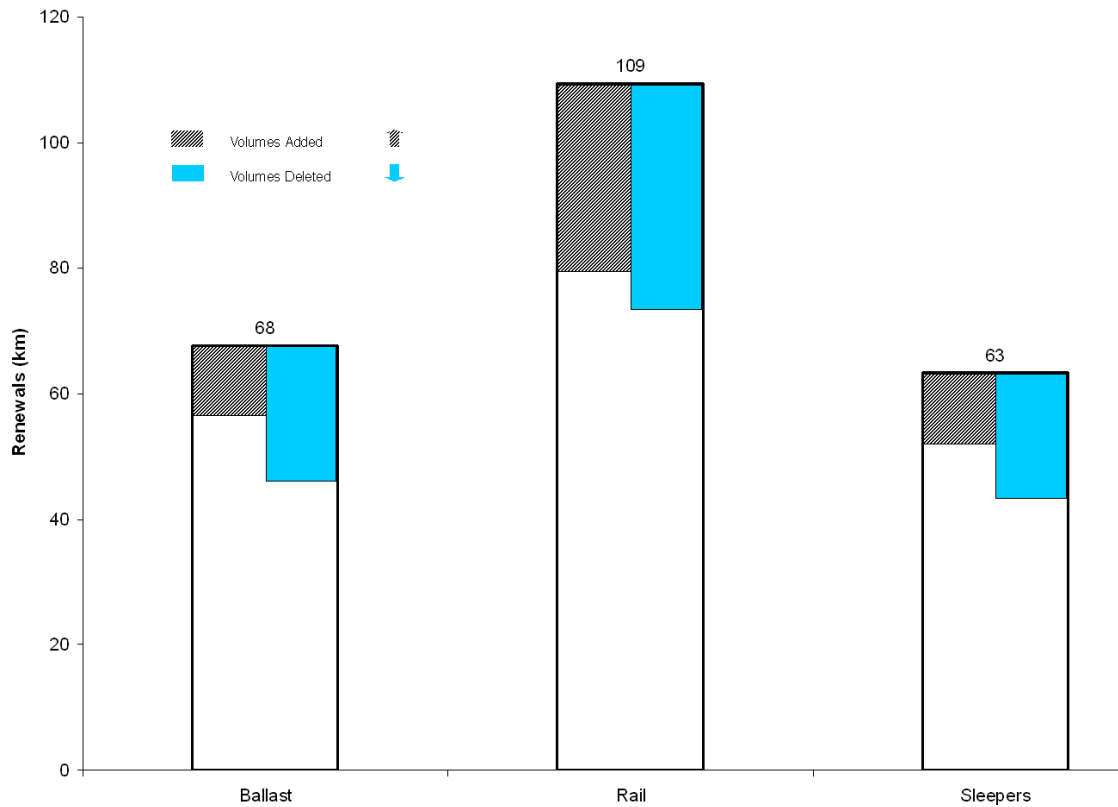
Southern Region reports renewals totals for rail, sleepers and ballast at 128km, 74km and 74km respectively. The total number of S&C units renewed totalled 37.

The rail, sleepers and ballast figures were reconciled within  $\pm 10\%$  with supporting data provided to the Reporting Team. Three key data sources were used to verify the reported data; confirmation of the information held in the period return sheets from the Region to HQ during the audit, PMCS outputs and a working spreadsheet used to update renewals data. The Reporting Team could not verify the number of S&C units renewed based on the information provided by the Region.

Southern Region personnel demonstrated a good working knowledge of the management processes for track renewals. The Region acknowledged it had particular difficulty in developing and maintaining a stable workbank in track renewals, more so than other Regions, with the reasons being a combination of operational demands that restrict possession availability and delivery problems from contractors. Therefore the relationship between the declared NMS expenditure and delivery is more tenuous than elsewhere.

The ideal planning horizon of 3 to 5 years for track renewals is seldom met. The Region uses its own renewals planning tool, HARTS, in preference to PMCS which it claims is more suited to its purposes. A demonstration of HARTS to the Reporting Team showed that mitigation of human errors and inconsistency in data updates are central to the value added by the system over other Network Rail databases.

We have undertaken limited analysis based on the information available. Again an illustration of the relative volatility of workbanks is provided here to draw attention to potential inefficiencies in the management of the renewals projects masked by the presentation of high-level figures. Figure 14.6 below shows the level of activity volumes added to and deleted from original forecast figures for track. The graph is based on one of the data sources presented to the Reporting Team to verify the figures reported in the Annual Return and given our comments above regarding data variations found in the Regional supporting data, the actual figures shown on the graph do not wholly concur with those presented in the Annual Return.



**Figure 14.6: Southern Region Workbank Variations**

The Region could not provide substantial renewals cost data for NMS reconciliation purposes. As was experienced in other Regions, local knowledge of renewals requirements in both a technical and commercial sense was good, however this was offset by the lack of supporting data, highlighting drawbacks in the Region’s reporting ability.

A lack of robust supporting data was similarly experienced in our audit of the Signalling and Structures activity volumes. The Region reported a nil return for signalling and offered no substantial data related to the actual level of activity undertaken for this measure.

Structures renewals processes are similar to nationwide methods with Southern Region reporting renewals at 3, 7 and 80m<sup>2</sup> for bridges, culverts and retaining walls respectively. The Region demonstrated a satisfactory understanding of the development of structures workbanks but again could not offer supporting data in a form allowing assessment on the robustness of the processes employed.

**14.2.5 Key Conclusions**

The 2002/03 audits have focused on the data quality and analysis procedures employed by Network Rail rather than the process driven assessment undertaken for the purposes of our report on the 2001/02 Annual Return.



The presentation of the renewals volumes in the 2002/03 Annual Return should not only reflect the actual level of renewal activity to the Office of the Rail Regulator but should also provide confidence in the management of the renewals workbanks, with particular focus on each Region's ability to report year-end figures comparable to original forecasts with the ability to explain variances to plan throughout the reporting period. In light of these criteria we put forward the following key conclusions:

- We believe that material consumption in terms of lengths (km) installed is a reliable measure of track renewals, however where its validity is reducing is where alternative methods of life extension works are being implemented. For example, the increasing and significant use of rail grinding to re-profile rail in Southern Region is not captured as a renewal activity;
- The structures measure of bridge spans renewed does not reflect the level of renewal activity undertaken by Network Rail due to the narrow definition of the measure. In its current form the measure also masks the true costs of bridge renewals by not classifying the extent of the renewals works in physical or monetary terms;
- The measures applied to culverts and retaining walls also give an inadequate measure of the levels of activity. Renewals on these assets are generally reactionary in response to an emergency e.g. flooding, rather than part of a comprehensive renewals or maintenance plan;
- The signalling measure does not reflect the actual level of signalling activity due to the narrow definition of the measure. Signalling workbanks include a significant amount of work in progress across key signalling categories such as interlockings renewed, level crossings upgraded or schemes completed by value, information which is not reflected in the Annual Return;
- We note the increasing use of unit costs as a measure of determining project costs and comparison of emerging and final costs. Review of the process of deriving and monitoring of these costs was not conducted as part of this audit. We would however suggest that the processes involved be subject to careful scrutiny to ensure existing inefficiencies are not enshrined into the pricing of future projects;
- Our principal concern is the difficulty experienced by the Reporting Team in reconciling the Regional NMS proposals with the actual activity volumes reported. There is also a large discrepancy between the business plan as published and the actual work delivered. The primary constraint is the financial budget and therefore whilst the Regions return outputs comparable to forecasts, the content of the workbanks delivered differed by significant amounts. The overall numbers presented in the Annual Return and in the supporting data provided by the Regions mask any

inefficiencies or planning problems in the delivery of the content of the plan as well as the financial targets set. We note that Network Rail HQ recognises this deficiency and that it anticipates improvements in 2003/04 as the new organisation structure and associated processes settle in. It is important that the Regions clearly own their respective commitments to the business plan;

- Network Rail has three principal systems for supporting and managing its investment processes; PIPS, PMCS and BMIS. The use of these systems in terms of consistency, accuracy and timeliness of data updates varies between Regions. All Regions have their own supporting investment planning systems within the delivery departments to monitor activity in summary form on a daily basis. This suggests risks of duplication of effort and error between systems as data is transferred;
- There remains a need for a common reporting system that is standard across the Regions and can be central to the management process in order to mitigate data duplication and discrepancies and to facilitate greater accessibility of all renewals data;
- Compliance in principle with the ARM is now standard across the Regions, however the quality of supporting documentation remains varied;
- The allocation of maintenance volumes within the renewals figures presented in the Annual Return remains an issue. Network Rail staff could not demonstrate a thorough understanding of how maintenance volumes are processed. Maintenance volumes have been included in the reported figures for Scotland and Southern Regions but not for Eastern.

### **14.3 Recommendations**

Our recommendations are based on the processes and variances in data quality observed in the Regions:

- Greater control of budget and baseline figures is required through the establishment of more robust change control and business planning processes;
- The Regional reporting processes require standardisation to mitigate data discrepancies and facilitate a more robust audit trail;
- The use of the various management reporting tools such as PIPS and PMCS requires review and standardisation to aid consistency in the reporting process. Both Regional and HQ personnel described these systems as unwieldy and difficult to use. We believe these are key drivers behind the disparity observed in the reporting processes between Regions;

- The reporting of maintenance volumes within the Regions requires immediate review. This has already been highlighted by HQ personnel however there are no immediate measures in place to resolve the situation. The definition of what constitutes reportable maintenance activity has also led to some confusion within the Regions. Section 2: Definitions, of the ARM was updated in November 2002, stating that both maintenance and renewals should be included in the reporting process however there is no clear indication what constitutes a maintenance activity nor is there any reference to the specific reporting of maintenance volumes in Section 3: Procedures of the ARM;
- There is a desire expressed by all Network Rail personnel to review and refine the definition of signals and bridges renewed to provide a more adequate reflection of the level of activity undertaken. For signalling the use of Signal Equivalent Units as a driver towards the measurement of renewal activity should be explored in greater detail;
- The reporting of life extension works, such as rail grinding, as separate line items should be explored. These works can be significant in physical and monetary terms. Reporting of these works will allow assessment of the rationale behind implementing such measures against the best time to undertake full renewals. The cost and subsequent benefits of implementing these measures can also be addressed.

## 15 Network Capability (C1-C4)

### 15.1 *Audit Scope*

The audit was undertaken in Eastern, Scotland and Southern Regions to assess the accuracy and reliability of the Network Capability data presented in the 2002/03 Annual Return. The audits included an assessment of Regional compliance with the procedures laid out in the Asset Reporting Manual for each of the four capability measures, namely:

- C1: Linespeed Capability;
- C2: Gauge Capability;
- C3: Route Availability; and
- C4: Electrified Track Capability.

### 15.2 *Audit Report*

#### 15.2.1 *Regulatory Targets*

The regulatory target for each of the capability measures is for 'no overall reduction in functionality during the reporting period other than those administered through the network change procedure'. There are no quantifiable regulatory targets.

#### 15.2.2 *Reported Data*

In 2001/02 Network Rail reported 49 linespeed changes, 2 route availability changes and 3 changes in electrified track capability.

The 2002/03 Annual Return reports no physical changes to any of the capability measures across the network.

As a result of changes to the process by which capability data is derived there are significant differences between the 2002/03 and 2001/02 figures. If no significant changes to the network capability measures are reported, no change in the reported figures year-on-year would be expected.

Table 15.1 below shows the variances between data presented in the current and last years' Annual Returns.

<b>Measure</b>	<b>2002/03</b>	<b>2001/02</b>	<b>% change</b>
<b>Linespeed (C1)<sup>a</sup></b>			
up to 35	5289	4427	16%
40-75	16978	17462	-3%
80-105	7106	7724	-9%
110-125	2393	2359	1%
<b>Total</b>	<b>31766</b>	<b>31972</b>	<b>-1%</b>
<b>Gauge (C2)<sup>b</sup></b>			
W6	16670	15787	5%
W7	11291	11668	-3%
W8	9659	8695	10%
W9	2533	2496	1%
W10	163	163	0%
<b>Route Availability (C3)<sup>a</sup></b>			
RA 1-6	2411	2321	4%
RA 7-9	24262	26196	-8%
RA 10	4734	2582	45%
<b>Total</b>	<b>31407</b>	<b>31099</b>	<b>1%</b>
<b>Electrification (C4)<sup>c</sup></b>			
25kv ac	7803	7937	-2%
3rd rail dc	4496	4493	0%
<b>Total</b>	<b>12299</b>	<b>12430</b>	<b>-1%</b>

**a: km of track in each band**

**b: km of route in each band**

**c: km of electrified track**

*Table 15.1: Network Capability Variances*

The proportion of track in the low speed band categories has increased by 16% from last year, offset by reductions in the higher speed bands. The greatest variance can be seen in the route availability measure with a 45% increase in the length of track in the highest route availability band.

The variances are not a reflection of any reported physical change to the network.

In 2002/03 Network Rail embarked on a data consolidation exercise in response to variations in capability data received from the Regions. In our report on the 2001/02 Annual Return we described the problems encountered by the Regions in the use of the standard Network Rail systems to report capability data. We reported upon the different ways some Regions report this data and highlighted the lack of a standard reporting mechanism for the measures in question.

As a result of variations in Regional reporting processes and data quality, HQ brought the process of reporting capability data within its control using the Regions to verify the

information it produced. The exercise consisted largely of the consolidation of data held in GEOGIS, and the figures presented in the 2002/03 Annual Return are based on outputs from the data consolidation exercise.

The principal driver behind the year-on-year variances therefore is the treatment of GEOGIS data which includes the correction of data omissions, duplications and inaccuracies held within the system in the previous year.

### 15.2.3 Overall Findings and Conclusions

Eastern, Scotland and Southern Regions reported no changes to the capability measures. Compliance with the procedures set out in the Asset Reporting Manual was satisfactory for all Regions. Furthermore we established that:

- The data consolidation exercise undertaken by HQ has yielded more accurate baseline figures for the Network Capability measures than reported in the 2001/02 Annual Return. The success of the exercise will be reflected in the consistency of the overall network totals reported in years to come, with particular alignment of the linespeed and route availability figures. In 2002/03 the difference between the overall figures for these two particular measures has reduced to 359km compared to 873km reported in the 2001/02 Annual Return;
- The extent to which the 2002/03 reported capability data differs from the 2001/02 figures reflects the problems encountered in the data analysis and reporting processes used to derive the 2001/02 figures;
- In Section 4 of the 2002/03 Annual Return, Network Rail has reported no changes across any of the capability measures. This contradicts the statement in Section 2 of the Annual Return where commentary provided on the variation of standard deviation data for Track Geometry states: “There has been a significant increase in the population of track in higher speed bands due to linespeed increases, principally Cross Country.” The reported Regional linespeed data does not support this statement and the HQ Capability champion could not validate it. The statement was based on HQ interpretation of GEOGIS data;
- In light of the comment above it is apparent that rationalisation of GEOGIS data requires further work. During the audit meeting with the HQ Capability champion it was suggested that linespeed changes had occurred across the network but were not reported by the Regions within the appropriate timescales;
- The 2001/02 Annual Return included a table of 49 linespeed changes to the network. The reasons behind these changes included Sectional Appendix Updates, Linespeed

Improvement Programmes, SPAD Mitigation Measures and Wrongly Notified changes;

- The data in the 2002/03 Annual Return suggests that none of these events were encountered in the reporting period. Given the nature of the network we would expect some of these events to occur and this is a view shared by HQ personnel;
- Details of the data consolidation exercise undertaken by HQ were not communicated to the Regions. As a result the Regions were unable to verify some of the HQ generated data against Regional records.

Given the stated and suggested inconsistencies in the reported capability data we believe that the process has suffered from a shortfall both in data quality and the reporting process. HQ's drive to establish more robust baseline data is commendable however the entire process requires close monitoring to facilitate a greater level of data accuracy.

### **15.3 Recommendations**

In light of the findings arising from our audits we propose the following recommendations:

- The data held within the GEOGIS system requires continuous monitoring and analysis to increase the levels of data accuracy presented;
- A co-ordinated approach is required for the reporting of capability data, which affects other measures. For example, linespeed changes, which are paramount to the analysis of track geometry measurements, should be monitored and verified between the appropriate HQ functions. This will assist Network Rail personnel in understanding their own data trends better and will promote consistent reporting;
- The Asset Reporting Manual should be updated to reflect changes in the derivation and reporting of capability data.

## 16 Reconciliation for 2002 NMS

### 16.1 Audit Scope

The audit was undertaken to validate the Reconciliation Statements presented in the 2002/03 Annual Return to the Office of the Rail Regulator. In line with the Regulator’s requirements the audits focused on sense checking of the numbers presented in the Annual Return with Regional documentation and the Regulatory accounts, highlighting any potential errors or causes for concern. Where possible the Reporting Team have endeavoured to reconcile the renewals expenditure to the activity volumes presented in Section 3 of the Annual Return. Since Network Rail’s financial systems, data and Regulatory Accounts are subject to statutory audit, all figures were assumed to be accurate and correctly classified.

### 16.2 Audit Report

#### 16.2.1 Reported Data

Network Rail report maintenance, renewal and enhancement expenditure by Region with a further breakdown of these figures by line of route. In the 2002/03 Annual Return Network Rail report a national renewal spend of £2,421m, marginally lower than the NMS forecast of £2,493m. Of the total expenditure reported to sustain the network during the 2002/03 reporting period, maintenance and enhancement spend comprised 27.2% and 17.1% respectively. The graph below shows the year-on-year national expenditure reported since the 2000/01 reporting period.

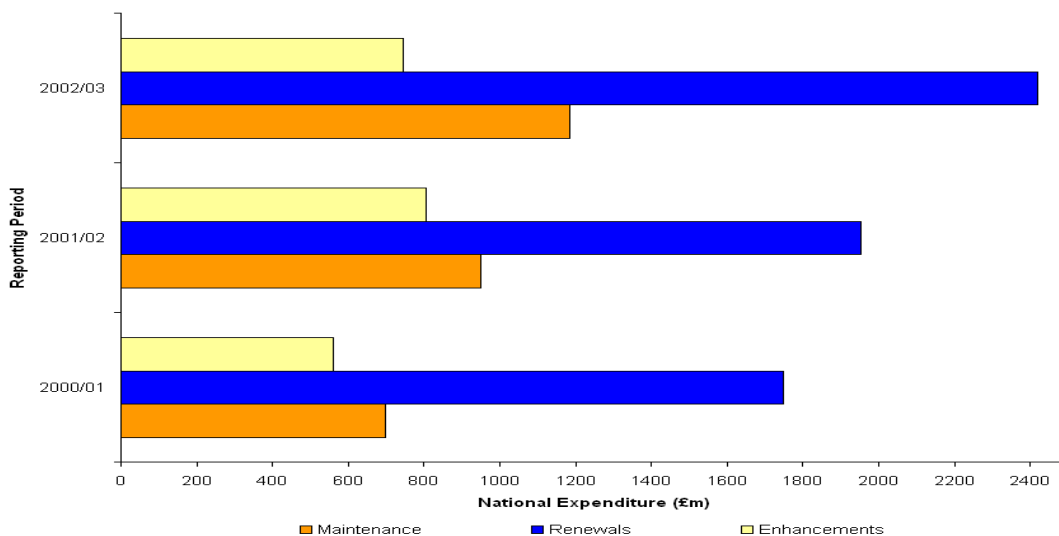
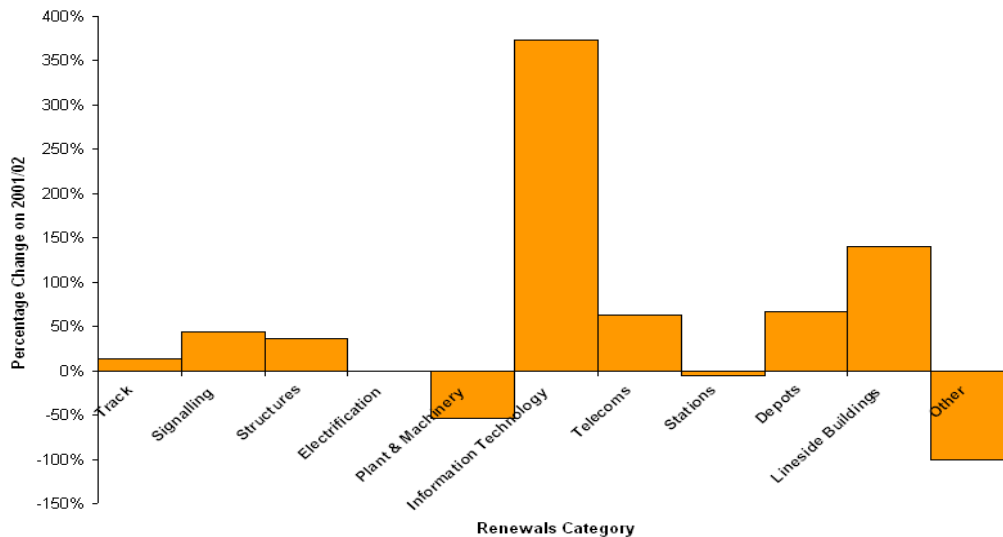


Figure 16.1: Year on Year National Expenditure



The reporting period sees a significant increase in overall spend, particularly renewals. The variances for each renewals category against 2001/02 reported expenditures are shown on the graph below.



**Figure 16.2: Variance in NMS Renewals Expenditure between 2001/02 and 2002/03**

Expenditure on track, signalling and structures renewals has increased by 14%, 44% and 36% respectively. A reported spend of £142m on Information Technology, 98.5% of which was incurred at Network Rail HQ, represents the largest single increase in expenditure on 2001/02 (373%).

Overall the total 2002/03 renewal expenditure is 24% higher than reported in 2001/02, offset by under-spends in the Plant and Machinery, Stations and Other categories.

As recommended in our report on the 2001/02 Annual Return we are pleased to see the presentation of Major Stations, West Coast Route Modernisation and Network Rail HQ expenditure as separate reconciliation tables. We also acknowledge the inclusion of Contingency/Overlay commentary preceding the tables in Section 5 of the Annual Return. In order to facilitate greater visibility of the delivered expenditure against forecast expenditure however, expansion of this commentary would be useful in each of the Regional reconciliation tables.

### 16.2.2 Overall Data Quality and Processes

The process for the compilation of the NMS forecast and actual figures is standard across the Regions. These are produced as an output of the rolling Quarterly Business Review (QBR) management processes and are owned by the business planning teams within the Regions.

Network Rail's standard reporting system, PIPS, is utilised as the primary data recording and reporting tool for business planning purposes.

All Regions have processes in place to take unconstrained workbanks (submitted by the Regional delivery teams) to an annual programme, which includes processes for peer reviews and policy inputs from HQ. HQ is responsible for the authorisation of business plans submitted by the Regions and follows its own management processes in the form of peer and deliverability reviews to validate all business plan proposals.

The quality of the source data and information submitted to HQ varies between Regions. Through the peer and deliverability review processes administered at HQ, Overlays are allocated to Regional forecasts to compensate for poor data quality, particularly in the allocation of expenditure across routes, and "optimistic" delivery aspirations.

HQ Overlays fall in to two broad categories:

- Data Collection Overlay: estimated expenditure administered as a result of poor data management in the Regions e.g. the allocation of expenditure across routes;
- Efficiency Contingency Overlay: estimates reflecting shortfalls in Regional ability to meet delivery targets.

Data collection overlays are applied across all renewals categories where appropriate. Efficiency overlays are generally applied to track and signalling renewals where planned expenditure targets are reduced to take into account the deliverability of specific projects or renewals schemes.

The NMS forecast figures are based upon a "snapshot" of one point in time in the QBR process. As such the degree to which the NMS represents the actual internal business plans recognised, and worked to, by the Regions is dependent upon the time period and how close it is taken to the setting of the period 1 Budgets. In 2002 there was a significant time lag between the submission of initial forecast figures from the Regions and final sign-off the budgets. Final budget authorisation was typically not received until three to four months into the reporting period.

### 16.2.3 *Regional Findings*

#### (a) Eastern Region

The 2002/03 Annual Return reports expenditure for East Anglia and London North Eastern separately however only one audit was undertaken for the Region as a whole.

Eastern Region reports a total NMS expenditure of £722m against a forecast of £716m, key variances being greater than forecast expenditure on Maintenance and Signalling renewals, principally in East Anglia Zone. The commentary on these variances provided in the Annual Return concurs with information provided by Regional representatives.

The Region provided a breakdown of forecast and actual expenditure incurred for each of its sub-Regions. Supporting documentation consisted mainly of outputs from BMIS and PIPS. The supporting data validates the actual expenditure figures reported in the Annual Return. The Regional 2002/03 NMS forecast figures were subject to considerable overlays from HQ and movement of allocated budget between asset categories, however these overlays and adjustments are not presented in BMIS outputs which clearly state actual expenditure incurred against Regional budget only.

(b) Scotland Region

The Region provided a reconciliation of its renewal and enhancement expenditure, with clear and defined supporting documentation. The Region report a total renewals spend of £197m against a reported Regional NMS Forecast of £163m. The table below shows the full breakdown of the forecast figures published in the 2002/03 NMS.

£m	2002/03 NMS Forecast				NMS 2002/03	Actual 2002/03
	Regional Forecast	HQ Overlays	WCRM	Major Stations		
Track	43.00	5.05	16.26	0.00	64.32	54.31
Structures	52.39	4.81	3.92	0.00	61.12	92.47
Signalling	32.90	-4.82	2.43	0.00	30.51	31.26
Electrification	3.65	0.00	11.06	0.00	14.72	2.25
Plant & Machinery	3.19	0.00	0.00	0.00	3.19	1.58
Telecoms	8.20	0.00	2.24	3.05	13.48	4.50
Stations	10.51	0.47	0.00	2.17	13.15	4.67
Depots	3.09	0.00	0.00	0.00	3.09	2.30
Lineside	1.48	0.00	0.00	0.00	1.48	2.26
<b>Total</b>	<b>158.41</b>	<b>5.51</b>	<b>35.92</b>	<b>5.22</b>	<b>205.06</b>	<b>195.61</b>
	<b>2002/03 Annual Return</b>					

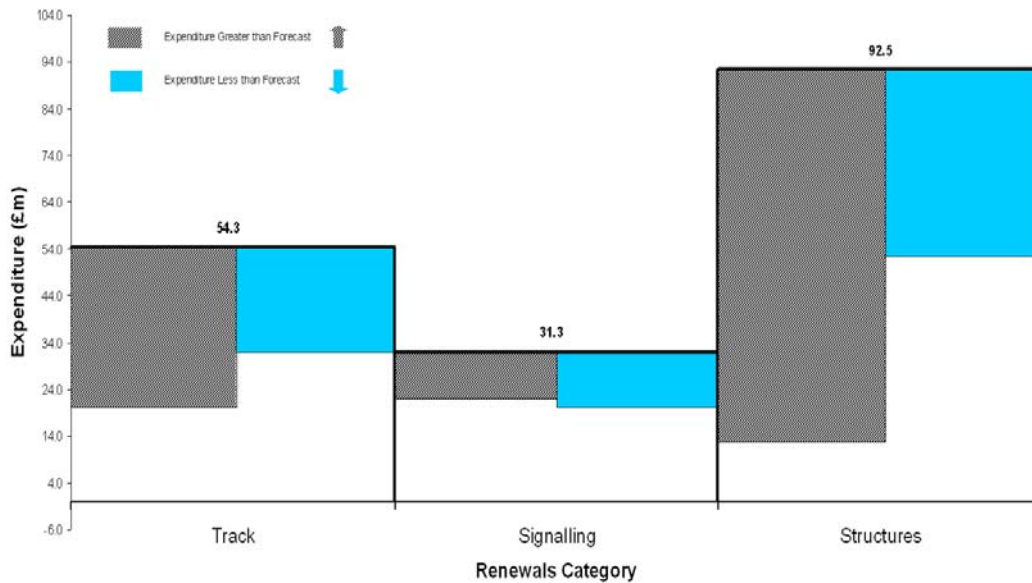
*Table 16.1: A full breakdown of Scotland Region’s NMS Forecast Renewals Expenditure*

Table 16.1 shows that the forecast figures published in the NMS 2002 are the total of the Region’s internal forecasts plus the addition of HQ Overlays, WCRM and Major Stations expenditure. The NMS forecast figure presented in the 2002/03 Annual Return is the total of the Regional forecast and the HQ Overlays – highlighted in yellow in the table.

The table also highlights a HQ efficiency overlay (-£4.82m) for signalling renewals where forecast expenditure was expected (by HQ) to be less than Regional expectations in order to mitigate shortfalls in the delivery of signalling projects. No expenditure was incurred by the Region on WCRM and Major Stations renewals.

As highlighted in Section 14: Activity Volumes, renewals workbanks and associated expenditure levels are susceptible to significant fluctuations during the year. Approximately £112m (57% of the reported total) of expenditure was incurred during the year as a result of new projects not forecast in the original business plan. This was offset by £40m of deferred or deleted work from the original NMS forecasts.

Figure 16.3 below shows the variations in spend for the three key renewals categories, Track, Signalling and Structures. The graph shows the variances incurred above and below NMS forecasts including new expenditure realised during the year and also expenditure deferred. The figures presented are exclusive of any overlays.



**Figure 16.3: Variations in NMS Expenditure**

Costs were incurred for track renewals primarily as a result of additional RCF works unforeseen in the NMS Forecasts. Structures renewals incurred the greatest variances from budget with a total of £76.6m worth of additional activity offset by £40m of work deferred from the original NMS forecasts.

Almost 60% of the total Regional expenditure was incurred across NMS Routes 2 and 14, East Coast Mainline and the Edinburgh to Glasgow, Aberdeen and Inverness lines, of which 65% was as a result of the unforeseen cost increases on Structures renewals.

We cannot reconcile the forecast and actual Enhancements expenditure reported in the Annual Return with the supporting data provided by the Region. The differences between the Regional and the published figures for forecast and actual expenditure amount to 7.4% and 24% respectively.

(c) Southern Region

Southern Region reports a total NMS expenditure of £558m against a forecast figure of £627m. Maintenance accounted for 40.5% of total expenditure with 44.4% on renewals and 15.1% on enhancements.

Regional supporting data validates the actual expenditure figures published in the AR. However the NMS forecast figures for Signalling and Track differ from those found in some of the supporting data provided by the Region suggesting a discontinuity in the reporting process.

16.2.4 *Key Conclusions*

In general Regional representatives demonstrated a good working knowledge of the business systems and processes utilised in the development of the NMS forecasts and the reporting of the year-end actuals. The numbers presented in Section 5 of the 2002/03 Annual Return concur with supporting data provided by the Regions. However the Regions suffer from disparities in the reporting process, the utilisation of unwieldy reporting systems and poor co-ordination in collating key data. This was reflected in the quality of the various data sources and documents provided to the Reporting Team. Furthermore we concluded that:

- The NMS is clearly a document for external consumption and the fact it includes Regional forecasts preceding the finalisation of the Regional budgets implies that Network Rail personnel do not view it as a significant component of the objectives of the business units responsible for asset stewardship. This presents communication and reconciliation issues with the Regions in understanding the derivation of entries in the NMS, and risks misleading external readers if sufficient explanation is not given of the compilation of key figures;
- PIPS is generally perceived as unwieldy for general use and is most successfully utilised where input is limited to one or two individuals who are familiar with the system. It is a key management tool for business planning purposes however the extent and the manner in which it is utilised varies between Regions and therefore accounts for some of the data quality issues raised in the development of forecast figures;
- The development of Route based expenditure in the NMS is seen as adding little value within all the Regional delivery teams audited. The common practice is that the analysis by route of the NMS data is created within the financial process and is not a discrete investment activity. However we support the use of the presentation by route, recognising its value to train operators and other industry stakeholders;
- The allocation of HQ Overlays is not communicated effectively back to the Regions. There is no consultation between HQ and the Regions as to the allocation and

quantity of overlay expenditure thereby forming a gap in the knowledge of Regional investment teams;

- Analysis of Scotland Region's expenditure highlighted the instability of renewals workbanks both in the nature of the physical works but also the expenditure levels. We question whether inefficiencies in the forecasting, management and reporting of activity and expenditure levels are masked by the presentation of the aggregated figures in the Annual Return;
- No tangible insight could be provided by the Regions on maintenance expenditure. This clearly falls outside the control of the Regional representatives audited. It was expected, given the nature of roles and responsibilities held by the Regional representatives, that maintenance expenditure could be explained and verified – this was not the case;
- The commentary provided in the 2002/03 Annual Return varies in quality and clarity. Key variances or significant changes to expenditure levels from last year are not explained adequately, for example there is no explanation given on the 373% increase in Information Technology expenditure from last year;
- Supporting data provided by the Regions varied in form and content to such an extent that the Reporting Team questions the adequacy of the reporting process currently in place. Scotland Region was clearly more proactive in the collation, analysis and management of NMS expenditure than other Regions. This was reflected in the supporting data presented to the Reporting Team and consequently our ability to validate and analyse the data provided. HQ has recognised the issue of data quality and are proactively developing methods of improving and standardising the reporting process however this can only be achieved when root cause problems are tackled such as the efficient use of PIPS and the provision of greater clarity on HQ allocated expenditure;
- Over-zealous rounding of the input data remains an issue. The Reporting Team discovered a number of errors in the application of the rounding methodology used to report the figures in the Annual Return. Although all year-end expenditure concurred with Regional supporting data, sampling of Regional data yielded differences of approximately  $\pm 3\%$ , a significant amount given the magnitude of the numbers presented;
- We are able to reconcile NMS expenditure with track renewals activity for Scotland Region. Given the nature of data submitted by Southern and Eastern Regions we are unable to reconcile expenditure with activity levels;

- The expenditure reported in the Annual Return concurs with that presented in the Regulatory Accounts. There are slight differences between the expenditure statements due to accounting treatments and the allocation of costs, however it must be noted that no in-depth analysis was undertaken on the Regional regulatory statements.

### **16.3 Recommendations**

We have a number of recommendations related to the process for the development of forecasts and reporting of actual expenditure levels in the Annual Return, namely:

- Greater control of budget and baseline figures is required through the establishment of more robust change control and business planning processes;
- The timing of the NMS expenditure audits was in direct conflict with the review and finalisation of the reported year-end figures. This led to significant delays in the receipt of key data by the Reporting Team and also hindered further data analysis. We recommend that in following years the NMS expenditure audits are undertaken directly after publication of the final figures;
- The reporting process requires improvement. HQ should continue with its drive towards the standardisation of reporting processes but it needs to develop a more robust understanding of the reporting problems specific to each Region, rather than adopting a high level approach;
- The utilisation of business planning tools such as PIPS requires review. All Network Rail personnel are of the view that the system is unwieldy and limited in reporting functionality. HQ needs to understand exactly how PIPS could be improved to facilitate a smoother and more accurate reporting process;
- HQ should provide greater clarity on the allocation of overlays not just in the Annual Return but also in the NMS;
- The audits were carried out under the expectation that the Network Rail staff audited would be able to provide robust information on all aspects of the NMS expenditure outputs including maintenance. The fact that this was not the case is cause for concern from both an auditing and a Network Rail process perspective. For the purpose of the 2003/04 Annual Return it is recommended that Network Rail address this matter urgently;
- The development of NMS expenditure forecasts requires greater alignment with the reporting cycle. Ideally NMS forecasts should be a true reflection of finalised Regional budgets at period 1 of each reporting year;

- The process of reporting route-based expenditure requires improvement. Although Network Rail personnel were found to question the value of presenting the data in this form, the Reporting Team believes transparency of expenditure is vital for other rail industry stakeholders. Currently the process is time consuming and inefficient, often compromising data quality which in turn requires further attention and resources from HQ.



## 17 Customer Reasonable Requirements

### 17.1 *Audit Scope*

Audits were undertaken in East Anglia, LNE, Scotland and Southern Regions in order to assess the Customer Reasonable Requirements data presented in the 2003 Annual Return. The audits focused upon four principal areas:

- Data records – the accuracy of the records within the Regions, HQ and between HQ and the Regions;
- Recoding process – the process of managing Customer Reasonable Requirements (CRRs) from the creation to the conclusion of items;
- The nature of CRRs – sampling of the type of activity encompassed within CRRs;
- The relevance and value of the measure – subjective discussion of the function of CRRs within the management task of Network Rail.

### 17.2 *Audit Report*

#### 17.2.1 *2002 Audit Follow Up*

The recommendations in our Report on Network Rail's 2002 Annual Return for CRRs are set out briefly below with summary comments on progress made during 2002/03.

2002 Report – CRR recommendation	2002/2003 – Progress
CRRs to be presented in writing	It was found that CRRs are now presented in writing.
A CRR pro forma to be created for recording	A robust process has now been created by HQ for recording and managing the CRRs. It is set out in section 5.1 of the Commercial Manual (last revised in February 2003). The process has been introduced retrospectively for this audit period and is now used by all Regions for recording and reporting CRRs. The SMART-f test is applied to determine the status of a request for inclusion as a CRR.
A database to be developed outside PIPS	This database was created and is now held and managed by the HQ Commercial Development Team.
There should be a customer sign off process	This is now a requirement, although for the 2002/03 reporting year compliance has not been total, but separate records do exist where CRRs have been either withdrawn or completed.
The database should be used for signing off the Annual Return data	The database has provided the sign off figures for the Annual Return.
The relevance of CRRs to be considered, particularly with respect to the Local Output Statements (LOS)	This remains an issue – see comments in Section 17.2.5 (a) below particularly with the creation of the Local Output Commitment (LOC) to replace the LOS.
A measure of Customer Satisfaction should be developed	Network Rail does conduct a very broad ranging “Customer Survey” annually with six monthly updates using an independent polling organisation (MORI).

**Table 17.1: Follow up of 2002 Audit Recommendations**

*17.2.2 Compliance with Procedures*

Our audits indicated that all Regions now use the procedure and pro forma outlined in Section 5.1 of Network Rail’s Commercial Manual. The process was introduced during 2002/03 and applied retrospectively to the start of the year.

*17.2.3 Data Accuracy*

The retrospective application of the new process has introduced problems between the Regions and HQ in determining the starting figure for the year where CRRs have been concluded at or near the 2001/02 year-end. Reconciliation has been carried out as part of the 2002/03 sign off process and the differences were reconciled as part of the audit. Network Rail has included explanatory remarks in Section 6 of the Annual Return.

The trend last year of a reducing number of outstanding CRRs continues (403 at the start of the year compared to 161 at the year-end), with a significant number being withdrawn rather than

completed during the year. This was as a result of the more rigorous application of the SMART-f test. Forty-four new CRRs were submitted in 2002/03 compared to 70 for 2001/02.

#### 17.2.4 *Regional Variations*

##### (a) East Anglia

Our audits indicated that the Region is compliant with the process. It has actively reduced the number of CRRs, which hides the significant amount of work carried out as part of the routine TOC account management activity. The local control of CRRs is incorporated within a master investment planning spreadsheet.

##### (b) London North Eastern

CRR management is split between the two principal business units, which are both compliant with the process. The GNER and Hull trains account manager uses the CRR process as the local management process. The Arriva business manager, with currently a very low number of outstanding CRRs, is focusing on developing the LOCs with the PTEs as a more valid measure of activity.

##### (c) Scotland

The Region is fully compliant with the process with the prime user being Strathclyde PTE who are keen to track their requests. Each step in the planning process is separately identified for enhancement CRRs. The reporting of CRRs is done outside the master investment planning spreadsheet. This spreadsheet gives a more complete picture of activity with the customer, and the CRR report essentially duplicates the information.

##### (d) Southern

The Region is compliant with the reporting process; however, the reports are again abstracted from the individual account management procedures. Each account manager champions his or her own CRRs. It is suggested that the partnership approach to customer relationships currently being created across the Region is removing the need for creating CRRs. Many of the “process” CRRs will become part of the LOCs.

#### 17.2.5 *Comments*

##### (a) The Measure

CRRs were introduced as a measure to ensure that Network Rail meets its obligations under Licence Condition 7 - to comply with all reasonable requests from customers to undertake work on the network. CRRs as currently defined produce a very narrow view of the activities Network Rail is actually performing for its customers.

All Regions have broadly similar processes for regular liaison with their customers of which CRRs form generally a very small part. It is known that many aspirational issues are discussed in the process of the “pre-feasibility” activity of project development. This activity is not recorded and is regarded by most Regions as part of the “day to day” account management. All Regions

state that their approach to the creation of CRRs is determined by the attitude of the particular customer. It is noted that PTEs and the freight companies are particularly keen users of the process whereas passenger train operators are less so. It is recognised that there are reasons for this associated with the current stage of many franchise lives.

Discussion with the Regional representatives suggests that customers only request items as CRRs when they have no other way of ensuring delivery. The TOCs in particular have recourse through their Access Agreements to obtain information and action. All Network Rail staff interviewed recognised the value in having a measure of the activity to demonstrate that their obligations to customers were being met. The development of the LOC was cited by several as a source for future assessment, subject to the degree of support given to it by customers.

(b) Analysis

The policy of reducing the number of ill defined and aspirational CRRs has continued from 2001/02. There is evidence that the new submissions are more tightly defined, although the depth of definition applied varies between Regions. Examples range from route clearance for rolling stock to specific station enhancements.

The Annual Return reports 44 new submissions but the effect of the footnote, confirmed from the Regional audits, states that only 30 were actually submitted during the year. The others were submitted in 2001/02 but not registered until 2002/03, including 11 from one customer.

This continuing reduction in CRR numbers is not reflected in the local investment control documentation and hence the actual level of activity within the Regions. The decline in activity from train operators has been partially offset by increased activity from the PTEs.

(c) Process

The process established for the recording and monitoring CRRs is now in common use, however the Regions generally compile the list of CRRs as an abstract of other project monitoring processes (PIPS, PMCS and various local control documents). It cannot therefore be regarded as an “embedded” process that assists the Regions in their management of activities for their customers but is an “overlay” return submitted to Headquarters.

The SMART-f process is recognised as a useful tool to define a CRR. It is however a valid tool in the early stages of any project development and not unique to CRRs.

17.2.6 *Key Conclusions*

- The measure represents a very narrow view of the activity Network Rail conducts in response to its customers;
- The refinement of the process has itself contributed to the narrowing of the measure;

- The process, whilst now standard across the Regions, is viewed as an addition to the management of customer relationships and is not central to it;
- The reporting of the numbers of CRRs alone provides no information on the nature of the relationship or activity level between the customer and Network Rail. It is, however, very important that a view be provided of that relationship and activity level, in which CRRs can play a part;
- The LOC appears to represent the next step in the refinement of the relationship, incorporating a broader range of activities and objectives that will permit independent assessment of achievement both quantitatively and qualitatively.

### **17.3 Recommendations**

- It is recommended that the HQ and Regional processes be examined to remove the need to abstract data specially to report the progress with CRRs;
- We recommend that the measure be widened to incorporate the LOC achievements as a measure of Network Rail's management of its customer relationships;
- It is suggested that early discussions be held between ORR, Network Rail and the Rail Reporters to develop the customer responsiveness measures as part of the creation of LOCs;
- With the continuing decline in CRRs and the creation of different forms of customer account management, future audits should include a review of the processes used and include the opportunity to sample customer opinion.

## 18 Conclusions

### 18.1 *Introduction*

This report has been prepared on the basis of our Reporting Team's audits, investigations and analyses of the measures presented in Network Rail's 2003 Annual Return to the Office of the Rail Regulator.

Audits were carried out in Eastern, Scotland and Southern Regions and at Network Rail Headquarters. Eastern Region officially operated as one Region during the 2003 reporting year although for most measures the actual management and data collection remained divided between the component parts, East Anglia and LNE Regions. Therefore audits were carried out in both the East Anglia and LNE where necessary.

In this report we have provided our findings, analysis and recommendations for each of the measures, presenting Regional variations where applicable. We have commented on the following aspects:

- The reliability and accuracy of the data presented in the 2003 Annual Return, paying particular attention to the source of the data and Network Rail's compliance with set procedures;
- The methods by which Network Rail have measured, collected, prepared, analysed and included the data in the 2003 Annual Return;
- The usefulness and significance of the Annual Return to demonstrate the effectiveness of Network Rail's management of the assets, and to indicate where the measures might be developed;
- The underlying trends in the stewardship of the rail network shown by the condition, operational performance and renewal of the assets; and
- Network Rail's compliance with regulatory targets.

### 18.2 *Key Findings*

#### 18.2.1 *Accuracy and Reliability*

The data presented in the 2003 Annual Return has, on the whole, been collected and processed in a diligent manner.

While the Annual Return allows broad conclusions to be drawn, there are various shortcomings of the measures, described in detail in Sections 4-17, which, if addressed, would improve the

accuracy and reliability of the data and enable more reliable comparisons between Regions and performance overall year-on-year.

There is potential for the inconsistent application of condition assessments for Bridge, Signalling and Electrification assets between and within Regions. The subjectivity of the assessment tools themselves could allow different interpretations thus producing different scores. This is further exacerbated by the lack of internal auditing and checking.

Some of the measures requiring condition assessments only yield realistic results because of the experience and detailed knowledge of the engineers carrying out the assessments. Contingency measures must therefore be in place to ensure sufficient training and the transfer of this knowledge. Our audits revealed that there are not always processes in place to ensure this.

#### *18.2.2 Compliance With Procedures*

Network Rail generally comply with the procedures and guidance for the monitoring, collection and collation of the Annual Return data as agreed by the Rail Regulator. There are minor deviations that do not materially affect the reported data. However, as noted above, there are shortcomings in internal auditing and checking for some of the measures, which is a cause for concern.

#### *18.2.3 Audit Process*

Network Rail have co-operated fully with the Reporting Team, providing relevant information and giving adequate time to the audit process. The audits were well organised and assistance was provided throughout.

In general requests from the Reporting Team for data were responded to positively. However, the operational performance and signal failures data was not provided at the time of the audits. This was because the data is subject to 'refreshes' to incorporate updates to delay attribution, which were due to occur after the time of the audits. As the data could not be analysed it was not possible to discuss and investigate changes, trends and the underlying explanations during the Regional audits. If the most recent periodic data were provided in advance, it would give a reasonable indication of the trends compared to the previous year and enable a fuller discussion and investigation to be held in the Regions. Similar problems were experienced with NMS expenditure data. Final sign-off of the expenditure and regulatory statements from HQ were significantly delayed hindering discussions and analysis of the figures presented with HQ personnel.

#### *18.2.4 Regulatory Targets*

Regulatory targets are set out in the Annual Return along with statistical tolerances which take account of the statistical 'noise' associated with the measures. No regulatory target is set for freight delay minutes, rail defects, track geometry speed band data, temporary speed restrictions or station facility score. A baseline target level has not yet been set for the bridge, signalling and

electrification condition measures but will be established during the second control period once sufficient sample sizes are obtained.

Performance against regulatory targets set out in the Annual Return has not changed significantly in the 2003 reporting year compared to 2002.

The following measures have not met the regulatory target and are outside the statistical tolerance in both 2002 and 2003:

- Delay minutes per 100 passenger train km;
- Seven of the 12 track geometry standard deviation measures;
- Number of signalling failures.

The following measures have not met the regulatory target but are within the statistical tolerance in both 2002 and 2003:

- Number of electrification failures - OHLE; and
- Station condition index – average condition grade.

The following measures have met the regulatory target in both 2002 and 2003:

- Number of broken rails;
- Five of the 12 track geometry standard deviation measures;
- Track geometry level 2 exceedences; and
- Electrification failures – conductor rail.

### **18.3 Recommendations**

Detailed recommendations are included within Sections 4-17 of this report which deal with each of the measures individually. These recommendations provide specific guidance to Network Rail with regard to improving the quality of the data, for example through improved checking and auditing and increased resource capability and competence. We also present recommendations in Sections 4-17 for the improvement and development of the measures in order to provide a more meaningful and reliable representation of the condition of the assets and Network Rail's performance.

#### **18.3.1 Priority of Measure Recommendations**

While attention should be given to all of the recommendations set out in Sections 4-17, the following are those which the Reporting Team regard as a priority:

#### **Operational Performance/Signalling Failures**

- There should be a final reconciliation between FRAME and delay attribution.



### **Broken and Defective Rails**

- Immediate action is required by Southern and EA Regions to address the issue of limited confidence in the period reports from one IMC's reporting system;
- Network Rail personnel should be allowed read only access to IMC systems for monitoring purposes within Network Rail offices;
- The reporting of continuous rail defects requires immediate attention. The treatment of ex-RCF sites, currently viewed as live under the requirements of Network Rail, requires closer scrutiny to ensure that these numbers are not included in the reported 'defects remaining' figures;
- Network Rail HQ, LNE and its primary IMC should actively pursue the issue of continuous rail defect reporting in order to provide robust figures for the 2003/04 Annual Return;
- Network Rail HQ should conduct a significant review of the IMC reporting processes to ensure that existing problems are resolved and do not impart a margin of error on the data uploaded to Raildata 2.

### **Track Geometry**

- Processes should be developed to help Network Rail verify the extent to which the track inspection plan is completed in order to ensure that all track is inspected to the required standards and delays to the inspection regime may be minimised through ongoing monitoring by appropriate HQ personnel;
- Standard deviation and Level 2 Exceedence data should be presented without the distortions imparted by S&C measurements. It should be noted that whilst the S&C analysis provided by Network Rail and the Reporting Team in this report is indicative only, there remains a need to provide a more accurate reflection of overall track quality which requires more detailed scrutiny at Regional levels.

### **Bridge Condition Index**

- There is an urgent need to provide continuous support in SCMI to all involved but particularly to the examiners in the field to improve the accuracy of SCMI labelling and marking. This requires personnel experienced in SCMI. The lead needs to be taken by Network Rail and the process driven though proactively by them;

- Regular site re-scoring should be undertaken by Network Rail in all Regions and the results fed back to the Examinations Contractor and diligently followed through. It is important that the re-scoring should aim to cover the work of all examiners somewhere in the cycle;
- In East Anglia and Scotland Regions the Network Rail staff positions allocated in the reorganisation (Org 1) which are vacant need to be filled as a matter of urgency;
- In areas of competency assessments and training the coverage is patchy and further efforts are required in all Regions. Further work is needed to create a Competency Management System in some Regions.

### **Signalling Condition**

- Internal audit of the SICA assessments should be undertaken to check for accuracy and for consistency across Regions and practitioners as stated in the ARM;
- The shortcomings we have identified in the SICA tools should be investigated and addressed, particularly the scope for differing interpretations of questions, omissions from the tools, the questions that are not split to refer to individual elements and caveats to the condition scores given.

### **Electrification Condition**

- There should be more internal auditing and checking of condition assessments to ensure consistency within and across the Regions;
- Investigation should take place into possible modifications to the condition assessments to ensure that all elements affecting the condition are assessed and that all information available is used.

### **Station Condition Index**

- More emphasis should be placed on ensuring that a reasonably representative (by Region and station category) 20% sample inspection programme per annum is carried out;
- Checking and auditing of inspections data should be improved;

### Station Facility Score

- Investigation into the development of the measure to make it more meaningful should take place;
- The checking and auditing procedure should be improved.

### Activity Volumes

- Greater control of budget and baseline figures is required through the establishment of more robust change control and business planning processes;
- The use of the various management reporting tools such as PIPS and PMCS requires review and standardisation to aid consistency in the reporting process. Both Regional and HQ personnel described these systems as unwieldy and difficult to use. We believe these are key drivers behind the disparity observed in the reporting processes between Regions;
- The reporting of maintenance volumes within the Region requires immediate review. This has already been highlighted by HQ personnel however there are no immediate measures in place to resolve the situation. The definition of what constitutes reportable maintenance activity has also led to some confusion within the Regions. Section 2: Definitions, of the ARM was updated in November 2002, stating that both maintenance and renewals should be included in the reporting process however there is no clear indication what constitutes a maintenance activity nor is there any reference to the specific reporting of maintenance volumes in Section 3: Procedures of the ARM;
- There is a desire expressed by all Network Rail personnel to review and refine the definition of signals and bridges renewed to provide a more adequate reflection of the level of activity undertaken. For signalling the use of Signal Equivalent Units as a driver towards the measurement of renewal activity should be explored in greater detail.

### NMS Reconciliation

- Greater control of budget and baseline figures is required through the establishment of more robust change control and business planning processes;
- The reporting process requires improvement. HQ should continue with its drive towards the standardisation of reporting processes but it needs to develop a more

robust understanding of the reporting problems specific to each Region, rather than adopting a high level approach;

- The utilisation of business planning tools such as PIPS requires review. All Network Rail personnel are of the view that the system is unwieldy and limited in reporting functionality. HQ needs to understand exactly how PIPS could be improved to facilitate a smoother and more accurate reporting process;
- HQ should provide greater clarity on the allocation of overlays not just in the Annual Return but also in the NMS;
- The audits were carried out under the expectation that the Network Rail staff audited would be able to provide robust information on all aspects of the NMS expenditure outputs including maintenance. The fact that this was not the case is cause for concern from both an auditing and a Network Rail process perspective. For the purpose of the 2003/04 Annual Return it is recommended that Network Rail address this matter urgently.

#### 18.3.2 *General Recommendations*

The following general recommendations were provided in our report on Network Rail's 2002 Annual Return and have not yet been acted upon:

- We recommend that the ARM be extended to include details of standards and processes applying to all the measures reported in the Annual Return to more readily ensure consistency and quality control, processes and reported information;
- We recommend that, notwithstanding Regional differences, standardisation of information gathering and reporting systems at the source of the data should be standardised and automated and duplicate entry of data minimised. The process should also ensure facilitation of sharing of best practice across Regions and IMCs;
- We recommend that the ARM incorporates a record of changes to procedures in order that where reported measures change between years, data is presented in a consistent format to validate performance trends.

We would like to make the following additional recommendations:

- We recommend that internal audit and checking procedures be reviewed and enhanced to ensure that they are sufficient to ensure consistency in reporting. This is an issue across many of the measures, particularly those relating to condition assessment;

- We recommend that the most recent version of data be provided in advance of the audits for all measures in order that meaningful discussions about the data and trends can be held during the audit meetings;
- The issue of training and knowledge transfer should be addressed now to ensure that the detailed knowledge and expertise that enable reliable condition assessments remains within Network Rail.