Rail Reporter Project

2003 Annual Return
Final Report Volume 1

August 2003

Halcrow Group Limited

Network Rail

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ORR and Network Rail

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Contents Amendment Record

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GLOSSARY

2001	Year ending 31st March 2001 = 2001 reporting year
2002	Year ending 31st March 2002 = 2002 reporting year
2003	Year ending 31st 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

0   Executive Summary

0.1   *Reporter's Scrutiny and Opinion*

In accordance with its Licence Condition 24, Network Rail has appointed Halcrow Group as Reporter A to provide reporting services to the Office of the Rail Regulator (ORR) on its Annual Return for Scotland, Eastern and Southern Regions together with associated Headquarters functions.

This report presents our views and analysis of Network Rail's 2003 Annual Return to the ORR. It follows our report on the 2002 Annual Return, the executive summary of which can be found on the ORR website.

The Reporter, Jon Bateman, and the Reporting Team of technical and operational specialists have visited each of the three Regions and Network Rail HQ in order to draw conclusions regarding the following:

- The reliability and accuracy of the data presented in the 2003 Annual Return, paying particular attention to the source 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 measures reported in Annual Return to demonstrate the effectiveness of Network Rail's management of the assets including where they might be developed;

- Any underlying trends shown by the measures of condition, operational performance and renewal of the assets and how these relate to the stewardship of the rail network; and

- Network Rail's compliance with regulatory targets.

Our audits and analysis of the data provided enable us to present the following findings:

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

- Network Rail generally comply with the procedures and guidance for the monitoring, collection and collation of the Annual Return data as agreed by

the Regulator. There are minor deviations although these do not materially affect the reported data. However, there are shortcomings in the internal auditing and checking of some of the measures which is a cause for concern;

- There is potential for inconsistent assessment of condition for Bridge, Signalling and Electrification assets between and within Regions. This is further exacerbated by the lack of internal auditing and checking;

- While the Annual Return measures give a high level view of performance, we note that there is potential for some developments in the measures which, if carried out, would allow a more detailed and reliable assessment of Network Rail's performance;

- The accurate reporting of asset condition assessment measures is reliant on the experience and specific, independent knowledge of the engineers carrying out the assessments. Measures must therefore be established to ensure sufficient training, transfer of this knowledge or improved structuring of the assessment processes to reduce this reliance.

Network Rail have co-operated fully with the Reporting Team, providing relevant information and giving adequate time to the audit process.

0.2   Reporter's Overview of the 2003 Annual Return

0.2.1   Introduction

Our audits took place contemporaneously with Network Rail's compilation of their 2003 Annual Return in May and June 2003 (after the data for the year ending 31st March 2003 was collected). This enabled the Reporting Team to examine the data at various stages in the collation process. However, some data was not available at the time of the audits limiting the level of investigation and verification that could be undertaken in the Regions.

Our 2003 audits focussed on the following aspects:

- Verification of the source data for the reported measures with visits to "front line" Network Rail and IMC personnel and site visits to verify the primary data;

- Verification of the full reporting process covering:
  ➢ Investigation into the reliability of condition assessments;
  ➢ Examination of resource and competency constraints;
  ➢ Assessment of compliance with procedures;

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- Evaluation of the effectiveness of the measures within the Annual Return to demonstrate the condition of the assets on the network and the performance of Network Rail;

- Review of our 2002 Report findings and recommendations.

We provide below specific conclusions and observations. A detailed commentary of our findings for each section of the Annual Return is presented in our main report. We provide recommendations on how some measures could be further refined to more accurately reflect the condition of the network. We also give guidance designed to aid Network Rail to improve the reliability and accuracy of the data.

0.2.2   *Regional Effects*
At the time of our audits Network Rail were implementing the new "Org 1" organisational template in the Regions. The Regions had undergone or were imminently due to undergo this organisational change and our audit programme was structured to mitigate any conflicts of staff availability. This did not have any adverse affects on the audits and Network Rail personnel were present at the meetings to provide sufficient information, data and evidence for our reporting purposes.

We note that measures presented in the Annual Return have limited normalisation between the Regions to take account of differing characteristics, number of assets, traffic volumes and types. This should be taken into consideration when carrying out Regional comparisons.

0.2.3   *Regulatory Targets*
No new regulatory targets have been established in the 2003 Annual Return. Performance varied by measure with eleven of the reported measures failing to meet target. These included signalling failures, OHLE electrification failures, station condition, delay minutes per passenger train kilometre and seven of the twelve track geometry measures (principally relating to vertical geometry standards). We note, however, that the reported values for station condition and OHLE failures are within the statistical tolerances for reporting. Measures which met targeted performance were broken rails, track geometry Level 2 exceedences, conductor rail failures and five of the track geometry measures (all relating to horizontal geometry standards). Ten of the reported measures showed an improvement against 2002 performance.

0.2.4   *Reporter's Conclusions by Measure*
It was agreed with the ORR and Network Rail that audits should explore a sufficient breadth of issues to fulfil the independent reporting requirements, however it was also agreed that the Reporter's scrutiny would be more focussed on asset condition and performance measures deemed particularly critical to the operation of the network.

The detail of the audits and analysis varied accordingly by measure, however all are considered within this report.

We provide below a summary of our key findings for each measure.

Overall **Operational Performance** has worsened some 10% between 2002 and 2003 but has not returned to the low levels of 2001. Part of this increase is attributable to some changes in the reporting process, however reported performance has worsened significantly in many categories. Over the whole network the three highest increases in delay from 2002 to 2003 were in 'track circuit failures due to leaf fall' which increased 425%, 'external fires' which increased 128% and 'commercial: dispute take-back' (which is the delay originally attributed to Train Operating Companies (TOCs) but reallocated to Network Rail following the dispute resolution process) which increased 118%. The three largest decreases from 2002 to 2003 were in the categories of 'rolling contact fatigue' which reduced by 75%, 'commercial responsibility: other' which decreased by 41% and 'unexplained delay' which decreased by 19%.

The Regions have made significant progress improving resource and competency levels in delay attribution which has improved data quality. However, the significant variations in year-on-year delays for a number of different delay codes suggests volatility and potential inconsistency in the delay recording systems, rather than wholly supporting variations in asset condition. Network Rail have separately provided reasons for some of the increases and decreases.

We have noted that the IMCs are able to change attribution between causes, potentially leading to inaccuracies in attribution between codes although we have seen no evidence to suggest that incorrect attribution is taking place. This does not affect the total amount of delay reported however we suggest that Network Rail monitor the situation closely.

Network Rail's commitment to reduce the number of **Broken Rails** across the network has once again resulted in a significant decrease in rail breaks. During the 2002/03 reporting year, a total of 444 breaks were reported, which is some 37% better than the regulatory target and represents a 17% decrease against the 2001/02 figures. This reduction has been achieved through the continued application of focused management processes across the Regions.

The number of **Rail Defects** remaining in the track is comparable to last year. The levels of utilisation of Ultrasonic Testing Units and inspection regimes in the Reporting year have not changed significantly compared to the 2002 reporting year. Accordingly there is no material change in the levels of rail defects detected in 2002/03. It is expected however that over the coming year new technology and more frequent testing will lead to an increase in the level of rail defects detected. There have been no

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significant changes to the management of rail defects within the Regions and we note that issues of data quality and consistency reported in our 2002 report are still apparent.

There are twelve regulatory targets for standard deviations (SDs) of **Track Geometry** data. In the 2002/03 reporting year, five of the twelve targets were achieved (all relating to horizontal alignment) with overall track quality improving marginally on 2001/02 figures. The reported data includes details of combined geometry measurements for switches and crossings (S&C) and plain line. We note that S&C measurements have a large effect on overall performance for both SDs and Level 2 exceedences. Our review indicates that for SD measurements both plain line and S&C trends were consistent whilst Level 2 defects in S&C measurements decreased more significantly than those reported for plain line. Overall performance for reported Level 2 defects improved by more than 10%. We note, however, that reported Level 2 exceedences have been affected by a small error in track twist measurements caused by technical problems with the recording and measurement systems.

The number and severity of **Temporary Speed Restrictions** reported in the 2003 Annual Return have decreased over the whole network compared to 2002 except in the case of the severity score for earthworks TSRs which has increased by 6%. We are confident that the methods of data collection for the TSR measure yields reliable results, although through checking the audit trail from the Annual Return data back to the source data we identified some minor discrepancies and cases of missing source data. We recommend that the Regions undertake more rigorous checks of their data and ensure that source data is available for verification. We note that whilst the score for this measure has decreased, the overall delay and the number of incidents caused by TSRs has increased.

A total of 6,691 **Bridge Condition Index** assessments are included in the Annual Return with an average condition grade of 2.0 (grade 1 being good, grade 5 being poor condition). There is a significant lack of internal audit to ensure consistency within and between the Regions. We noted that only one Region (Southern) carried out routine re-scoring checks of the condition assessments. The results of the re-scoring revealed that there were a number of inaccuracies in labelling and scoring and cases of examiners misunderstanding guidelines in the Structures Condition Marking Index (SCMI) handbook. There are resource and support deficiencies in the majority of the Regions visited in addition to shortcomings in the training and competency of staff. The Reporting Team's assessment of the accuracy and reliability of this condition assessment is low.

SCMI examinations to be included in the Annual Return are programmed over a 6-year period. Progress against programme to date shows that 39% of the programmed results for East Anglia Region were in the SCMI database at the time of the 2003 Annual Return collation, 32% for LNE, 78% in Scotland and 65% in Southern Region.

Due to the shortcomings in the data and the relatively small sample size currently included in the Annual Return in relation to the overall bridge stock, comparisons and trend analysis have not been carried out.

Signalling Failures have increased in all Regions visited except Scotland. A proportion of the increase is associated with disruption due to the installation of Train Protection Warning System (TPWS) equipment. Signalling failures are extracted from the operational performance data and thus there are the same concerns regarding volatility. We have also identified that when the IMC's fault recording system is updated following investigation into the cause of an incident, there is not necessarily a final reconciliation between the IMC's fault recording system and Network Rail's delay attribution. The measure does not allow for Regional comparisons as it is not normalised by the differences in asset characteristics, number of assets or volume of traffic.

The average **Signalling Condition** grade using all types of assessment carried out between 2000/01 and 2002/03 is 2.4 (grade 1 being good, grade 5 being poor condition). This is a slight improvement of the grade 2.5 for the years 2001-2002, however there are concerns regarding the robustness of the data. While the Regions diligently collect the signalling condition data, there are no mechanisms in place to ensure consistency between the Regions, within Regions and between the outputs of different methods used for arriving at a condition grade. There are shortcomings in the condition assessment tools including ambiguities in interpretation, caveats and dependencies to the scores which are not shown in the Annual Return data or reflected in the score and exclusion of some elements which are considered fundamental to a robust assessment by the Reporting Team. Caution should therefore be exercised when using the data. The assessment relies to a large extent on the practitioner's experience and detailed knowledge of the assets. At present there are limited formalised knowledge and skills transfer processes in place to address the long-term implications of this.

The number of **Electrification Failures** reported is relatively stable compared to previous years, although only those that cause delay of 500 minutes or more are included. The Reporting Team noted that the processes set out in the Asset Reporting Manual are generally complied with and reported failures are adequately recorded, monitored and checked in the Regions by the electrification engineers. The electrification engineers do however rely upon the operational performance data for the number of minutes attributed to each failure. We note that failures in plant and machinery are not reported upon in the Annual Return although they may significantly contribute to the delays on the network.

For the four **Electrification Condition** measures, the condition grades have improved slightly over the 3 years reported and currently range between 1.8 and 2.1 (grade 1

being good, grade 5 being poor condition). In general the Regions are on target to complete the total number of assessments required over the 5-year control period. Electrification Condition assessments presented in the Annual Return are considered generally reliable and are collected using set procedures, however we note that the accuracy is reliant on the detailed "local knowledge" and experience of the engineers who currently carry out the assessments. Network Rail should take action to ensure effective transfer of this knowledge. The assessments are partly subjective by nature and there is a lack of internal audit to ensure consistency within and between Regions. Plant is not included although it constitutes a significant proportion of the electrification equipment.

The average **Station Condition Index** for all stations for 2000/01 to 2002/03 is 2.25 (grade 1 being good, grade 5 being poor condition). Reporting procedures are generally complied with although there was some lack of checking of surveys. The station condition score gives equal weighting to all the different elements included in the assessment irrespective of their actual impact on customer perception and risk to operations and all stations are subject to the same assessment regardless of size. The data collection process will be improved in the future by the introduction of new technology.

The **Station Facility Score** for the whole network has improved from the index of 100 set in 2000/01 to 102.7 in 2002/03 although the changes vary by station category and theme. However, the Reporting Team consider that the station facility score is weak in many aspects, particularly as it does not give any indication of the availability, quality, condition or usefulness of the facilities. However, the Regions generally collect the data in a diligent manner.

The **Activity Volumes** reported are based on renewals projects undertaken by each Region during the reporting year. Projects are grouped into workbanks for each renewals category, representing a defined scope of works for each reporting year. During our audits we found that the proposals contained in the workbanks are changed during the year leading to a significant difference in the actual work carried out against the original NMS forecast, despite consistency in overall volumes. Across the network, rail renewals volumes have fallen from last year reflecting improved control of rolling contact fatigue. Volumes of switches and crossings, structures and signalling renewals have all increased significantly. The majority of signalling renewals were undertaken for the West Coast Route Modernisation programme. Scotland, Eastern and Southern Regions report a nil return for signalling renewals.

Analysis of various renewals categories suggests that there is scope to refine the definition of the renewals measures to give a more appropriate indication of the level of activity undertaken across the network. This applies particularly to signalling and

bridge renewals, where the definition of the measures does not reflect partial renewal or life extension works for these asset categories.

Overall, the processes and procedures administered within the Regions were deemed to comply with the requirements set out in the Asset Reporting Manual. The accuracy of the numbers presented in the Annual Return suffers from minor shortcomings however, based on the data provided by the Regions, we believe the figures presented reflect the levels of activity undertaken by the Regions.

Data consolidation exercises on GEOGIS (Geography and Infrastructure System) have lead to the presentation of revised baseline figures across all **Network Capability** measures. No physical changes to the network were reported during the 2002/03 period.

In the **NMS Reconciliation** Section of the Annual Return an increase in maintenance and renewals expenditure by 24% from 2001/02 is reported which is partly offset by a 7% decrease in enhancement expenditure yielding an overall increase of 17%. Track and signalling expenditure has risen by 23.5% compared to 2001/02 levels and 18.6% against forecast. As planning of NMS expenditure is based on renewals workbanks, the actual expenditure is subject to the same variability as activity volumes with considerable variance of actual works compared to planned. This raises concerns over the robustness of the expenditure planning and control process. The data presented in the Annual Return concurs with supporting evidence from the Regions.

The number of live **Customer Reasonable Requirements** has been reduced to 161 at April 2003 from 403 at April 2002. CRRs are included in the Annual Return in order to show Network Rail's relationship with their customers. Network Rail comply with the procedures for administering CRRs, however CRRs are not used widely by all of the customers and thus the measure does not fully demonstrate the effectiveness of those relationships.

1 Introduction

1.1 *Background*

As part of the Rail Regulator's Periodic Review of Network Rail's Access Charges, a number of changes were to be implemented for the Control Period 2001-2006 (CP2).

The Regulator has implemented improvements in the information reporting arrangements of Network Rail through modifications to Network Rail's network licence. In summary, Network Rail are required:

- To prepare more detailed regulatory accounts which are consistent with the basis on which the price controls are established;
- To ensure that enhancement expenditure is separately reported alongside information on those enhancements implemented;
- To appoint Reporters (chosen by the Regulator in consultation with Network Rail) to provide an independent assessment of the robustness of Network Rail's information submissions; and
- To provide an Annual Return (plus some monthly returns) in which data is reported for the previous year and compared with both historic and baseline data underlying the periodic review.

In accordance with these requirements, Network Rail now produce an Annual Return which contains data on operational performance, asset condition and serviceability, activity volumes, network capability and customer reasonable requirements and reconciles the forecast expenditure set out in the Network Management Statement against actual expenditure.

Halcrow was appointed as one of two Reporters for the network on 8th October 2002 and is described as Reporter A. The role of Reporter A is split into 2 parts:

- Part A: Report to the Rail Regulator on Network Rail's Annual Return for Scotland, London North Eastern, East Anglia, and Southern Regions and Network Rail HQ;
- Part B: Report to the Rail Regulator on Network Rail's Asset Register.

This report refers to Part A and is our second report on Network Rail's Annual Returns, covering the 2002/03 financial year.

1.2 *Scope*

Our objectives for the audit of the 2003 Annual Return were as follows:

- To assess 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. This included visiting Network Rail staff and contractors, carrying out site visits to verify the primary data and assessing the reliability of the condition assessments;
- To examine the methods by which Network Rail have measured, collected, prepared, analysed and included the data in the 2003 Annual Return. This involved examining the full reporting process from the source of the data, through the collection and collation processes, to the data finally presented in the Annual Return which included the following:
  - Investigation into the reliability of condition assessments;
  - Examination of resource and competency constraints;
  - Assessment of compliance with procedures;
- To gauge the usefulness and significance of the Annual Return in demonstrating the effectiveness of Network Rail's management of the assets;
- To study the underlying trends in the stewardship of the rail network shown by the condition, operational performance and renewal of the assets; and
- To assess Network Rail's compliance with regulatory targets.

We have reviewed, in detail, all data provided by Network Rail and have structured our assessment of the Regions around a framework of key performance parameters including procedures and best practice, data collection and quality, system quality and resource levels.

The aim of the audit of the Annual Return is not only to verify the data and the processes used to collate the data and confirm Network Rail's compliance with obligations set out in its network licence conditions, but also to advise on the development of the measures in the Annual Return by assessing the appropriateness of the measures and their significance in demonstrating the stewardship of the network. In order to do this the Reporting Team have examined what data is used to manage the network in addition to the data used to populate the Annual Return.

1.2.1   *HQ Championed Data*

There are measures reported in the Annual Return which are identified as 'HQ Championed' measures. HQ rather than the Regions collect and manage the data for the whole network for these measures therefore they were not audited by both Reporters but divided between them with respect to the 2002 and 2003 Annual Returns.

The HQ Championed measures are:

- M3 Track Geometry;
- M5 Level 2 Exceedences;
- M6 Slope Failures; and

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- M19 Depot Condition.

Halcrow are responsible for reporting on the M3 Track Geometry and M5 Level 2 Exceedences measures.

1.2.2 *Eastern Region*

Eastern Region operated as two separate zones, East Anglia and LNE, prior to the 2003 reporting year. During that year, East Anglia and LNE zones were officially merged to become Eastern Region. From 28th April 2003, Eastern Region was divided again to become East Anglia Region and LNE Region. The 2003 Annual Return presents data separately for East Anglia and LNE Regions although they officially operated as one Region for the year in question. While for some measures operations and management was merged for the period in which Eastern Region existed, the day-to-day operation of many disciplines remained separate. We undertook an audit therefore in both East Anglia and LNE Regions. Where possible our findings are presented for the Regions together as Eastern Region but, in most cases, due to the separate operation LNE and East Anglia are reported upon individually.

1.2.3 *Recommendations*

In Sections 4-17 of this report our detailed findings for each of the measures are presented along with recommendations. These recommendations provide specific guidance to Network Rail to aid the improvement of the quality of the data, for example through improved checking and auditing, increased resource capability and competence. We also present recommendations for the improvement and development of the measures in order that they might give a more meaningful and reliable representation of the condition of the assets and Network Rail's performance. These recommendations are to be discussed between the Reporters, Network Rail and the ORR in order to agree a programme of implementation.

1.3 **Audit Programme**

The Regional and HQ audits of the 2003 Annual Return took place during the time period when Network Rail were compiling their 2003 Annual Return (in May and June 2003). The audit programme was structured as follows:

- IMC audits   28th April – 2nd May
- East Anglia Region   6th – 9th May
- LNE Region   12th – 16th May
- Scotland Region   19th – 23rd May
- Southern Region   27th – 30th May
- HQ   2nd – 9th June

1.4 *Final Report*

This is the final version of our 2003 Annual Return Report following our interim report which was submitted in July.

2   Compliance Assessment

2.1   Access to Information and Timing

Under the terms of our contract Network Rail are obliged to provide full access to data, information and personnel required for the Reporting Teams to carry out their audit.

We can confirm that we experienced the necessary co-operation from Network Rail in organising and attending meetings and providing information necessary for preparation of our report.

We note, however, that due to the timing of the audits, no data was available for some measures prior to or during the audit meetings. This was a particular issue in the case of the operational performance, signal failures and NMS data where subsequent analysis of the data revealed particular issues that we would wish to investigate in the Regions. We propose that in future audits the Reporting Team be provided with the most recent periodic data prior to the audits where final data is not available.

Network Rail's checking procedures resulted in adjustments being made to the data until just a few days before the production of their Annual Return. In view of this we would propose that the 7-day period laid down in the contract for the Reporter's review of Annual Return data be extended to allow for a full and detailed reconciliation with the data provided in the Regions.

2.2   Audit Organisation and Preparation

The preparation and organisation by Network Rail for the audits in both HQ and the Regions was good and the timetable generally effective with some minor exceptions. During the audits, the Regional contacts were on hand to ensure the appropriate personnel attended the meetings and to help with any further requirements or questions. Around the time of the audits all of the Regions were experiencing an organisational change to the new template organisation for Network Rail Regions, 'Org 1'. While this was causing some disruption in the Regions, it did not adversely affect the audits.

As noted previously, our audits were carried out at the same time as final collation and checking of data by Network Rail at HQ and the Regions. Where data was provided prior to audits, we noted that in some instances revisions were ongoing at the Regions. Whilst data control is maintained through use of "sign-off" sheets, these were only available in Southern and Scotland Region (excluding operational performance, NMS Reconciliation, and CRRs) at the time of the audit.

2.3 Regulatory Targets

Network Rail's performance against the regulatory targets for the reporting measures as set out in the 2002 and 2003 Annual Returns is shown in Table 2.1 below. The table also gives the statistical tolerances for each measure where applicable.

The table lists the currently quantified output measures reported in the 2001/02 and 2002/03 Annual Returns against the corresponding regulatory targets as stated in the Annual Returns. Table 2.1 does not include:

- Those measures for which no regulatory target has been set, i.e. freight delay minutes, rail defects, track geometry speed band data, temporary speed restrictions and station facility score; and
- Those measures for which baseline target levels will be established during the second control period once sufficient sample sizes are obtained, i.e. bridge, signalling and electrification condition.

As shown by Table 2.1 performance against regulatory targets set out in the Annual Return has not changed significantly in the 2003 reporting year compared to 2002. The number of broken rails, level 2 exceedences and reported conductor rail failures have met the regulatory target. For track geometry standard deviation data, five of the twelve regulatory targets were met. Overhead line failures and the station condition index have not met the regulatory target but the levels are within the statistical tolerance set to take account of the statistical "noise". The regulatory targets for the number of delay minutes per 100 train km and the number of reported signal failures have not been met.

Measure	Compliance

Operational Performance

Target 03 | R02 | R03

| Delay Minutes per 100 passenger train km | <1.35 | 2.74 | 2.90 |

Asset Condition and Serviceability

R03 | R02 | L | U

| Number of Broken Rails | 444 | 535 | 608 | <705 | 802 |

Track Geometry Standard Deviations:**

35m Top (Vertical Deviation) - 50%	R03 61.9%	R02 62.4%	>64.6%
35m Top (Vertical Deviation) - 90%	R03 88.9%	R02 89.4%	>90.3%
35m Top (Vertical Deviation) - 100%	R03 97.0%	R02 97.1%	>98.3%
35m Alignment (Horizontal Deviation) - 50%	>70.9%	R02 73.6%	R03 74.6%
35m Alignment (Horizontal Deviation) - 90%	>91.6%	R02 93.1%	R03 93.6%
35m Alignment (Horizontal Deviation) - 100%	R02 96.3%	R03 96.7%	>97.4%
70m Top (Vertical Deviation) - 50%	R02 61.9%	R03 62.2%	>62.5%
70m Top (Vertical Deviation) - 90%	R03 92.1%	R02 92.5%	>92.8%
70m Top (Vertical Deviation) - 100%	R03 95.2%	R02 95.6%	>97.8%
70m Alignment (Horizontal Deviation) - 50%	>64.7%	R02 80.0%	R03 80.9%
70m Alignment (Horizontal Deviation) - 90%	>91.9%	R02 96.0%	R03 96.2%
70m Alignment (Horizontal Deviation) - 100%	>97.3%	R02 97.4%	R03 97.5%

R03 | R02 | L | U

| Track Geometry Level 2 Exceedences per track mile | 1.179 | 1.351 | 1.693 | <1.820* | 1.947 |

L | U | R02 | R03

| Number of Signalling Failures | 23,273 | <25,106* | 26,939 | 27,905 | 29,077 |

L | R03 | R02 | U

| Number of Electrification Failures - OHLE | 63 | <88* | 102 | 107 | 113 |

L | R02 | R03 | U

| Number of Electrification Failures - Conductor Rail | 24 | 30 | 32 | <45* | 66 |

L | R02/03 | U

| Station Condition Index - Average Condition Grade | 2.1 | <2.2 | 2.25 | 2.3 |

Worse than Target
Better than Target

* Target relates to the level reported in 2000/01
** The statistical tolerance for Track Geometry applies to an average of all 12 measures, therefore cannot be applied individually
R02 = 2002 Reported Figure
R03 = 2003 Reported Figure
L = Lower tolerance of regulatory target
U = Upper tolerance of regulatory target

Table 2.1: Regulatory Targets, Compliance 2002 & 2003

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2.4 Confidence Grading

Table 2.2 below presents the confidence grades the Reporting Team have assigned to the data in the 2003 Annual Return using the OFWAT grading system. These grades were assigned based on the Reporting Team's overall impression of the data quality management processes and general measure management from their audits to date (reflecting findings from the 2002 and 2003 audit processes). Each reporting cycle adds to the understanding of the robustness of Network Rail's reporting processes and allows a more comprehensive application of the OFWAT confidence grading system. The grades are expected to change during each audit cycle and should be viewed in conjunction with the individual measure reports to understand the variations in data quality year on year.

Measure	East Anglia	LNE	Scotland	Southern
Regional Measure Grades				
Operations (3 accuracy categories	Reliability varies considerably day to day. Accuracy can be split into the 3 categories graded below.			
Accuracy of time recording	C2	C4	B2	B2
Delay attribution	B4	B4	B3	B3
Internal audit of attribution	C2-3	C2-3	B2-3	B2-3
M1 Broken Rails	B2	B2	A1	B2
M2 Defective Rails	B3	C3	B2	C3
M4 TSRs	B2	B2	B2	B2
M8 Bridge Condition Index	B4	B4	B4	B4
M9 Signalling Failures	B4	B4	B3	B3
M10 Signalling Condition	C5	C5	C5	C5
M11-M13 Electrification Failures	A3	A3	B2	B2
M14-M16 Electrification Condition	A3	A3	B2	B2
M17 Score Station Condition Index	B4	B4	B4	B4
M18 Station Facility	B3	B3	B3	B3
M20-M22, M25 Track A.V.	C2	B3	A2	C3
M23, M26 & M27 Structures A.V.	B2	B2	B3	C3
M24 Signalling A.V.	B2	B2	B2	B3
C1-C3 Track Capability	B2	B2	B2	B2
C4 Electrified Track Capability	B3	B3	B3	B2
NMS Reconciliation	B2	B2	A2	B2
CRRs	B2	B2	A2	B2
HQ Championed Measure Grades				
M3 Track Geometry (HQ only)	A2			
M5 Level 2 Exceedences (HQ only)	A2			

Table 2.2: Confidence Grades

While Reporters A and B have used the same confidence grading criteria as set out in the OFWAT system, the grades arrived at are dependent on the specific analysis, level of audit and investigation carried out and therefore differing grades between the two Reporters may be partially due to these differences rather than fully attributable to variances between Network Rail Regions.

We are developing a new multi-criteria confidence grading system to assess in greater detail the various factors influencing reported data quality. This system is still under development and thus the OFWAT system is presented here.

3   Regional Summaries

This section summarises key Regional findings arising from our audits on the 2003 Annual Return. Sections 4 – 17 of this report contain detailed commentary and findings for each of the reported measures.

Overall, the Regions were well prepared for the audits, meetings were organised diligently and, in most instances, the appropriate personnel attended the audits. In general, data requests from the Reporting Teams were responded to positively although the quality and consistency of supporting data varied between Regions.

3.1   *Eastern Region*

Eastern Region has been subject to significant organisational change over the periods of the 2002 and 2003 Annual Returns.

The two areas, East Anglia and LNE, were merged for the 2003 reporting year to form the Eastern Region, but were subsequently re-divided at the end of that year to become two separate Regions. Both Regions are now organised in compliance with Network Rail's 'Org 1' Regional structure template. These organisational changes presented challenges during both our 2002 and 2003 audits, as inconsistencies in reporting lines and the movement of NR personnel to different roles led to disparities in the data collection process. However, this problem was experienced to a lesser extent during the 2003 audits, where NR personnel were proactive in responding to the Reporting Team's data requests.

For certain measures Eastern Region operated as one complete Region during the 2003 reporting year although for the majority of measures East Anglia and LNE were never completely merged and therefore it was necessary to carry out audits in both East Anglia and LNE Regions.

We experienced an improvement in Eastern Region regarding the preparation, organisation and on-hand assistance during the timetabled period for the 2003 audits compared to the 2002 audits.

However, because of the organisational changes, our audits found that the Regions had experienced problems, for example there are resource issues that have yet to be rectified. We envisage that there will be improvements in both East Anglia and LNE Regions once the re-organisation has had a period of operation and adjustment.

We provide below some specific findings relating to Eastern Region citing both positive aspects and negative areas that require improvement:

- Resource issues in the Control based in York had improved since our last audit. There is extensive checking of the delay attribution clerk's incident creation work although other Regions carried out more monitoring of delay attribution as well as incident creation;

- The LNE part of Eastern Region has the highest amount of unexplained delay minutes, while East Anglia has the least which indicates differing approaches to attribution;

- Rail breaks have decreased in the Region however the level of rail defects remains high. Problems encountered with the reporting of continuous rail defects in LNE suggest immediate action is required to improve the reporting processes between Network Rail and the primary IMC;

- In East Anglia Region, although the number and severity of the reported TSRs has not materially changed between 2002 and 2003, the amount of delay minutes attributed to condition of track TSRs has significantly increased;

- In East Anglia there are resource issues for the Bridge Condition Index measure, although this is not the case in LNE Region;

- HQ provides the Regions with a schedule of assets to assess for the electrification condition assessments each year which is intended to cover a representative range of assets. However, Eastern Region find this schedule unworkable because of resource and time constraints and therefore carry out the required number of assessments but combine the condition assessments with other activities in order that these are more time efficient. This, however, may have the result of skewing the results slightly as the engineers generally carry out the assessments when maintenance is due and thus the assets maybe in a poorer condition than average;

- Of the three Regions audited, Eastern Region undertakes the greatest amount of track renewals and consequently incurs the greatest levels of track renewal expenditure. Track renewal expenditure has fallen from last year in line with a fall in the level track renewals undertaken.

3.2 Scotland Region

The 'alliance' formed between Scotland Region and its primary IMC continued to result in a close and effective working relationship during the 2002/03 reporting year, the benefits of which were observed during our audits. Compared to other Regions, the alliance arrangement has facilitated a higher degree of communication and transparency between the different components of the operations and management of the network.

Scotland Region were due to adopt the 'Org 1' Regional structure template in the week following our audits but this had no adverse effect on the audits. The organisation and execution of the audits was carried out to a high degree of diligence in Scotland Region. There was good assistance during the audits to aid with the meetings, data collection and any subsequent requirements. In the majority of cases appropriate Network Rail personnel attended the audit meetings and were able to provide sufficient data and supporting evidence.

The list provided below indicates specific areas of improvement, strength and weakness in the Region:

- A resource deficiency in delay attribution clerks had been addressed during the reporting year and there are now sufficient resources which will lead to improved reliability of delay attribution;

- Delay minutes increased by 32% from 2002 to 2003 which is higher than the increases in Southern and Eastern Regions;

- The implementation of the new rail defect management system, TARDIS, has yielded immediate benefits to the reporting process helping to drive down data duplication, increase staff efficiency and, most importantly, offering Network Rail personnel the ability to review and validate the data within the system from Regional headquarters. The Region has also benefited from the recruitment of approximately 120 track patrol personnel;

- Although the number of reported TSRs has decreased, the severity score and the delay minutes attributable to condition of track TSRs have increased;

- There is a resource deficiency for the Bridge Condition Index measure which must be addressed;

- Scotland Region was the only Region where the number of reported signal failures decreased between 2002 and 2003;

- Activity Volumes and NMS Expenditure processes suffer from disparities in the reporting process especially with regard to the use of the Network Rail standard management systems. However this effect was experienced less than in other Regions – the Region provided high quality supporting data and demonstrated robust data verification processes.

3.3   Southern Region

The audits were well organised by the Region and there was good assistance throughout the audit period. A member of the Regional Asset Reporting Team attended the audits wherever

possible, which enhances the Team's understanding of the audits and issues with the data collated in the Annual Return. Shortly before our audits took place Southern Region underwent a reorganisation in order to be compliant with Network Rail's new 'Org 1' Regional structure template. Despite this reorganisation the meetings were attended by appropriate staff who could provide sufficient information, data and evidence.

The following points illustrate specific findings in the Region, indicating both good performance and areas of weakness to be addressed:

- The Southern Region operational performance section have recruited and trained staff through the reporting year to counteract significant resource problems. The Region has also developed a comprehensive competency system for delay attribution clerks which monitors performance and indicates training requirements. This system is due to be implemented in other Regions;

- The Region reported the only rise in broken rails across the network;

- Rail defect figures were susceptible to data discrepancies as a result of errors arising out of the IMC reporting systems;

- The number of reported TSRs and the severity score has remained broadly similar in 2003 to the levels in 2002, although the minutes of delay attributed to condition of track TSRs have decreased;

- Southern is the only Region where SCMI assessments for the Bridge Condition Index are re-scored in order to check them. The results of this 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 system;

- The renewals workbanks held within the Region change frequently throughout the year with significant project deferrals and additions, masking the management of renewals projects originally intended for delivery in the 2002/03 reporting year. This issue was more prevalent in Southern Region than other Regions, as the operational characteristics and capacity constraints differ considerably to the rest of the network.

4   Operational Performance

4.1   Audit Scope

This audit was undertaken to verify the operational performance data presented in Network Rail's 2003 Annual Return for Eastern, Scotland and Southern Regions. During the 2003 reporting year East Anglia and LNE operated as one Region, Eastern Region, in terms of operational performance reporting and thus a single audit was carried out although the data is presented for the two Regions separately in the 2003 Annual Return.

The audit meetings took place before any of the operational performance data for the 2003 Annual Return was available. Therefore it was not possible to investigate the reasons behind particular changes that we have noted since being provided with the data following the audits. Only in the case of Southern Region was any data made available to the Reporting Team at the time of the meetings.

4.2   Audit Report

4.2.1   Procedures and Resources

The Asset Reporting Manual (ARM), which contains definitions and procedures for the asset condition measures, does not cover operational performance. There is a Delay Attribution Guide which the delay attribution staff in all Regions appeared to have access to and follow. There are also guidelines for incident creation in the TRUST delay attribution system which should be followed by the delay attribution staff. These guidelines were seen in Scotland and Southern Regions. In LNE the Performance Manager was able to provide us with these guidelines but they were not evident in the York Control.

All Regions suffered resource problems at the beginning of the reporting year. These resource problems were solved through the year with recruitment and training.

4.2.2   Quality and Reliability of the Data

Our audits identified the following measures taken by Network Rail which are helping to improve the quality and reliability of the operational performance data:

- Due to the use of the Control Centre of the Future (CCF) computer system and some Regions operating integrated control centres with TOCs, IMCs and Network Rail staff, delay attribution (DA) is becoming more transparent and therefore the delay attributers carry out their work more diligently;

- In connection with possessions and track work advised in Weekly Operating Notices, DA staff receive weekly notices which indicate the delays which are caused to different categories of train. This facilitates consistency in delay attribution;

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- Regions have varying relationships with TOCs, with Scotland having a totally integrated Control, Southern having most TOCs located in the Control but East Anglia and LNE still working in their Controls independently of the TOCs. Integrating the Controls should lead to better communication and transparency and therefore improved delay attribution and data quality;

- The delay attribution system, TRUST, is fully auditable. Any changes made are logged and it is possible to tell who made the changes as their user-IDs are recorded;

- Improved resource levels are leading to an increase in data checking, facilitating improvements in data quality;

- Improved competency through the utilisation of training programmes in each Region;

- Checking in each Region is extensive because of the commercial implications. In Scotland and Southern Regions DA and incident creation is checked within the Controls. While this does occur in Eastern Region it does so when there is time available rather than as a rule. The performance departments carry out various checks on delay attribution and incident creation for specific categories and in cases of particularly severe delays;

- Eastern Region carries out 'SATIN' audits which monitor incident creation. However Southern and Scotland Regions do not carry them out and questioned the benefits of such audits. The key to monitoring the quality of performance data is monitoring the quality of delay attribution rather than incident creation, once staff are competent at incident creation.

- There are also checks carried out by the engineers responsible for the areas, as they wish to ensure that no delay has been attributed to them in error.

However, our audits also uncovered the following issues which reduce confidence in the operational performance data and where it would be desirable for improvements to be made:

- There is no final crosscheck against the IMC's fault recording system, FRAME. DA staff attribute delays to the cause as best they can assess at the time of the incident creation although, following investigation into the incident, the IMC may find that the actual cause is different to that first input into TRUST. The IMC would update this change in cause in FRAME but Network Rail would not necessarily carry out a final check against FRAME. Network Rail staff may find that a change has been made in FRAME through random checks and through the dispute resolution process, but

there is no guarantee that every change would be noticed, checked and updated by Network Rail;

- IMCs are able to change the attribution of delay between those codes for which they are responsible. Attribution may need to be altered once investigation has revealed that the cause initially input was incorrect. It should be noted that the entirely laudable effort to attribute causation correctly might not be the only motive for IMCs to make changes. However it is possible to check any attribution changes within TRUST, and various checks and monitoring by Network Rail staff may pick up any changes, but there is no 'catch all' mechanism to ensure that all IMC changes are correct;

- The Data Quality Manager in York Control pointed out that there could be inconsistencies in the application of coding between the Regions;

- A National Data Quality Report used to be produced at HQ which monitored the quality of incident creation and delay attribution in the Regions. The person in the post of HQ Data Quality Manager prepares the report but this post was vacant from June 2002 until January 2003 and therefore the report was not produced. Network Rail have informed us that the post has now been filled and a report covering the last 6 months of the reporting year has been produced;

- Scotland Control stated that they have to rely on manual inputs from signalmen where there is no automatic time recording, and there is no way of checking these timing inputs. Within Scotland Region the routes which are covered by manual inputs from signal boxes are all lines north of Larbert and Ladybank and also for the G&SW route from Glasgow to the south via Kilmarnock. This latter route includes several originating points for freight traffic, which can present particular risks of errors in reporting and duplication. Scotland Region maintains that this is not a real problem because most of their freight working is included in a weekly short-term plan. While there is no particular cause for concern, it is not a fully automated system and therefore cannot be relied upon as fully as the data from automatic recording points;

- Scotland Control staff sometimes have to input times manually if the system fails and this is less accurate. There remain a few locations in otherwise automated areas where manual interpolation is the reporting method;

- In Scotland Region the IMC no longer has a performance regime and therefore there is not as much incentive for its staff to check delay attribution. However it was stated that the contract managers would monitor performance and delay attribution through this process.

4.2.3   Data

Delays attributed to Network Rail and IMCs are presented in the Annual Return. Across the whole network the number of delay minutes increased from 13.38 million in 2001/02 to 14.67 million in 2002/03. However, there was a difference in the way the data was processed in 2002/03 which has the effect of increasing the number of minutes. Network Rail estimate that although there was a 10% increase overall, 3% of this increase was attributed to the new processes. The data analysis below does not take into account this change, thus the figures for 2002/03 appear marginally worse than if they were calculated using the old process.

Other factors which distort the reported data are given below.

- Disputed delays are attributed to TOCs. Therefore if, at the time of reporting, any disputes are outstanding, they will not be included in the Annual Return. HQ informed us that at the time of collation of the data for the 2003 Annual Return, 491,235 minutes (about 3% of the total minutes) attributed to TOCs were currently in dispute which would not be included in the reported numbers, but once resolved, a proportion of these could be attributed to Network Rail. In Scotland it was estimated that 30-35% of delay minutes disputed by the TOC are taken back into Network Rail's responsibility through the year;

- In 2002/03 there was a change in the codes for trespass and suicide at stations. These delays were formerly attributed to the TOC responsible for the station but are now attributed to Network Rail. Delays attributed to external fatalities and trespass in East Anglia Region increased between 2001/02 and 2002/03 by 69% to 56,220 minutes, which is 4% of total delay, in LNE they increased by 19% to 85,158 which is 3% of total delay, in Scotland Region they decreased by 7% to 27,551 minutes which is 2% of total delay and in Southern Region they increased by 95% to 163,100 minutes which constitutes 5% of total delay;

- Average delay per incident has increased. This may be due to increased caution, increased contractor response times, stricter safety regulations and awaiting clearance to go on site.

4.2.4   Data Analysis

The total number of delay minutes are shown in Figure 4.1 below and Figure 4.2 presents delay per 100 train km against the regulatory target for delay per 100 train km for passenger trains. There is no regulatory target for freight delay.

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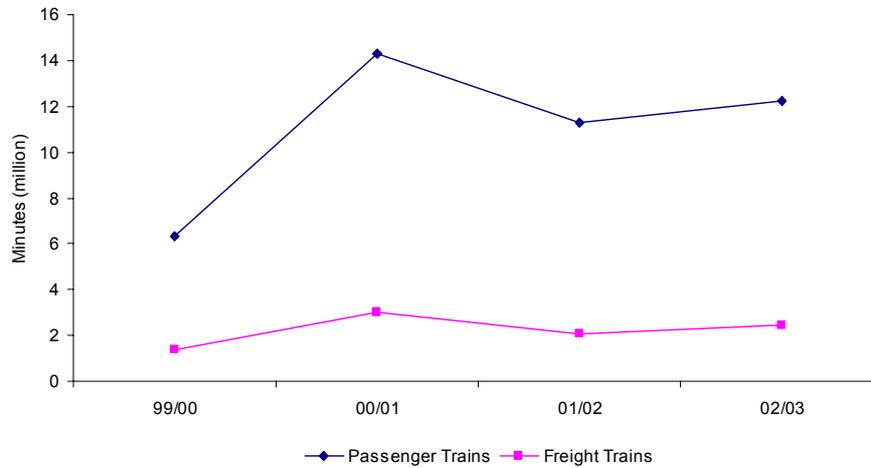
Figure 4.1: Total Delay Minutes
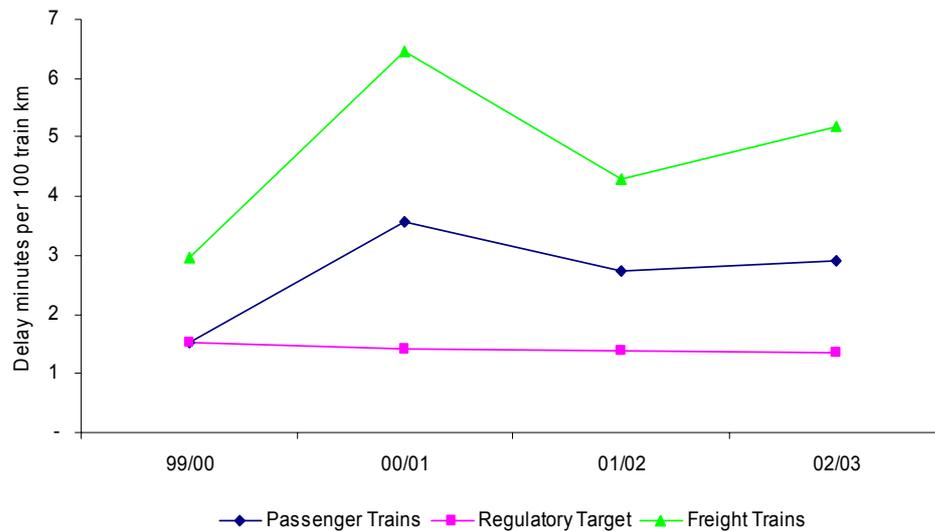
Figure 4.2: Minutes Delay per 100 Train km

As shown by the figure, the regulatory target for passenger delay per 100 train km is not being met.

We present below the findings from analysis that we have carried out on the operational performance data.

(a)   Split of Delay Minutes

Figure 4.3 shows the proportion of delay minutes attributed to each of the categories by Region as reported in the 2003 Annual Return.
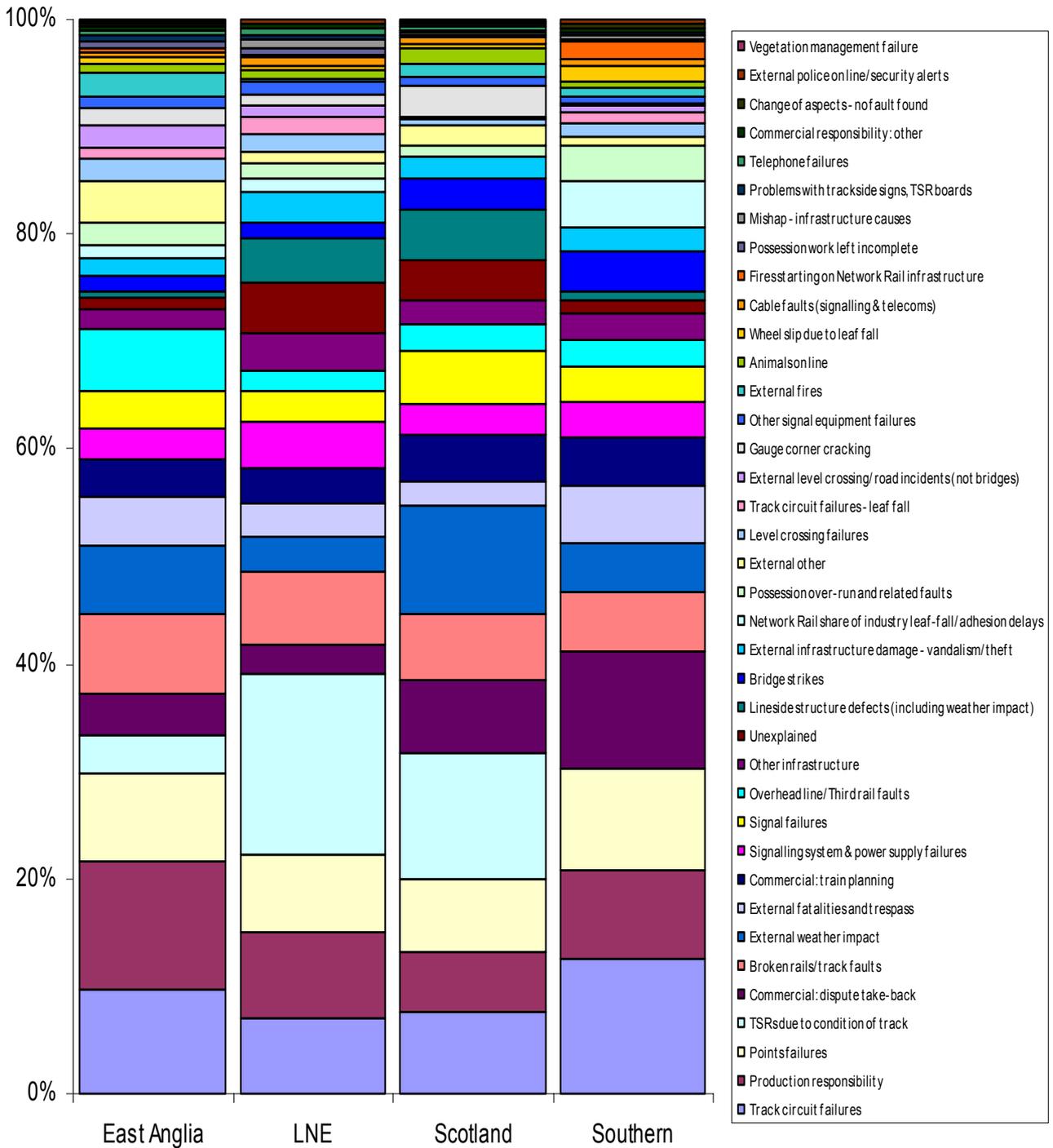
Figure 4.3: Proportion of Delay Minutes by Category, 2003

Legend (top to bottom):
- Vegetation management failure
- External police on line/security alerts
- Change of aspects - no fault found
- Commercial responsibility: other
- Telephone failures
- Problems with trackside signs, TSR boards
- Mishap - infrastructure causes
- Possession work left incomplete
- Fires starting on Network Rail infrastructure
- Cable faults (signalling & telecoms)
- Wheel slip due to leaf fall
- Animals on line
- External fires
- Other signal equipment failures
- Gauge corner cracking
- External level crossing/road incidents (not bridges)
- Track circuit failures - leaf fall
- Level crossing failures
- External other
- Possession over-run and related faults
- Network Rail share of industry leaf-fall/adhesion delays
- External infrastructure damage - vandalism/theft
- Bridge strikes
- Lineside structure defects (including weather impact)
- Unexplained
- Other infrastructure
- Overhead line/Third rail faults
- Signal failures
- Signalling system & power supply failures
- Commercial: train planning
- External fatalities and trespass
- External weather impact
- Broken rails/track faults
- Commercial: dispute take-back
- TSRs due to condition of track
- Points failures
- Production responsibility
- Track circuit failures

(b)   Principal Causes of Delay

The category with the highest amount of delay attributed to it is different in each Region: in East Anglia it is Production Responsibility, in LNE it is Condition of Track TSRs, in Scotland it is Track Circuit Failures, and in Southern Region it is External Weather Impacts.

The following Table 4.1 shows the top 5 categories causing the highest amount of delay in 2002/03 by Region.

| East Anglia		LNE		Scotland		Southern	
Category	Mins. delay (000s)	Category	Mins. delay (000s)	Category	Mins. delay (000s)	Category	Mins. delay (000s)
Production responsibility	153.6	TSRs due to condition of track	444.0	TSRs due to condition of track	144.4	Track circuit failures	383.7
Track circuit failures	123.8	Production responsibility	212.8	External weather impact	124.1	Commercial responsibility: dispute take-back	330.5
Points failures	107.9	Points failures	187.3	Track circuit failures	92.6	Points failures	292.0
Broken Rails/track faults	94.0	Track circuit failures	182.8	Points failures	83.7	Production responsibility	253.3
External weather impacts	84.5	Broken rails/track faults	181.2	Commercial responsibility: dispute take-back	83.4	Broken rails/track faults	169.1

Table 4.1: Categories causing highest amount of delay

In the top 5 categories causing the highest amount of delay, track circuit and points failures feature in all Regions.

(c)   Changes in delay 2002-2003

Having analysed the delay data, we have found that the changes in delay from 2002 to 2003 vary across Regions and some changes are significant. Figure 4.4 below presents the changes in delay minutes of more than ±30% between 2002 and 2003 across the whole network. Following our audits, Network Rail have provided reasons for these changes, for example they have stated that the 425% increase in track circuit failures due to leaf falls reflects the extreme weather and storms at the start of the autumn and that the category of 'change of aspects – no fault found', which increased by 92%, is one that would be expected to increase reflecting increased caution in operating procedures. However, we believe that further investigation would be necessary to ensure that no proportion of these large changes and differences between Regions is due to

inconsistencies in the application of the delay attribution system between the Regions and from year to year.
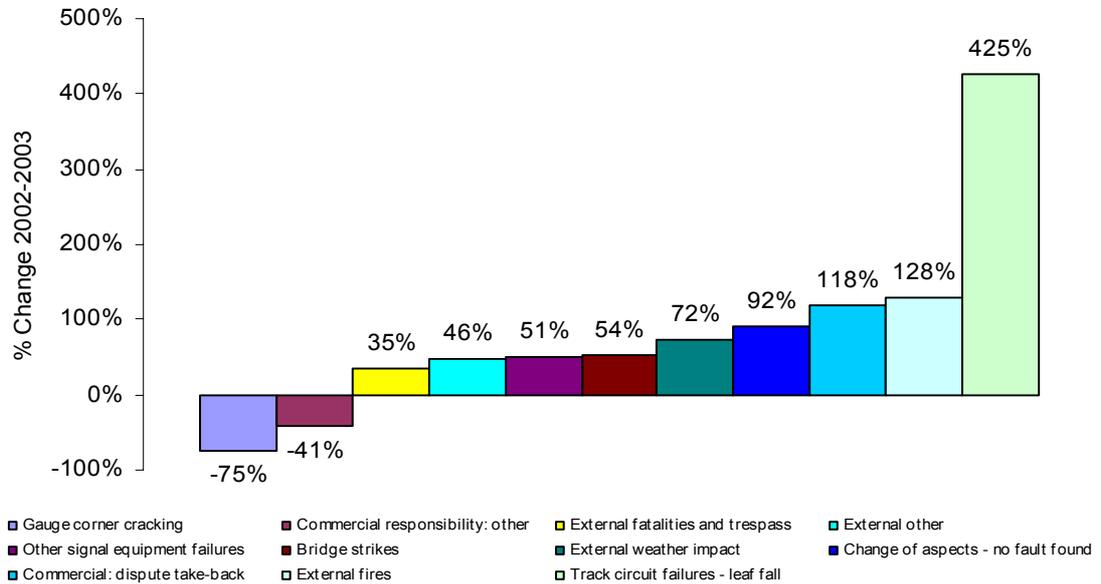
Figure 4.4: Percentage changes of more than ±30% in delay minutes between 2002 and 2003

(d)   Unexplained Delay

The amount of unexplained delay has risen between 2001/02 and 2002/03 in all of the Regions which we audited except Southern Region where it has reduced from 5% of total delay to 1%. The following figure shows the change in proportion of total delay.
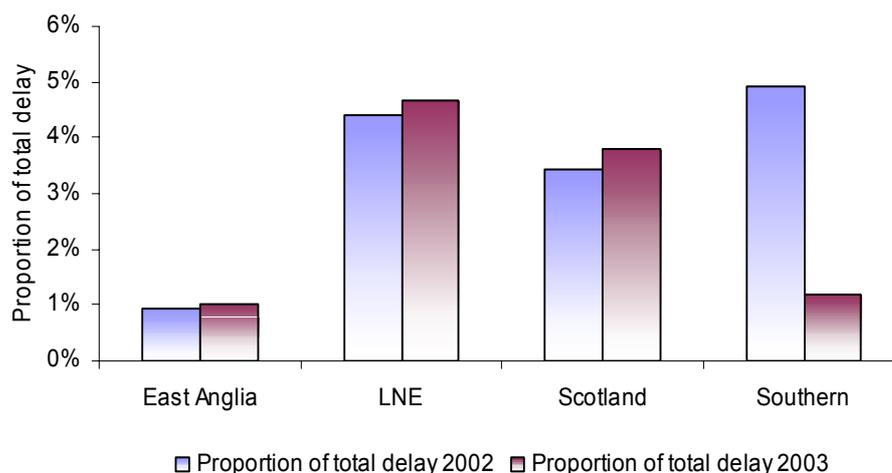

Figure 4.5: Unexplained Delay Minutes as a Proportion of Total Delay 2002-2003

No adequate explanation has been offered as to why unexplained delay recorded by East Anglia Region is so low compared to LNE and other Regions. However, it is noted that in 2002/03 the level of unexplained delays in Southern Region has been very significantly reduced so that it is now approaching that of East Anglia. Southern Region concluded that this progress is directly related to improved quality of delay attribution work.

(e)   Rolling Contact Fatigue

Delays attributable to rolling contact fatigue have significantly reduced between 2001/02 and 2002/03 as shown by the following figure:
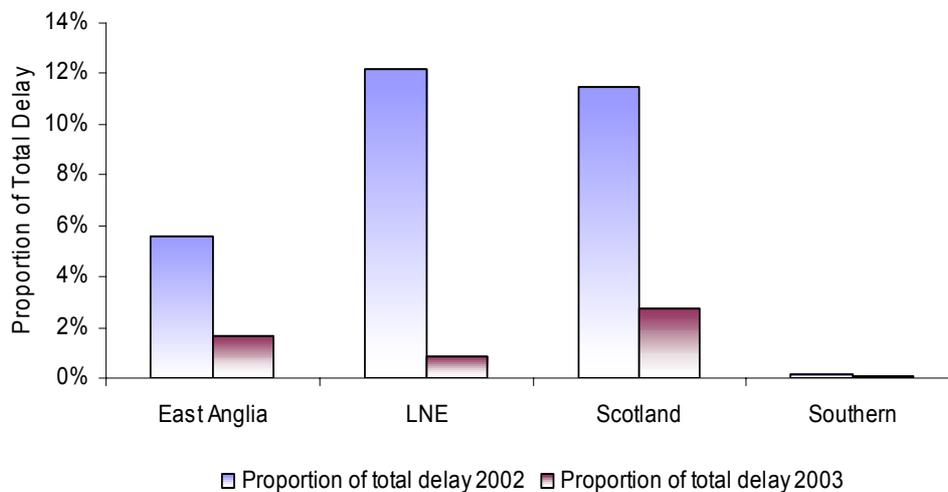

Figure 4.6: Rolling Contact Fatigue % of Total Delay 2002-2003

It has been noted that delay code 104C which in the 2002 Annual Return was described as Gauge Corner Cracking has been changed in the 2003 Annual Return. It is now referred to as Rolling Contact Fatigue. This is a more generic term which is used as a 'catch all' for a number of different conditions affecting rail. Network Rail have informed the Reporting Team that the change is in name only and there have been no differences in the attribution of these delays.

(f)   Commercial: take-back

Delay in the 'Commercial: take-back' category, which refers to incidents shared by Network Rail and TOCs and delay taken back by Network Rail which was disputed by the TOCs, has significantly increased although this is partly because of the change in processes in 2002/03 which results in more updates to the data being included. The following figure shows the changes:
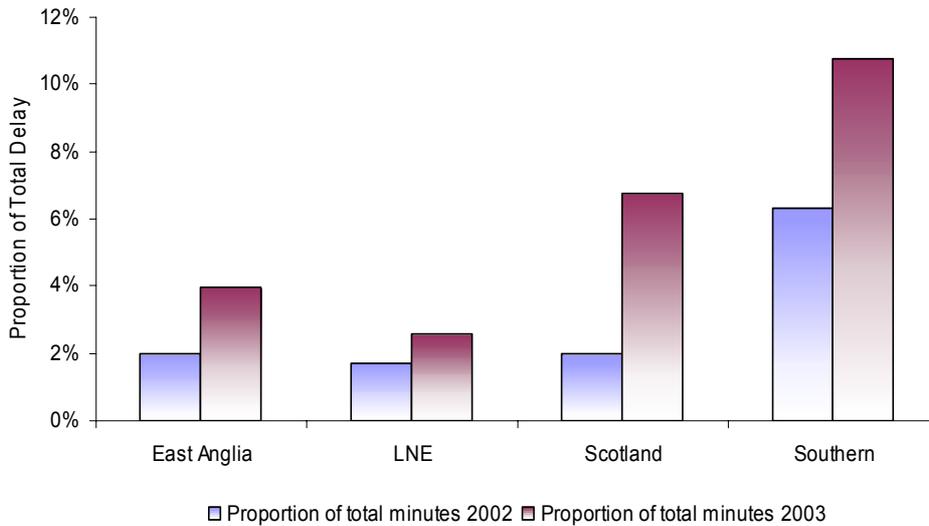
Figure 4.7: Commercial: dispute take-back, proportion of total delay 2002-2003

The significant increases may reflect greater transparency in delay attribution or a more aggressive approach by the TOCs.

(g)   Number of Incidents
The following figure shows the increase in the number of incidents and the equivalent amount of delay between 2002 and 2003.

For a number of categories the increase in delay is significantly higher than the increase in incidents. The average delay per incident has increased in all categories for which incident data is provided except for 'Condition of track TSRs' and 'Fires on Network Rail Infrastructure'. This indicates an increase in the severity of the impact for the incidents recorded.

We note that the increase in track TSR incidents is significantly higher than the increase in delay attributed to this category indicating a lower amount of delay per condition of track TSR incident. We also note that the M4 TSR measure (reporting TSRs which are imposed for 4 weeks or more) shows a decrease in both the number and severity of TSRs. This indicates that the increase in incidents and delays is due to a significant increase in the number of short duration TSRs.
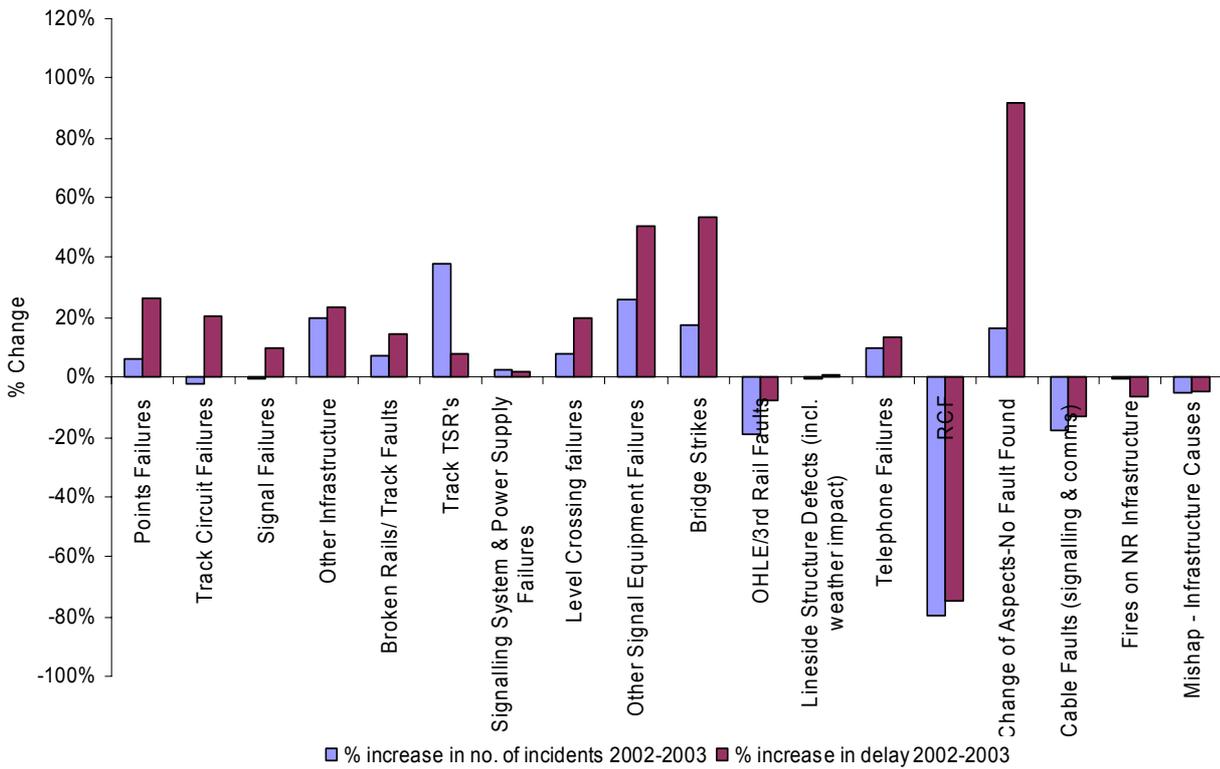
Figure 4.8: Percentage increase in incidents vs. delay 2002-2003

4.2.5   *Resources*

All of the Regions that we have audited have made substantial progress in the recruitment and training of staff specifically for DA work. Consequently the extent to which Controllers are covering DA work as an addition to their normal tasks has been reduced, and most of the DA work is carried out by dedicated specialists. Controllers are still involved in some circumstances, for example in LNE on night shift or in the event of staff shortages or major incidents.

Associated with the engagement of additional staff for DA work there have also been improvements in training methods. This is leading towards the extension of competence assessment in monitoring work quality. LNE Region's incident quality monitoring system provides a data quality monitoring process on the basis of a 5% sample of the incidents created. This system has now been extended to cover East Anglia and provides monitoring of DA team performance. Scotland Region has developed a competency assessment system which will be linked to training needs and looks at DA in addition to incident creation.

All Regions have positively claimed real improvement in the quality of their DA work as a result of these developments.

4.2.6   *Eastern Region*

Network Rail staff stated that the increase in freight traffic in LNE Region had caused operational performance problems, but it is not possible to compare delays attributable to freight in LNE this year and the previous year as we only have received the figures for 2003 split at regional level. However, LNE has the highest amount and proportion of freight delay than any other Region at 27% of total delay.

LNE Region has the highest amount of unexplained delays and East Anglia has the smallest amount of unexplained delay compared to all of the Regions that we report on. There is no clear explanation for this difference, which suggests variations in approach.

Particularly significant increases in delay between 2002 and 2003 for East Anglia Region were:

- 'TSRs due to condition of track' which increased 368% from 9,419 minutes to 44,081 and now account for 3% of all delays;

- 'External other' which increased from 19,876 to 50,445 minutes and now account for 4% of all delays;

- 'Commercial: dispute take-back' which increased from 20,917 to 51,204 minutes and account for 4% of all delays;

- 'Track circuit failures due to leaf fall' which increased by 3296% from 320 to 10,868 minutes;

- 'External fires' which increased by 253% from 8,669 to 30,565 minutes.

Particularly significant decreases in delays identified between 2002 and 2003 for East Anglia Region were:

- 'Signalling system and power supply failures' which decreased from 52,251 to 36,303 minutes and account for 3% of all delays;

- 'Rolling contact fatigue' which decreased from 58,637 minutes to 21,754 and account for 2% of all delays.

Particularly significant increases between 2002 and 2003 in delay for LNE Region were:

- 'Points failures' increasing from 94,733 to 187,300 minutes and which now account for 7% of total delay for the Region;

- 'Track circuit failures' which increased from 93,285 to 182,843 minutes and account for 7% of total delay;

- 'Signalling system and power supply failures' which increased from 68,571 to 110,742 minutes and account for 4% of total delay;

- 'Track circuit failures due to leaf fall' which increased by 159% to 41,396 minutes which is 2% of total delay.

Particularly significant decreases between 2002 and 2003 in delay for LNE Region were:

- 'TSRs due to condition of track' which decreased from 474,913 to 444,033 minutes but still comprised 17% of the total delay;

- 'Overhead line/3rd Rail faults' which decreased from 75,888 to 48,917 minutes;

- 'Rolling contact fatigue' which reduced dramatically from 296,860 to 23,252 minutes which is a 92% reduction.

4.2.7   Scotland Region
Particularly significant increases between 2002 and 2003 in delay for Scotland Region were:

- 'Commercial: dispute take-back' which increased from 18,538 to 83,392 minutes and accounts for 7% of all delay;

- 'External weather impact' which increased from 28,880 to 124,079 minutes and accounts for 10% of all delay;

- 'TSRs due to condition of track' which increased from 61,705 to 144,431 minutes and account for 12% of all delay;

- The largest increase was in 'Change of aspects, no fault found' which is contained within the signalling failure measure. This category increased by 1689% to 787 minutes, however this constituted only 0.06% of the total delay.

Particularly significant decreases between 2002 and 2003 in delay for Scotland Region were:

- 'Overhead line/3rd rail' which decreased from 54,247 to 31,485 minutes;

- 'Gauge corner cracking' which decreased from 106,993 minutes to 33,611.

4.2.8   Southern Region

The Region had set the objective in 2002/03 of achieving a real improvement in the accuracy of Delay Attribution work and they believe they have achieved this and that the work is being carried out more consistently. The Region state that there are greatly reduced levels of criticism and challenge on the delay attribution from the TOCs. Unexplained delays have reduced between 2002 and 2003 from 5% to 1% which is the most significant improvement compared to the other Regions. There has, however, been a significant increase in the 'commercial take-back' category where incidents were attributed to TOCs and later taken back to be Network Rail's responsibility following dispute by the TOC, although this increase may be partly due to the change in processes.

Southern is the only Region where it may be necessary to carry out delay attribution after the real time of the events due to the scale of the incidents and potential volume of delay. If it is not carried out in real time, the delay attribution may be carried out on the night shifts in the 7 days following the incident or by a team working 'off-line'.

While the Region is in the process of co-locating TOCs and IMCs and Network Rail into the same Controls, some of the TOCs are not keen to use CCF as they use their own system, P2. This causes some problems as there are elements which CCF cannot show that P2 can and vice versa which presents an issue with dispute resolution as neither party can check using the other's system.

Particularly significant increases between 2002 and 2003 in delay for Southern Region were:

- 'Commercial: dispute take-back' which increased from 167,456 to 330,464 delay minutes and accounts for 11% of total delay for the Region;

- 'External weather impacts' which increased from 73,185 to 142,563 minutes and account for 5% of total delay;

- 'External fatalities and trespass' which increased from 83,743 to 163,100 minutes and accounts for 5% of total delay;

- The two highest increases were in 'External Fires' and 'Track Circuit Failures due to leaf fall' which increased by 910% and 849% respectively. These two categories each comprise 1% of total delay for the Region.

Particularly significant decreases between 2002 and 2003 in delay for Southern Region were:

- Network Rail share of industry leaf-fall/adhesion delays which decreased from 161,408 to 133,115 minutes;

- 'Signalling system and power supply failures' which decreased from 127,887 to 100,511 minutes;

- 'Cable faults (signalling and telecoms)' which reduced from 42,084 to 23,227 minutes;

- Unexplained delays which decreased from 129,579 to 36,285 minutes;

- The amount of delay attributed to TSRs due to condition of track has decreased from 678 minutes to 56 minutes. However this figure is inconsistent with the numbers presented under the M4 measure which state that there were 55 condition of track TSRs which lasted over 4 weeks.

4.3 Recommendations

- There should be a final reconciliation between TRUST and FRAME to ensure that all changes in FRAME are captured in TRUST. We understand that Network Rail are actively pursuing this matter;

- Investigation into the reasons behind the extreme differences in changes from year to year in most categories of the measure should be made available to the Reporting Team to explain changes in delay.

5   Broken and Defective Rails (M1&M2)

5.1   Audit Scope

The audit was undertaken to assess the accuracy and confidence in the Broken Rail (M1) and Defective Rail (M2) measure data produced in 2002/03 Annual Return to the Office of the Rail Regulator. The audit for these two measures was combined for the following reasons:

- It was recognised that there was significant commonality on personnel and systems used for recording and collation of figures for the two measures;

- It was also recognised that there is a clear link between the results reported in each measure and therefore to provide commentary on the implications and trends for the reported figures they cannot be considered in isolation.

The audit scope covered Scotland, Eastern and Southern Regions. During the 2002/03 reporting period EA and LNE Regions were combined to form the Eastern Region. The 2002/03 Annual Return reports measure data separately for each Region. We therefore have adopted the same approach for the purpose of this report.

This report also includes commentary based on findings arising from our audits of the Infrastructure Maintenance Contractors (IMCs). Our findings on the IMC processes and systems are incorporated within the Regional commentaries.

5.2   Audit Report

5.2.1   Regulatory Targets

The regulatory target for broken rails was set at 705 in the 2002/03 reporting period. The statistical tolerance for this measure was defined at $\pm$ 13.7%. There is no regulatory target for defective rails.

5.2.2   Reported Data

In the 2002/03 Annual Return, Network Rail report a national total of 444 broken rails removed at the end of the period, 37% below the regulatory target of 705.

Figure 5.1 illustrates the continual improvement in Network Rail's management of broken rails. The graph also illustrates the number of broken rails removed normalised against track and train miles.
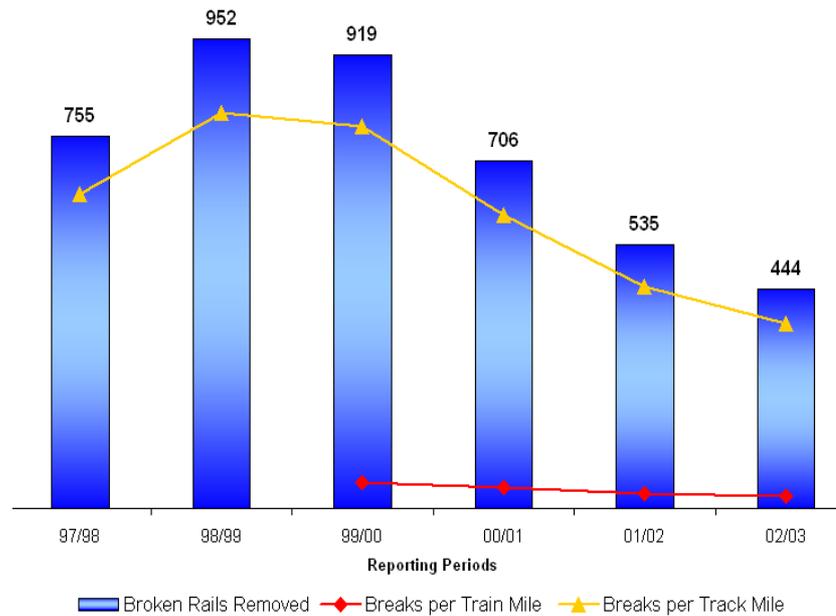
Figure 5.1: Number of Broken Rails Removed between 1997 and 2003

The published number of isolated and continuous rail defects remaining at the end of the same reporting period was 34,964 (3.8% increase on 2001/02) and 1,583km (2.8% decrease on 2001/02) respectively. The number of isolated defects detected, defects removed and weld repairs were 31,334; 24,890 and 5,554 respectively. However corrections were made by Network Rail HQ to the defects remaining figure which has not been updated in the Annual Return to reflect these changes. We calculate the defects remaining at year-end to be 34,114.

For continuous defects, a total of 415km of new defects were detected, whilst 348km of defects were removed. These figures represent an improvement on last year however the Reporting Team cannot validate the continuous defect figures for LNE Region which were submitted to HQ after the audits had been undertaken.

5.2.3   *Overall Data Quality and Compliance with Procedures*
Network Rail compliance with the Asset Reporting Manual definitions and procedures was found to be satisfactory across all Regions. Some minor amendments are required to Regional procedures to reflect recent changes in local processes, for example, in Scotland Region the implementation of the new rail break and defect reporting system, TARDIS, has altered the reporting process.

In our report on the 2001/02 Annual Return we highlighted the importance of IMC processes on the quality of data reported in the Annual Return. During the current auditing process further investigation into the collation of data both at the Regional and IMC level has revealed variations in reporting consistency and data quality between the Regions.

Scotland Region reported a year-end total of 40 broken rails however supporting information provided by the Region indicated that this number should be 39. We attribute this discrepancy to an addition error in the data collation process.

Eastern Region reported broken rails at 31 for EA and 79 for LNE. However supporting evidence provided by the Region shows these numbers to be 32 and 78 respectively. Furthermore, interrogation of the reporting system used by the IMC to report broken and defective rail figures revealed an LNE year end total of 82 broken rails.

Errors were found in the period end defect reports from one of the IMCs in Southern Region. Every period report inspected for the 2002/03 reporting year was found to include data discrepancies between the data held on the IMC's reporting system and the reports generated by it which are subsequently forwarded to Network Rail.

Isolated rail defect numbers vary significantly between the Regions. Figure 5.2 below shows the number of isolated rail defects reported for each Region with further normalisation against Track and Train miles facilitating a more comprehensive view of the defect figures in relation to the operational characteristics of each Region.
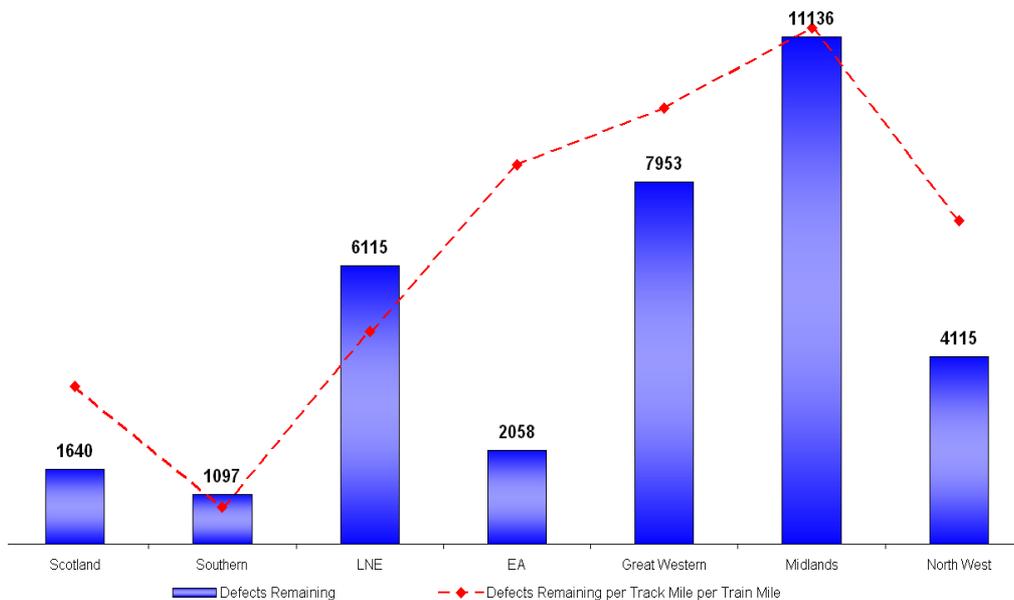
Figure 5.2: Isolated Rail Defects normalised against Track and Train miles

Southern Region is the most heavily utilised of all Regions with the largest number of train miles across the network, however in comparison to EA, which has 60% less in train miles, the number of isolated rail defects is significantly lower. The graph also shows that in proportion to

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track and train miles, Southern and LNE Regions display a better performance in the reporting of rail defects than all the other Regions.

5.2.4   *Region Specific Findings*

(a)   Eastern Region

The 2002/03 reporting year saw the amalgamation of LNE and EA to form the Eastern Region. Control of broken and defective rail reporting and management was co-ordinated from York. The Reporting Team observed no proactive management processes in place in EA Region – the Region was acting in a reporting capacity only.

In EA broken and defective rail data is supplied by the IMCs, collated and forwarded to York. No analysis is undertaken on the data; no significant validation is carried out on data integrity. The process is also susceptible to the similar defect reporting errors observed in Southern Region as a result of one of the IMCs' reporting systems.

The Reporting Team also reviewed RAMS, the reporting system of another IMC operating in EA Region. A random sample of six defects was reviewed within the system and on site. No significant discrepancies were found.

In LNE it was discovered that 40% of the incident report forms, the primary supporting documentation generated when a defect/break is detected, were missing from the Regional records. The generation of these forms is a requirement under NR procedures. The Reporting Team and HQ believe these are imperative for the effective management of rail defects. The situation represents a significant non-compliance against Standard RT/CE/S/057 and may lead to an under-reporting of rail defects.

The broken rail figures reported by LNE Region differ from those held within Regional documents and the defect reporting system operated by the IMC. It was apparent that no robust validation of the numbers was carried out before final sign off of the reported figures.

We believe the lack of reporting of continuous rail defects in LNE Region is a serious issue. Currently the data is held in three different systems to varying degrees of robustness. The IMC listed a number of issues limiting its ability to report this data including resource availability and problems experienced with the classification of continuous rail defect sites. However, as LNE is the only Region in the UK not to report these figures, we question the lack of proactive actions to resolve this issue on behalf of the IMC and Network Rail.

(b)   Scotland Region

Scotland Region has reported a reduction in rail breaks from 46 to 40, although supporting evidence from the Region suggests that the final year-end total is 39. The Region reports isolated defects remaining at 1640 and continuous rail defects remaining in track at 140km. The

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Region has benefited from a substantial increase in UTU testing and track patrolling resources (120 new staff) contributing to the relatively low level of defects and rail breaks reported.

The key change in the Region has been the implementation of a new defect reporting system, TARDIS. The new database has been developed in order to meet the requirements of the ORR reporting processes and is designed to increase reporting efficiency within the Region. IMC personnel demonstrated the system and a random sample of defects were analysed, both within the system and on site by the Reporting Team. No discrepancies were found. The system is designed to automatically produce period defect reports with minimal manual input. Data is checked via the generation of defect reports that are validated by track patrol teams, mitigating the duplication of defect data.

Samples of rail break data and defect information were analysed for discrepancies and robustness. No significant discrepancies were found.

The Reporting Team interrogated the system to validate the period end defect figures supplied to Network Rail. Due to limitations in the usability of the database it was found that the ORR reported figures could not be manually validated using the system. We believe this functionality is an important requirement for data integrity purposes.

(c)   Southern Region

The only rise in broken rails reported across the network has been reported in Southern Region. Broken rails have increased by 21% against the 2001/02 total of 74. The Regional target set for the year was 70. This deterioration in performance has been attributed to a combination of excessive cold weather and wheel flats. Figure 5.3 illustrates the Region's broken rail figures over the reporting period.
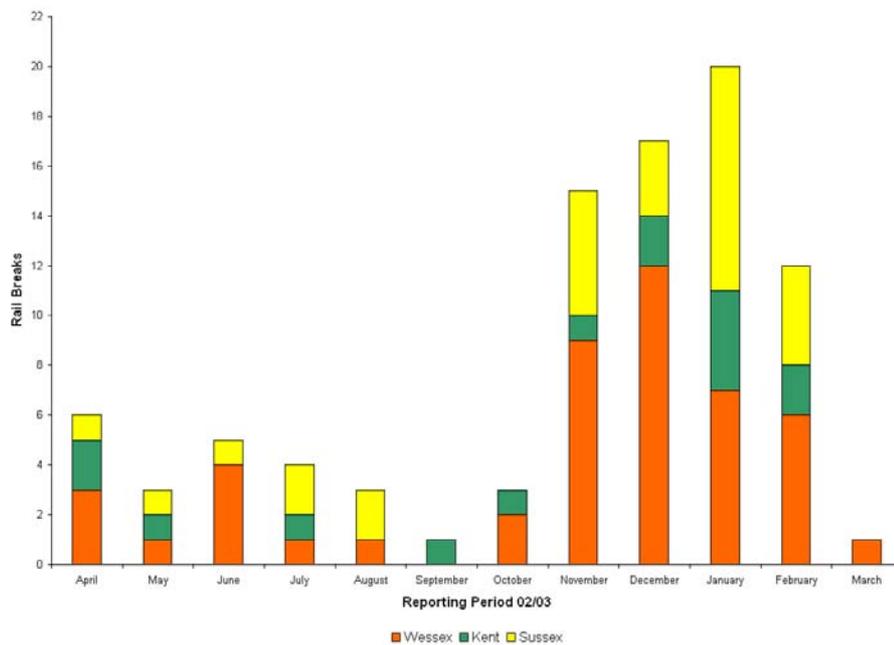
Figure 5.3: Southern Region Broken Rails 2002/03

The graph shows that the majority of broken rails occurred in the Wessex and Sussex areas, however the IMC for Sussex met its area broken rail target for the year. Another IMC, responsible for maintaining Kent and Wessex areas, is fully up to date in its UTU testing programmes. It has also reduced the number of significantly overdue defects to zero. No explanation for the rise was offered in the Annual Return data sheets to HQ. HQ has conducted a review into the reported increase although we were not provided with this information.

The Reporting Team conducted a review of the yet to be approved defect reporting system developed and maintained by the IMC for Sussex. A sample of six defects were monitored within the system and followed up with on site inspections by the Reporting Team. Although all the appropriate documentation (incident forms detailing defect/break information) could not be found for these defects, the defect data did appear in the system. However as a result of the on-site inspection we found that two of the six defects had been removed but the system had not been updated to reflect this information. If this were found to be a regular occurrence it would result in the under-reporting of defects removed from the network.

Period reports are generated by the system and forwarded to Network Rail in hard copy form only. These were inspected by the Reporting Team, however every period report was found to include counting errors. Further investigation revealed that a problem with the coding of the report generation element of the system may be the key cause of the errors. The system is yet to be audited by Network Rail but proactive measures have been pursued by them to rectify the problem.

All Network Rail and IMC personnel were well prepared for the audits and all data requests were responded to positively. We particularly wish to commend the LNE representatives for their thorough preparation prior to our audit.

Our key conclusions are as follows:

- There is a lack of system control by Network Rail personnel with respect to the IMC databases and reporting processes. Network Rail staff do not have direct access to the IMC databases therefore reported data from the IMCs cannot be interrogated or validated by Regional personnel. The exception is in Scotland Region where track and investment staff are allowed read-only access to the new TARDIS system;

- Network Rail is not sufficiently proactive in pursuing, in a timely fashion, reporting problems arising from system or process shortfalls. This was demonstrated in some Regions where data discrepancies were discovered during the audit process;

- LNE was the only area to demonstrate a tangible link between rail defect data and the generation of track renewals activities. Break and defect data is taken into account when deriving renewals workbanks. Track renewals are monitored within a bespoke system, RENLOG, which allows the track team to monitor renewals. However the data is not updated regularly and the latest renewals information is not held within the system, limiting its value as a key management reporting tool;

- The reporting systems used by the IMCs vary in size, structure, complexity and integrity. Many have been developed in MS Access except TARDIS which uses an Oracle platform with a Delphi front-end. This is an inherently more stable and robust system than the MS Access databases. Given the nature, volume and safety implications of the data processed by these databases, system stability issues should be monitored more closely by Network Rail;

- Southern Region reported that limited confidence could be given to the defect data reported by one of the IMCs in its period reports. The Region assured the Reporting Team that the final reported figures for rail defects are accurate, this conclusion being based on manual checks undertaken by Southern Region using data downloads from the IMC defect reporting system in question;

- The development of Raildata 2, the nationwide mainframe system to be used by Network Rail to manage rail defects, will necessitate significant updates to the IMC systems to facilitate effective interfacing and data transfer. Raildata 2 will now report broken and defective rails present in the track and will utilise new defect classification codes to comply with EU Interoperability Standards;

- Serco Railtest and Corus Rail are responsible for detailed investigations of rail breaks. It is not uncommon during the course of these investigations to discover rail breaks that had been wrongly classified at source. Serco and Corus are responsible for reclassifying rail breaks and feeding this information back to the Regions. It was not clear from the information presented by IMCs and Network Rail to the Reporting Team whether reclassified rail breaks were updated on their systems;

- We believe the problems encountered by LNE Region in providing robust continuous defect figures have not been adequately pursued by HQ and this represents a significant shortfall in the overall reporting process;

- The issue of data control and data quality problems experienced by the Regions remain a local issue. We believe that Network Rail HQ should have a greater involvement, at both the Regional and IMC level, in order to gain an understanding of the problems arising out of the reporting process in the Regions. Consequently Regions should be more proactive in communicating any problems encountered back to HQ;

- The problems of effective knowledge transfer and the allocation of appropriate resources to replace key individuals is a continuing problem causing shortfalls in data quality and consistency;

- Barring a few instances of minor data discrepancies it is our view that the figures put forward for broken rails are accurate. We base this conclusion on the reporting processes employed within the Regions and the supporting evidence provided to the Reporting Team;

- Rail defect data is susceptible to errors from a variety of sources. Due to the nature of defect reporting the data is continually changing, however we express concerns over the lack of data validation undertaken in the Regions. Errors in period reports, data duplication, lack of appropriate baseline figures and most importantly a lack of data and quality control from Network Rail has a resulted in the data discrepancies identified during the auditing process;

- In light of the comment above it must be noted that through the increased utilisation of sophisticated testing equipment the number of rail defects will rise considerably. The level of defects recorded could be greater than can be managed, given the current level of resources.

5.3 Recommendations

We recommend that the following actions be taken to address many of the issues arising from our audits:

- Immediate action is required by Southern Region and EA Region to address the issue of limited confidence in the period reports from one IMC's reporting system;

- All Regions should be more proactive in pursuing IMC reporting problems. Significant problems should be communicated to Network Rail HQ;

- LNE Region and its primary IMC should immediately review and amend local procedures to enforce the generation and management of rail break and defect incident report forms in order to mitigate against lost data as occurred last year;

- It would be desirable if all IMCs could provide period reports in electronic format. This will drive a more efficient data validation process;

- Network Rail and IMCs should report a figure for the number of rail defects present in the respective systems on 1st April of each reporting year. This will facilitate a more robust data tracking and validation process;

- Network Rail personnel should be allowed read-only access to IMC systems for monitoring purposes within Network Rail offices;

- The TARDIS system requires immediate updating to facilitate manual interrogation of ORR reported data;

- The level of audits undertaken by Network Rail on IMC systems needs to increase or, where audits are undertaken, the depth of such audits should be increased in order to highlight and correct any reporting problems within the systems;

- The reporting of continuous rail defects requires immediate attention. The treatment of ex-RCF sites, currently viewed as live under the requirement of Network Rail, requires closer scrutiny to ensure that these numbers are not included in the reported defects remaining figures;

- Network Rail HQ, LNE Region 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 into Raildata 2.

It is evident from our findings that the recommendations listed above are relatively small in form and complexity. These recommendations are based on measures which the Reporting Team believe will require only a minimal amount of effort to facilitate a step-change in the rail break and defect reporting process.