PREFACE

The Report for the year ended 31 March 2009 has been prepared in two volumes (No.8 - Performance Audit and No.11 - Compliance Audit) for submission to the President under Article 151 (1) of the Constitution of India.

This volume (No.8 - Performance Audit) contains results of the following reviews:

(i)	Freight Services in Indian Railways	(Chapter 1)
(ii)	Freight Operations Information System in Indian Railways	(Chapter 2)
(iii)	Implementation of Corporate Safety Plan in Indian Railways	(Chapter 3)

The observations included in this Report have been based on the findings of the test-audit conducted during 2008-09 as well as the results of audit conducted in earlier years, which could not be included in the previous Reports.

Chapter 1
Freight services in Indian Railways

Executive summary

Freight is a profit making business segment of Indian Railways and is the backbone of railway revenues. Over the years the market share of Indian Railways has been consistently shrinking and railways was losing out to road. Indian Railways laid down detailed freight operational and marketing strategies for the X Five-year plan to regain the lost market share. Achievement of projected freight targets largely depended on the manner in which the Indian Railways reshaped its policies and strategies not only to regain the lost share in freight traffic but also to provide value for money to customers in terms of better facilities and improved services.

This Performance Audit was aimed at assessing the adequacy of infrastructure commensurate with freight traffic growth envisaged in the operational and marketing strategy of Indian Railways. It is also intended to asses the effectiveness of initiatives taken to improve market share of Indian Railways besides efficient maintenance and optimum utilization of available assets.

The recent growth in freight loading due to more intensive asset utilisation and adoption of market responsive strategies has brought into focus its long term sustainability. Subsequent reviews of the impact of enhanced loading in the zones have amply demonstrated that the current infrastructure was overstretched and capacity enhancement was essential to sustain the enhanced loading strategy in the long run.

*Study conducted across the zones indicated that Indian Railways has thus far continued with the strategy of augmenting locomotives largely from its existing manufacturing facilities- Diesel Locomotive Works, Varanasi and Chittranjan Locomotive Works, Chittaranjan- whose manufacturing capacities were not sufficient to meet the planned annual augmentation of locomotives. Neither was the capacity of these manufacturing facilities enhanced nor was external procurement of locomotives adequately pursued. Augmentation of locomotives, therefore, did not keep pace with growth of traffic. Augmentation of wagons is primarily from wagon manufacturers in public and private sector. There is **a** case for improved contract management with effective deterrence on defaulting public and private wagon manufacturers, who were persistently supplying only 33 to 51 per cent of the contracted quantity every year, adversely affecting availability of wagons in the zones. As a corollary, the scarcely available funds, ranging from Rs.387 crore to Rs.1,864 crore remained unutilised during 2006-09.*

The various initiatives envisaged for capacity augmentation, throughput enhancement, port connectivity works and upgradation of permanent way, were plagued by procedural delays and were behind schedule. Infrastructure augmentation was, therefore, not commensurate with the projected growth in freight traffic and Indian Railways had a huge throw forward of 408 projects

costing Rs.1,41,015 crore (including the Dedicated Freight Corridor) as at the end of March 2009.

The initiatives for harnessing private investment for infrastructure augmentation through Public Private Partnership arrangements have not materialized as envisaged. Setting up of locomotive manufacturing facilities, and initiatives to recapture the road traffic such as development of multi modal parks and Roll –On-Roll-Off facility to provide door to door multi modal service were all in preliminary stages.

Major freight terminals that handle more than 30 rakes every month, including those identified for modernization were also deficient in basic facilities leading to heavy terminal detentions of rolling stock, which needs to be urgently addressed. Majority of the respondents to the survey ***of*** *terminal/siding owners also echoed similar sentiments. Customer perception also indicated that the mechanism of supplying rakes as per the demands of customers required improvement. This coupled with enroute detentions to rakes on account of stabling and inefficient interchange commitments between zones were bottlenecks in efficient delivery of freight services.*

A test check in loco sheds disclosed that several locomotives were increasingly failing within a short span of six months of their periodic overhaul indicating poor workmanship in the sheds. The quality of maintenance of locomotives, therefore, warranted improvement.

The various freight schemes introduced to capture piece meal traffic were only operating sporadically in some zones. Performance of the individual incentive schemes in terms of incremental freight loading achieved was not evaluated. Considering that the average annual growth of 8.1 per cent in freight loading more or less corresponded to the average annual growth of 8-9 per cent in Gross Domestic Product during the last five years, the incentive schemes at best contributed to retention of the market share. The marketing strategy needs to be restructured for improving the market share of Indian Railways.

1.1 Highlights

- **Capacity and manufacturing constraints in the two locomotive manufacturing units at Varanasi and Chittaranjan hampered locomotive augmentation vis-à-vis the growth in traffic. Only 11 per cent of the envisaged external procurement was provided in the Rolling Stock programmes, leading to shortage of locomotives. Procurement was not sychronised with requirements in the zones affecting the availability of locomotives in zones.**

  (Para 1.9.1.1)

- **Remedial measures were not in place even though the public and private wagon manufacturers continuously supplied only 33 to 51 per cent of the contracted quantity, adversely affecting availability of wagons in the zones. Funds ranging from Rs.387 crore to Rs.1,864 crore, comprising 12 to 31 per cent of the funds allocated for augmentation of rolling stock, remained unutilised during 2006-2009.**

  (Para 1.9.1.1)

- **The augmentation of specialised wagons envisaged in the Integrated Railway Modernisation Plan was being augmented at a very low scale even though four of the five year period of the plan had lapsed.**

(Para 1.9.1.1)

- **Major freight terminals handling more than 30 rakes every month also suffered from inadequate infrastructure and were not receiving adequate importance. The envisaged modernisation of freight terminals with enhanced facilities were not fully implemented in most of the terminals resulting in heavy terminal detentions to rolling stock.**

(Para 1.9.1.2)

- **Progress of capacity augmentation and throughput enhancement works was characterised by procedural delays and the pace of progress of these works rendered them unlikely to be completed within the envisaged period. Port connectivity works and upgradation of permanent way were similarly behind schedule. Dedicated Freight Corridor was at a primitive stage and even land acquisitions were not completed since setting up of the special purpose vehicle in 2006.**

(Para 1.9.1.3)

- **Customer perception indicated that the mechanism of supply of rakes to customers was inefficient. Further frequent stabling of rakes and inefficient interchange commitments between zones impeded efficient delivery of freight services.**

(Para 1.9.2.1)

- **Quality of periodic maintenance in locomotive sheds was poor as a substantial 25 per cent of locomotives failed on account of poor workmanship. The time involved in train examination in wagon maintenance depots continued to be beyond the envisaged norm due to operational and manpower constraints apart from deficient infrastructure.**

(Para 1.9.2.2)

- **The freight incentive schemes introduced to improve the market share of piece-meal traffic were not successful in improving the market share as envisaged. The commodity wise loading under the incentive schemes contributed to only 10 per cent of the traffic for all commodities except cement. Scheme wise data was not maintained and the performance of the individual schemes was not evaluated.**

(Para 1.9.3.1)

- **The envisaged Public Private Partnership projects for setting up of locomotive manufacturing facilities were at a nascent stage. Development of multi modal parks and Roll on Roll off schemes for capturing road traffic have not yet materialised though four years have lapsed since it was envisaged.**

(Para 1.9.3.2)

1.2 Gist of recommendations

- Indian Railways need to expedite augmentation of rolling stock, including those envisaged in the Integrated Railway Modernisation Plan, to ensure that the rolling stock infrastructure adequately caters to the projected growth in traffic. Indian Railways also need to address, on priority, the zonal imbalances in the availability of rolling stock.
- Contract management practices need to be strengthened and effective deterrence needs to be instituted on defaulting public and private wagon manufacturers to ensure timely supply of wagons.
- Indian Railways need to expeditiously provide the basic facilities in all freight terminals. Indian Railways should ensure that its initiative of modernisation of freight terminals is effectively implemented in the zones to minimise rolling stock detentions at freight terminals.
- Indian Railways need to expedite the capacity augmentation, throughput enhancement and port connectivity works to ensure that the infrastructure is commensurate with the projected traffic volume. Indian Railways needs to effectively monitor and curtail procedural delays in works contracts.
- IR needs to ensure adequate availability of power to haul the freight train, besides curtailing stabling of rakes enroute and improve the interchange commitments between zones to minimise enroute detentions and to enhance the efficiency of freight services.
- Indian Railways need to enhance the quality of locomotive maintenance and address the infrastructural and operational constraints to strengthen the mechanism of train examination at wagon maintenance depots. Indian Railways should provide train examination facility at all freight terminals to prevent avoidable empty haulage of rakes.
- Indian Railways should evaluate the incremental loading derived from incentive schemes and modify the schemes suitably to enhance the freight market share.
- Indian Railways need to expedite all the Public Private Partnership projects to effectively harness private investment. The initiatives aimed at capturing the road traffic also needs to be quickened. Alternatively, Indian Railways should explore other means of capturing such traffic in the short and medium term.

1.3 Introduction

Indian Railways (IR) is one of the largest and busiest rail networks in the world spread over a network of 64,015 route kilometers and is a chief carrier of the bulk freight traffic. Revenue from freight services (Rs.46,425 crore) account for about two thirds of the gross railway revenues (Rs.71,720 crore) and therefore management of freight services assumes greater importance. However, railway transportation is a derived demand and is directly dependent on the growth of six major infrastructure industries in the country viz.

electricity, coal, steel, crude petroleum, petroleum refinery products and cement, to which majority of railway customers belong. During the X Five year plan, IR recorded a phenomenal growth in freight loading, which was attributed to market focused strategy aimed at capturing large volume of traffic along with the efficient utilisations of assets. The enhanced freight loading strategies, however, impact the rolling stock consisting of locomotives and wagons, track and signals apart from affecting other service departments. Further the rapid economic growth accompanied by growing market competition in recent years presents a challenge to IR to reorient its operations through cost cutting and volume maximizing strategies.

1.4 Organisational structure

At the Railway Board, Traffic Commercial directorate formulates policies on tariff and marketing strategies while the Traffic Transportation directorate monitors the movement of traffic of different commodities. The two directorates function under the overall control of Member Traffic. In the zones, the freight business operations are vested with the Chief Commercial Manager, Chief Commercial Manager (Freight Marketing), Chief Operations Manager and Chief Freight Transport Manager. In divisions the Sr. Divisional Commercial Manager is responsible for implementation of policies and Senior Divisional Operations Manager is responsible for freight operations.

1.5 Audit objectives

The objectives of the Performance Audit of Freight Services in IR are to assess whether:

- Infrastructure was adequate and commensurate with growth in freight traffic as envisaged in the operational and marketing strategy of IR;
- Available assets were utilised and maintained efficiently; and
- Initiatives for improving IR's market share were adequate and effective.

1.6 Audit scope, criteria and methodology

The performance audit covered the five year period from 2004-05 to 2008-09. The scope of audit included study and evaluation of the major aspects that impact freight services such as infrastructure augmentation, utilisation of assets and initiatives for improving the market share of IR.

The various policy initiatives, guidelines and instructions issued by the Railway Board from time to time on the aforementioned facets of freight services were used as criteria for assessing the performance of IR. The audit methodology included examination of records at the Railway Board, Zonal Railway Headquarters and field locations and analysis of relevant quantitative data. A survey of owners /users of freight terminals was also conducted to harness their perception of freight services provided by IR. The survey questionnaire is given in **Annexure I**

1.7 Sample selection

The Performance Audit for evaluating freight services was conducted across all the 16 zones. Data was collected for the entire zone for trend analysis and

other macro level analysis. Micro analysis to evaluate the position obtaining in field locations was conducted on a judgmental selection of a representative sample of the various activity centres as indicated below: A representative sample of 173 major terminal/siding owners was surveyed in the zones.

Sl No	Activity centre	Sample selected
1	Division	39 Divisions
2	Terminals (Sidings /Goods Sheds)	110 terminals (loading /unloading terminals) handling more than 30 rakes per month
3	Inter-change points	53 points
4	Carriage and Wagon depot	47 depots

Detail of Sample size is given in **Annexure II**.

1.8 Acknowledgement

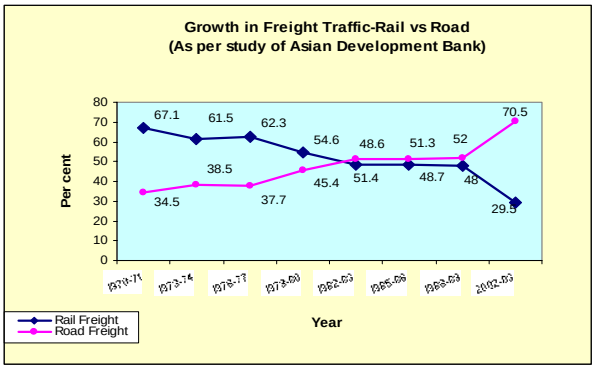
The audit objectives, scope of study and methodology were discussed with Member (Traffic) at Railway Board as well as with General Managers /concerned departmental heads in the zones by the Principal Directors of Audit during entry conferences. The inputs provided on various aspects including the suggestions on sample selection and the cooperation extended by railways is acknowledged with thanks. The audit findings and recommendations were discussed with Member Traffic, Member Mechanical and Member Engineering in an exit conference held in February 2010. Similar exit conferences were also held by the Principal Directors of Audit in the zones, with concerned zonal authorities.

1.9 Audit findings

The results of the Performance Audit of Freight services in IR are given in the following three sections.

- Augmentation of assets and infrastructure
- Utilisation and maintenance of available assets
- Improvement of freight market share

1.9.1 Augmentation of assets and infrastructure



Over the years, the railways' share of the total transport sector has come down from 53 per cent in the IV Five-year plan (1972-1977) to 37 per cent in the IX Five-year plan (1997-2002) due to inadequate investment in infrastructure and competitive weakness vis-à-vis other modes of transport. A study by Asian Development Bank also indicated a declining market share of IR as shown in the chart alongside.

The X Five-year plan (2002-2007), therefore, envisaged a target of 624 million tonnes of originating freight traffic by the terminal year of the plan (an average annual growth of four per cent from the terminal year of the IX plan period) and laid down detailed freight operational and marketing strategies to regain the lost market share, to strengthen the high density network and to improve efficiency, throughput and average speed of freight trains. The strategy also comprised operating freight trains by enhanced loading of wagons beyond their carrying capacity after complying with certain pre conditions to protect the permanent way (track) and rolling stock (wagons and locomotives). As a result during the X Five-year plan, IR recorded a phenomenal growth in freight loading and carried around 727 million tonnes of freight during the year 2006-07 at an average annual growth rate of 8.1 per cent. The XI Five year plan (2007 to 2012) emphasises on capacity enhancement to handle the projected growth in the medium and the long term through quick yielding investments.

A review of the augmentation of assets and infrastructure over the five year period from 2004-05 to 2008-09 revealed inadequacies in augmentation of rolling stock, modernisation of freight terminals and strengthening of permanent way and the capacity augmentation works were progressing slowly as brought out below:

1.9.1.1 Rolling stock

Rolling stock comprising of locomotives and wagons is the backbone on which freight movement depends. The augmentation of locomotives and wagons is planned centrally at Railway Board every year by means of a Rolling Stock Programme (RSP) and allotted to zones.

Locomotives

The augmentation of diesel and electric locomotives is primarily through the manufacturing facilities of Indian Railways – Diesel Locomotive Works, Varanasi (diesel locomotives) and Chittaranjan Locomotive Works, Chittaranjan (electric locomotives). Zones draw up power plans to assess and project their respective requirement of locomotives for passenger and freight services. As at the end of 2007-08, the overall holding of electric and diesel locomotives across IR was 3,443 and 3,933 respectively. A review of augmentation of locomotives vis-à-vis the requirement disclosed as under.

Augmentation of locomotives

Railway Board reckons the manufacturing lead time of locomotives as three years and accordingly plans augmentation considering the traffic projections, replacement of overaging fleet and funding constraints. However, the planning, was predominantly based on projected traffic requirements and was flawed since the planned annual augmentation of locomotives always far exceeded the manufacturing capacities of both Diesel Locomotive Works, Varanasi and Chittranjan Locomotive Works, Chittaranjan. IR primarily relied on its manufacturing facilities for augmentation of locomotives. The persistent gap between the annual requirements and manufacturing resulted in

heavy carry over of requirements (termed as throw forward) to subsequent years as tabulated below.

Types of locos	Year	Carry over balance	RSP Provision	Manufactured during the year	Throw forward
1	2	3	4	5	6
Diesel Locomotive Works (DLW)					
Main line locos	2004-05	94	208	121	181
4000 HP Locos		48	27	15	60
Main line locos	2005-06	181	126	148	159
4000 HP Locos		60	55	22	93
Main line locos	2006-07	159	0	186	(-) 27
4000 HP Locos		93	0	39	54
Main line locos	2007-08	-27	146	163	(-) 44
4000 HP Locos		54	161	59	156
Chittaranjan Locomotive Works (CLW)					
Main line locos	2004-05	114	124	90	148
6000 HP Locos		98	0	22	76
Main line locos	2005-06	148	107	129	126
6000 HP Locos		76	42	25	93
Main line locos	2006-07	126	209	150	185
6000 HP Locos		93	28	36	85
Main line locos	2007-08	185	286*	145	326
6000 HP Locos		85	205	55	234

**** Includes 100 locos planned to be procured from BHEL***

IR estimated a shortfall of 700 diesel and 700 electric locomotives by the end of the XI plan period and considered acquisition of locomotives to meet the shortfall apart from contemplating (August 2006) setting up of new manufacturing facilities for manufacture of High Horse Powered electric (12000 HP) and diesel (6000 HP) locomotives through Public Private Partnership (PPP) to cater to growing traffic requirements in the long term. In spite of heavy annual throw forward of requirements, IR continued with the strategy of augmenting locomotives largely from its existing manufacturing facilities at Varanasi and Chittaranjan rather than expeditiously exploring procurement options or alternatively enhancing the capacities of these units. Therefore, by October 2009, only 11 per cent (150 out of 1,400 locomotives) of the contemplated acquisition was provided for in the Rolling Stock Programmes (100 in 2007-08 and 50 in 2008-09). The first order on M/s BHEL was placed only in December 2007 and 11 locomotives have been received up to November 2009 from M/s BHEL

Further, the setting up of two green field locomotive manufacturing plants in Madhepura and Saran districts in Bihar through joint venture were still in the nascent stage three years after they were envisaged, though IR estimated the contracts to be in place by 2008-09. Owing to non receipt of bids from the short listed bidders, the projects were approved as production units by the Government (February 2009) but further processes were not yet initiated.

IR in its response (March 2010) conceded that it primarily relied on the production capacity of its Production Units for augmenting locomotives and accepted that there was a persistent gap in requirement and acquisition of both

electric and diesel locomotives. IR further mentioned that keeping in view the budgetary requirement for various projects the locomotive plants were again proposed to be taken up as joint venture projects. This highlighted that the planning process was flawed as the funding mechanism was not firmed up before obtaining Cabinet approval for setting up of these plants as railways' own production units.

Linkage with zonal power plans

The annual Rolling Stock Programmes had no linkage to the zonal power plans and was, therefore, not synchronised with requirements affecting the availability of locomotives vis-à-vis requirements in the zones. Shortage of electric locomotives was observed in five (SER, ECoR, SECR, ER and ECR) out of the eleven zones, which had electric traction (data was not available in two zones- WR and WCR); two zones (SCR and NCR) had assessed that locomotives were surplus to its requirement, while locomotives were commensurate with requirements in the other four zones (SR, NR, CR and SWR). Similarly, shortage of diesel locomotives was observed in three zones (SECR, NER and ECR) while in three zones (SER, NWR and SCR) the locomotives were in excess of requirements.

Owing to shortage of electric locomotives, zones were deploying diesel locomotives on electrified traction. In SER, which had 85 per cent of its route kilometers on electrified traction, the excess holding of diesel locomotives ranged from 126 (in 2006-07) to 152 (in 2004-05) locomotives during the period from 2004-05 to 2008-09 under review. Apart from lending diesel locomotives to two contiguous zones, SER was deploying diesel locomotives, which had a comparatively higher cost of operation, on routes with electrified traction. To have a perspective of the cost implication, deployment of diesel locomotives in 12 electrified sections, in SER, during the period 2004-05 to 2008-09 resulted in an additional expenditure of Rs.435.71 crore on fuel consumption alone. The zone stated that moving freight was the main objective and both diesel and electric locomotives had to be used to manage the growth of traffic. The fact, however, remained that due to shortage of electric locomotives, the zone carried traffic by deploying diesel locomotives, which had a higher cost of operation.

Further, in SCR even with introduction of improvised versions of diesel locomotives having lesser maintenance schedules, the zone while assessing its requirements of locomotives continued to provide a cushion of 10 per cent towards unforeseen repairs, while analysis revealed that locomotives receiving unforeseen repairs never exceeded seven and a half per cent.

IR in its reply (March 2010) mentioned that growth of traffic in most of the zones facing shortage of locomotives was above the IR's average growth and accepted that the increased overall growth in freight loading resulted in increased requirement of locomotives. As such the Rolling Stock Programmes of locomotives could not match the bare requirement of locomotives for efficient movement of freight traffic. IR also stated that diesel locomotives were deployed in electrified territories due to operational requirements (i.e. the locomotives were required to move from one non-electrified territory to

another with the load through an electrified territory) and that modern state-of-the-art diesel locomotives will work to a higher availability and will offset any disadvantage due to higher operational cost.

However, even in the scenario of overall shortage of locomotives in the system, availability of locomotives was surplus to requirements in some zones and therefore the deficiency in the system was non synchronization of the procurement plan with the zonal power plans. Further, presently the modern diesel locomotives comprised a negligible per cent of the overall diesel locomotive holding and therefore operating diesel locomotives under electrified traction invariably involved a higher cost of operation**.**

Management of locomotives

Inadequacies in the management of locomotives were seen in the zones. Rakes were persistently detained at freight terminals (goods sheds and sidings) for want of power (locomotives) even in zones that had adequate or surplus locomotives (SR, NWR). Out of 1,300 loaded rakes transported from Jaisalmer in NWR, during April 2006 to September 2008, 356 rakes comprising 27.38 per cent suffered detention due to delay in arranging power for double headed movement, involving a loss of earning capacity of Rs.4.63 crore. Similarly, in SR failure to arrange a high powered locomotive or alternatively a banker (additional locomotive) invariably detained rakes moving into Tamilnadu Electricity Board siding, Mettur Dam and Southern Iron Steel Company Limited sidings, Mecheri Road at Karuppur and Omalur stations involving a loss of earning capacity of Rs.8.89 crore. In J.K.Cement Siding of WR, which offered an average of 16 rakes of cement traffic per month, loaded wagons were constantly detained in the yard for a duration ranging from two to 59 hours due to non-availability of locomotives. From April 2006 to March 2009, 585 rakes comprising 58,078 wagons were detained for 4,99,805 hours causing loss of 20,826 wagon days.

IR while accepting (March 2010) shortages of locomotives vis-à-vis requirements added that in a system which had shortage of locomotives, detentions to rakes in certain pockets was unavoidable. However, detentions to rolling stock were constantly occurring even in zones with surplus locomotives and the management of locomotives was therefore inadequate**.**

Wagons

Augmentation of wagons is primarily from wagon manufacturers in public and private sector and a small fraction of the requirement is met from in house manufacturing in designated railway workshops. As at the end of 2007-08, the overall Broad Gauge wagon holding across IR was 41,532 wagons (in four wheeler units). A review of the position of wagon holding vis-à-vis requirements in the zones disclosed as under:-

- Performance Audit on Freight and Wagon Management contained in C&AG's Report on Railways (Report No. 6 of 2007) disclosed that wagon manufacturers in the public sector were persistently defaulting on supplying the contracted wagons and IR was continuously repeating orders on these manufacturers. Effective remedial measures were still

not in place and the public sector wagon manufacturers were only supplying 1,739 to 2,713 wagons every year comprising 33 to 51 per cent of the contracted wagons. Similarly, analysis of data for period 2006-09 disclosed that private manufacturers were also supplying only 5,445 to 7,170 wagons comprising 43 to 51 per cent of the contracted wagons leading to a heavy carry over of requirements adversely affecting availability of wagons in the zones.

Further, the persistent carry over of requirements of wagons and locomotives contributed to continuous non-utilisation of funds, ranging from Rs.387 crore to Rs.1,864 crore comprising 12 to 31 per cent of the total grant (both from budgetary support and IR's internal generation) for augmentation of rolling stock during 2006-09.

- IR formulated an Integrated Railway Modernisation Plan (IRMP) for implementation over a five year period (2005-2010) to address, among others, the growing demands of traffic and to modernise the freight business segment. This included induction of corrosion resistant stainless steel body wagons and light weight aluminium wagons to minimise the adverse effect of corrosion and high abrasions due to mechanised loading/unloading. IR also envisaged introduction of self steering bogies to reduce stress on track and rolling stock. IR while finalising its annual Rolling Stock Programmes for augmentation of various types of wagons was only considering a very low scale of augmentation of these improvised wagons. The pace of augmentation at the end of four out of the five year plan period indicated that the objective of the plan was not achievable by the envisaged period as shown below. Some zones (NWR, SWR, NR and ECR) did not receive any of these specialised wagons.

Sl No.	Type of wagons/ bogies	No. envisaged in IRMP	No. provided at the end of March 2009
1	Corrosion resistant stainless steel wagons	10,000	278
2	Light weight aluminium wagons	2,000	922
3	Self steering bogies	Not mentioned	Nil

- IR introduced (2006-07) Wagon Investment Scheme (WIS) to cater to the increased demand for wagons by inviting private investment in acquisition of wagons. The benefits envisaged in terms of rebate in freight and an assured supply of a guaranteed number of rakes to investors did not serve as an incentive as in 13 out of the 16 zones, no investor came forward to invest in the scheme. Out of the other three zones (SER, ECoR and SWR), while 91 customers opted for the scheme in two zones (SER-60, ECoR-31) only 15 customers opted in SWR. IR replied that the induction of rakes under the scheme was confined to a single commodity and was restricted to a few iron ore loading points with an assured supply of rakes, which created enormous pressure to fulfill other commitments of moving programmed traffic**.** The scheme, therefore, was not effective in harnessing customers for various other commodities and was withdrawn from April 2008 and a new scheme

namely Liberalised Wagon Investment Scheme (LWIS) was launched which is yet to fully materialize in the zone.

Thus augmentation of locomotives did not keep pace with growth of traffic in the zones owing to persistent manufacturing constraints and setting up of manufacturing facilities under PPP initiative were still in nascent stages. The initiatives envisaged in the IRMP for augmentation of specialised wagons were only partially achieved. Imbalances in availability of rolling stock vis-à-vis the requirements existed in the zones, warranting improved management.

Recommendations

IR needs to expedite augmentation of rolling stock to ensure that the rolling stock infrastructure adequately caters to the projected growth in traffic. IR also needs to address, on priority, the imbalances in the availability of rolling stock vis-à-vis the requirements in the zones.

1.9.1.2 Freight terminals

Freight terminals comprise goods sheds owned by railways and sidings owned by private parties. Efficient movement of rolling stock is dependant on various facilities provided at these terminals to enable faster loading and unloading of rakes without much detention to ensure that available scarce resources are optimally utilised. Modernisation of freight terminals, leveraging Information

Broken concrete basement at Jagdalpur goods shed

Technology and augmentation of private participation are some of the initiatives taken up by IR for improving freight services. A review of the adequacy of facilities provided at 110 freight terminals handling more than 30 rakes a month on an average, modernisation and Information Technology initiatives disclosed the following:-

Facilities in freight terminals

Facilities in freight terminals comprise direct reception and dispatch facility; all weather cemented/ tarred approach roads etc to enable quicker placement and removal of rakes and facilities such as a covered shed, mechanical equipment and weighment to enhance the quality and pace of loading/ unloading operations. IR also envisaged that terminals handling more than 30 rakes per month should have at least three lines for goods operations.

Partly covered shed at Pune goods shed

While planning the annual works programmes IR accorded priority to capacity enhancement works such as provision of new lines, gauge conversion and doubling works etc and terminal improvement works were planned to the extent of the remaining resources available. Allotment of funds towards Traffic facilities in the annual Budget Estimates also constituted barely 10 per cent of the allotment towards capital augmentation works, though the allotment increased from Rs.413.58 crore in 2005-06 to Rs.914.48 crore in 2007-08. Further, IR regularly surrendered about seven to nine percent of the allotment under Traffic facilities (ranging from Rs.41 crore to Rs.88 crore) during the three years 2005-08. As such, these basic amenities were not provided in a substantial number of terminals as shown below thereby adversely affecting placement, removal, loading/ unloading operations causing detention to rakes.

Sl No	Description of facility	Number of deficient terminals	Zones with deficiency in five or more terminals
1	*2*	*3*	*4*
Reception and placement facilities			
1	Separate engine escape line	47	CR , ECR
2	Direct reception /dispatch facility	48	CR, SER, SECR
3	Interlocking facility	62	SCR, CR, SER, WR, WCR
4	Track circuiting facility	80	CR, SER, WR, SECR, WCR, SCR, ER, NWR, ECoR,
5	Tarred approach road	39	CR, ECoR
6	Three lines for goods operations	23	ECoR
Loading and unloading facilities			
7	Fully covered shed	53	CR, SER, ECR, ECoR
8	Pucca circulating /handling area	44	CR, SER, ECoR, ECR
9	Lighting arrangement	23	CR
10	Loading and unloading equipment	41	CR, ECR
11	Weighment facility	56	CR, SR, ECR

In the absence of interlocking facility, the average time taken for manual operations for placement of rakes was one hour or more in 16 out of 59 terminals, of which in three terminals (Rourkela Steel Plant siding, OCL siding, Rajgangpur and JCP siding, Tatanagar) over SER, the average time taken was 18 hours, eight and a half hours and five hours respectively. In National Aluminium Company siding, Damanjodi in ECoR, though the siding authorities had deposited Rs.4.58 crore in phases with IR for undertaking interlocking and track circuiting works, IR did not commence any work till 2008-09 and insisted on an additional deposit of Rs.0.23 crore to commence work.. Similarly it was seen in ECR that due to non availability of direct reception lines in Raxaul and NarayanpurAnant goods sheds the rakes were first taken to the yard and then brought on to the goods shed for loading/unloading . In Raxaul, the rakes were being placed in the goods shed for loading only after 23 hours of its arrival in the yard.

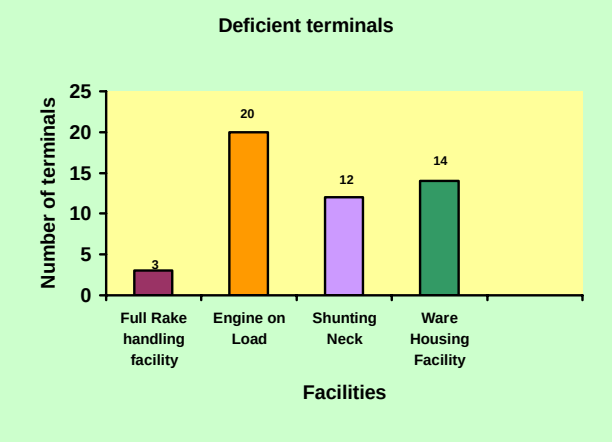
Further, absence of weighing facility at freight terminals exposed the system to the risk of overloading. It was seen in WR that goods trains were being detained for around two hours for weighment at the enroute electrical in motion Weigh Bridge at Viramgam alone. Though the number of trains detained at this facility has reduced from 3,000 trains in 2005-06, around 400 trains continue to get detained every year at Viramgam. The zone accepted that steps would be taken to further minimise this detention.

IR stated (March 2010) that 141 works costing Rs.831.60 crore were in progress for improvement/ upgradation/ provision of goods sheds and that upgradation of infrastructure was a continuous process. IR also stated that

development of reliable electronic in-motion weighbridge of the desired technical specification and the costs of 120 tonne weighbridges were the main reasons for slow proliferation. IR further added that instructions have now issued to all the zones for commissioning all planned/ proposed weighbridges quickly and as close to the loading points as possible**.**

However, a substantial number of terminals were not provided with even the basic facilities and IR needs to scale up its investment in traffic facilities. The management of resources also required improvement since the limited resources allocated for Traffic facilities was being persistently surrendered**.**

Modernisation of freight terminals



Recognising that most of the terminals on IR, other than the industrial sidings, suffered from inadequate infrastructure IR in its IRMP envisaged modernisation of freight terminals to provide quicker loading and unloading of rakes, improved turn around and customer satisfaction. Forty terminals were initially selected for modernisation and the list was later revised to 55 terminals. A review of facilities provided in 22 such terminals identified for modernisation disclosed that even modernisation works at freight terminals were not being planned by the zones and mechanisation of freight operations received low priority and were not taken up. Therefore, the facilities envisaged were not provided in many terminals as shown below even though four out of the five year period for implementation had lapsed.

The poor condition of some terminals and the pace of progress of works in terminals identified for modernisation, it is unlikely that the objectives of the IRMP would be met by the envisaged period as shown below:

- Sanctioned works on nine terminals in seven zones[1] were either not taken up or were in the preliminary stages such as finalising cost estimates, evaluation and placement of tenders. In two zones, works taken up in six other terminals[2] were progressing very slowly.
- Though full rake loading facility was available in Cuttack goods shed in ECoR, which on an average handled 33 rakes every month, the shed was lacking in basic facilities. The shed only had two lines as against the stipulated three. Even in these two lines, only partly covered sheds were

[1] Ghaziabad and Chandigarh –NR, Korukkupet and Tiruchchirapalli –SR, Salvordam –SWR, Sanathnagar- SCR, Navlakhi Port- WR , Solapur –CR and Kalumna-SECR..
[2] Laxmibainagar, Dewas, Mangliagaon , Chirai, and Gandhidham –WR and New Mulund goods terminal –CR

Chipped platform shed - Cuttack goods shed

provided and therefore each time about half a rake (15 to 19 wagons) was placed in the open. Further, the platform shed on one line was chipped to raise the traction wire and as a sequel the platform was exposed to rain water making it unsuitable for stacking food grains and sugar consignments during rainy season.

IR mentioned (March 2010) that modernization of freight terminals was a continuous process and that a number of works were in progress for upgradation of facilities in freight terminals. However, Audit observed that the pace of progress of these works was slow and thereby the objectives envisaged in the IRMP were not likely to be achieved within the envisaged period**.**

Private participation

In order to encourage the terminal or siding owners to invest in modernisation of terminals so as to reduce terminal detention of wagons by using modern methods of loading/unloading, the Terminal Incentive cum Engine On Load Scheme was launched with suitable financial incentive to siding or terminal owners. IR also offered a financial incentive by way of rebate in freight. The engine on load facility was applicable only in terminals where mechanical loading takes place and it was observed that mechanical loading facilities were not provided in many major terminals as shown in para 7.2.1 above. Therefore, there were no takers for the scheme in 10 out of the 16 zones. In the remaining six zones, only 66 parties opted for the scheme of which 51 customers were from one zone (SWR). The scheme was subsequently withdrawn in January 2009 and the initiative of augmenting private investment

for modernising terminals remained unsuccessful. A majority 54 per cent of respondents also opined that existing policies of IR were not providing adequate incentive to attract investments for improving facilities in terminals.

IR mentioned (March 2010) that a draft policy was under consideration to throw open development of private freight terminals for handling all types of rail-borne traffic (except outward iron ore and coal) to third parties**.**

Thus even major freight terminals across IR that handle more than 30 rakes every month were deficient in basic facilities. Modernisation of terminals by enhancement of facilities has not been fully implemented by the zones in most of the terminals leading to heavy terminal detentions of rolling stock. The objective of reducing detentions due to loading and unloading operations below 16 hours has not been achieved. Freight Operations Information System in its present state was not serving as a decision making tool.

Detention to wagons

Detention to rolling stock in freight terminals occur from the arrival of rake to its placement for loading/unloading (arrival to placement time), during loading/unloading operations (placement to release time) and till its actual departure (release to dispatch time) from the terminal. Analysis of detention details of terminals handling more than 30 rakes per month across IR for the period 2007-09 indicated that 54 per cent of the detentions occurred from placement of rakes to their release, when the basic loading/unloading operations take place.

Though Railway Board had advised the zones to restrict detentions from placement of the rake to its release to less than 16 hours, analysis in four zones (CR, ER, SCR and SWR) disclosed that in 60 out of the 87 terminals the average detention from placement of the rake to its release continued to be beyond the stipulated 16 hours due to deficient facilities in the freight terminals. Consequently, demurrage leviable from private parties for detention of rolling stock in terminals beyond the allowed free time for loading/unloading operations, were routinely waived across zones. SWR, however, mentioned that detentions had come down to nine hours between November 2008 and March 2009. Rake wise detention test checked for a period of ten days in the selected 110 terminals across IR during April to June 2009 indicated that the trend of detentions continued in the zones. Some of the major detentions observed and their financial impact are enumerated below:

- Kanakpura goods shed of NWR handling 45 rakes per month was opened for traffic in August 1995 without basic facilities. As a result, 86.87 per cent (483 out of 556 rakes) and 93.18 per cent (328 out of 352 rakes) of rakes suffered detention during 2007-08 and 2008-09 respectively causing a loss of earning capacity of Rs.18.99 crore. IR mentioned that the goods shed was provided with a siding, loading/unloading area and circulating space. However, it was seen that the other reception, placement facilities and loading/unloading facilities were not provided leading to persistent detentions to rolling stock**.**

- The unloading line at Ennore Port Limited siding in SR was partially wired to suit unloading by poclain cranes, which necessitated shunt moves for placement and removal of wagons. The consequential loss of Rs.9.19 crore due to detentions to wagons was not getting compensated as the siding was declared as an independent booking point.

IR accepted (March 2010) that the sudden jump in loading in the period under review resulted in shortages of locomotives and rolling stock and that currently the number of driving units in the system was substantially less than the number of rakes and thus detentions to rakes were unavoidable. Though IR claimed that by prioritizing facilities at terminals, detentions were reduced, Audit observed that the average detention from the placement of rake to their release continued to be beyond the envisaged time of 16 hours in a substantial number of terminals, indicating that the loading/unloading facilities were deficient in the freight terminals**.**

Leveraging Information Technology

Freight Operations Information System (FOIS) was developed by IR with a view to computerise freight operations and to provide a wide range of information to enable planning, direction and control of freight operations as well as to provide a real time view of transactions. IT Audit of FOIS was conducted across IR to assess the system design, reliability and timely availability of basic operating data, Information Systems controls and security environment. **The detailed findings are reported separately in Chapter 2**.

Broadly, it was seen that the system was largely being utilised to generate Railway Receipts. The system design was not comprehensive, the master data bases contained numerous errors and the system was not serving as a tool for decision making. Even though exhaustive details of demands of customers were captured to assess the load and to facilitate decisions on allotment of rakes using FOIS, decisions were taken manually defeating the very objective of capturing such exhaustive details.

Further, comparative analysis of manual data on detentions vis-à-vis the data reported through FOIS pertaining to nine terminals in SCR (whose details were only made available) indicated that the detentions details reported by FOIS were mostly understated and the extent of understatement ranged from 15 minutes to 32 hours, which indicated that the information was unreliable. Similarly, in ER, detention details were understated by FOIS ranging from 38 minutes to 57 hours in 21 out of 23 terminals.

IR in its reply (March 2010) stated that the discrepancies in reporting of detentions would be eliminated with full implementation of TMS along with control charting. IR also mentioned that zones were being advised to take appropriate measures to strengthen the internal checks**.**

Free time allowance

IR reduced the free time for loading/unloading from nine to seven hours at thermal sidings. The Committee constituted by Ministry of Power (June 2008) reviewed the infrastructure at 38 thermal power house sidings across IR and

concluded that the infrastructure was designed reckoning the free time as nine hours and therefore the reduction to seven hours was impracticable due to space and funding constraints. Unless IR initiates concerted action with the Ministries of Coal and Power, detentions of rolling stock beyond seven hours would continue to occur.

IR in its reply (March 2010) stated that the lower free time was prescribed to ensure faster release of wagons, which would correspondingly lead to greater availability of wagons for loading. However, since the Ministries of Coal and Power consider it impracticable with the current infrastructure, IR needs to initiate concerted action with these Ministries on priority for ensuring adherence to the prescribed free time allowance**.**

Feedback of terminal/siding owners

A majority of the 173 respondents to the survey of siding owners echoed similar sentiments as 52 per cent of them felt that mechanised loading/unloading facility was not available in terminals and that the free time allowed for loading was inadequate. 50 per cent of the respondents however expressed satisfaction over the approach roads, lighting, stacking area and the working hours at terminals. However, a significant 42 to 47 per cent of them felt that these facilities were inadequate.

Thus even major freight terminals across IR that handle more than 30 rakes every month were deficient in basic facilities. Modernisation of terminals by enhancement of facilities has not been fully implemented by the zones in most of the terminals leading to heavy terminal detentions of rolling stock. The objective of reducing detentions due to loading and unloading operations below 16 hours has not been achieved. Freight Operations Information System in its present state was not serving as a decision making tool.

Recommendations

IR needs to expeditiously provide the basic facilities in all freight terminals. IR should ensure that its initiative of modernisation of freight terminals is effectively implemented in the zones to minimise rolling stock detentions at freight terminals.

The system design and reliability of the Freight Operations Information System needs to be enhanced so that the IT application serves as a decision making tool as envisaged.

1.9.1.3 Capacity enhancement

IR projected freight traffic of 1,100 million tonnes by the terminal year of the XI plan (2011-2012). To handle the projected traffic volume, IR assessed that capacity augmentation and throughput enhancement works were essential and identified capacity augmentation and throughput enhancement works. IR also identified works for improving the rail connectivity with ports. Upgradation of the permanent way was planned to cater to the enhanced loading strategy. These works were over and above the works required to develop the Dedicated Freight Corridor. The overall annual outlay on capacity enhancement works ranged from Rs.4,365 crore in 2005-06 to Rs.8,650 crore in 2007-08.

The traffic density over IR indicated that the passenger trains outnumbered the freight trains. The increased number of passenger trains introduced every successive year contributed to congesting the available network and off-setting the capacity enhancement initiatives taken up annually. Notwithstanding the above, a review of these initiatives disclosed the following:-

Capacity augmentation works

IR identified the high density network routes across the railway network that included all the six Golden Quadrilateral routes (New Delhi- Mumbai-Chennai-Howrah) its diagonals and other feeder routes. IR evaluated that these routes comprise 28 per cent of the total route kilometers but accounted for 76 per cent of the total freight tonnage carried by IR. A total of 124 works were identified along these routes, which included gauge conversion, doubling, new lines, electrification on identified sections and automatic signaling works. A review of the progress of 38 works taken up in seven zones[3] indicated that:

- Twelve works[4] whose envisaged target date of completion ranged between November 2008 and December 2009 were delayed due to procedural delays in the pre tender finalisation stage and the physical progress of works taken up ranged from five to 70 per cent only.
- Another 16 works[5] whose target date of completion ranged from August 2009 to June 2011 have not yet been taken up. Most of these works were still in the preliminary stages of the tendering process such as drawing up of estimates, finance vetting and opening of tenders. The pace at which these works were progressing makes it unlikely that they would be completed by the envisaged period.

IR replied (March 2010) that during the first two years of the XI five year plan 513 kilometers of new lines, 2,112 kilometers of gauge conversion and 789 kilometers of doubling have been completed. However, Audit observed that procedural delays in the preliminary stages of tendering were delaying the progress of a substantial number of works, which needs to be addressed**.**

Throughput enhancement and other works

A review of the works taken up for throughput enhancement and port connectivity and progress of the Dedicated Freight Corridor disclosed that:

- During the entire X plan period (2002-2007) IR could only add 945 kilometers of New Lines and 1,363 Track Doubling kilometers as against the envisaged 1,310 and 1,575 kilometers respectively. This translated into an average annual addition of 462 kilometers of which only 189 kilometers comprised New Lines, which was inadequate considering IR's scale of operations in terms of its network of route kilometers, freight tonnage and passengers carried.

[3] SCR-8, NR-3, SER-3, ECoR-5, SECR-5, NFR-7, ECR-7.
[4] SCR-1, ECoR-4, SECR-1, NFR-6.
[5] SCR-2, NR-2, SER-3, SECR-1, NFR-1, ECR-7

- Out of the 86 throughput enhancement works identified by IR, the physical progress of 30 works which were planned for completion during 2009-10 and 2011-12 were less than 50 per cent. Of these, 10 works taken up during 1990-91 to 2003-04 were still in the land acquisition and earthwork stages and were progressing slowly. Seven other works were neither taken up nor their target dates determined.

  IR replied (March 2010) that overall 30 out of the 86 works would be completed by the end of 2009-10. However, as pointed out by Audit above, physical progress of works planned for completion during 2009-10 and 2010-11 were progressing slowly and were behind schedule and therefore the pace of progress of these works needs to be quickened**.**

- The port connectivity works taken up in three zones (SCR, ECoR and SER) were progressing slowly as shown below.

  - Haridaspur-Paradeep new line in ECoR was sanctioned in 1996-97 and was due for completion in June 2010. However, after more than 12 years, physical progress of the work was only 14 per cent as land acquisitions were still in progress. Further, out of the estimated 136 minor and 27 major bridges, only construction of major bridges was in progress and others were not yet taken up.
  - In SCR, laying of new line between Obulavaripalli to Krishnapatnam port sanctioned in 2007-08 with targeted completion in 2014 under phase I and the doubling work Samalkot and Kakinada port has been completed. The electrification work was still incomplete due to the zone's failure to include the work of a small patch of four kilometers from Kakinada port to New Block cabin in the original estimate. The material modification in the scope of work was pending sanction in Railway Board March 2010.
  - Similarly, in the 69.60 kilometer Panskura – Haldia port section in SER, the doubling work from Panskura to Rajgoda has been completed but the portion between Rajgoda to Tumluk remains to be completed and thus the planned port connectivity could not be achieved.

- The Dedicated Freight Corridor Corporation of India - a Special Purpose Vehicle - was set up in October 2006 to undertake planning and development, mobilisation of financial resources and construction, maintenance and operation of the proposed western and eastern corridors from Jawaharlal Nehru Port to Dadri (1483 kilometers) and Ludhiana to Dankuni (1806 kilometers) respectively. The project was at a very primitive stage. IR replied (March 2010) that the process of land acquisition was being closely monitored and funding tie ups with bilateral/multilateral funding agencies were at advanced stage and the loan agreement for the western corridor phase–I was expected to be signed in March 2010**.** The project cost initially estimated at 28,000

crore (January 2007) has almost doubled and is estimated at Rs.48,000 crore at present costs.

Permanent way

After enhanced loading was permitted on several routes, the permanent way (railway track) required strengthening to bear the heavier loads. The sections with 90R rails and/or steel trough sleepers were being identified in the zones and upgraded every year with 60 kilogram rails and PSC sleepers with a density of 1,660 sleepers per kilometer. However it was seen that even on routes identified for enhanced loading, in some zones (NCR and SWR) upgradation works on 115.54[6] kilometers were not taken up and in some others (NR, ER and NWR) the works taken up on 505.09 out of the planned 950.10 kilometers[7] were progressing slowly due to operational constraints such as non-availability of the sections and locomotives for testing the track. Similarly, while works of upgrading the sleeper density were not taken up in one zone (NCR) in some others (NR, NWR and SWR) works taken up on 558.20 out of 1,110 kilometers were progressing slowly.

Thus the progress of capacity augmentation, throughput enhancement, port connectivity works and upgradation of permanent way was behind schedule. Infrastructure augmentation was not commensurate with the projected growth in freight traffic and IR had a huge throw forward of 408 projects costing Rs.1,41,015 crore (including the Dedicated Freight Corridor) as at the end of March 2009.

Recommendation

IR needs to expedite the capacity augmentation, throughput enhancement and port connectivity works to ensure that the infrastructure is commensurate with the projected traffic volume. IR needs to effectively monitor and curtail procedural delays in works contracts.

1.9.2 Utilisation and maintenance of available assets

IR's phenomenal growth in freight loading in the recent past was due to efficient asset utilisation apart from adoption of market responsive strategies. The earlier performance audit on Freight and Wagon Management[8] and the multi disciplinary core committees constituted in the zones to oversee the impact of enhanced loading of wagons on some vital components of rolling stock and permanent way (railway track) provided ample evidence that the existing infrastructure was in fact over stretched. A test check of the current quarterly statistics continued to indicate that the wear and tear on rolling stock had increased manifolds as shown below:

[6] NCR-99.49, SWR(Bangalore Division) 16.05

[7] NR-232.90, ER- 95.87 and NWR-176.32 out of planned 541.92, 109.50 and 298.68 kms respectively.

[8] Chapter I of Report No 6 of 2007 of the Comptroller and Auditor General of India (Union Government Railways).

Parameter	Pre enhanced loading period Quarterly average of 2004-05	Post enhanced loading period Quarterly average of 2008-09
1	**2**	**3**
CBC and Draft Gears	158	760
Spring Defects	128	334
Stalling cases	15	37
Wagon Body defects	901	3547
Arisings in unloadables*		
A Category Repairs	602	1735
B category Repairs	460	1406
C Category Repairs	64	312

***** *Wagons forming part of rake damaged during loading /unloading & are unfit for loading*

The wear and tear on permanent way in terms of defects in track structure viz., rail fractures and weld failures had also increased significantly. The initiative of enhanced loading is, therefore, not sustainable in the long term unless it is accompanied by augmentation of assets and infrastructure.

IR in reply (March 2010) stated that due to heavy inputs given to track maintenance, rail fractures and weld failures have not increased significantly and that wear and tear on rakes was on the higher side, which was being controlled by providing additional springs to enable the rolling stock to carry heavy loads. However, current statistics continued to indicate that wear and tear on rolling stock continued to be perceptibly higher and there was no improvement in the defects to the track structure**.**

Further, viewed from the customer's perspective, efficient utilisation of assets should ultimately translate into efficient and effective delivery of freight services, which implies provision of a reliable and timely service. In the endeavour, it is also imperative that assets are efficiently maintained to enable optimum utilisation. A review coupled with the customer perception obtained by Audit through a survey of siding owners indicated inadequacy in supply of rakes to customers, inefficiencies in enroute stabling of rakes, interchange commitments and maintenance of rolling stock that affected the efficiency of freight services as brought out below.

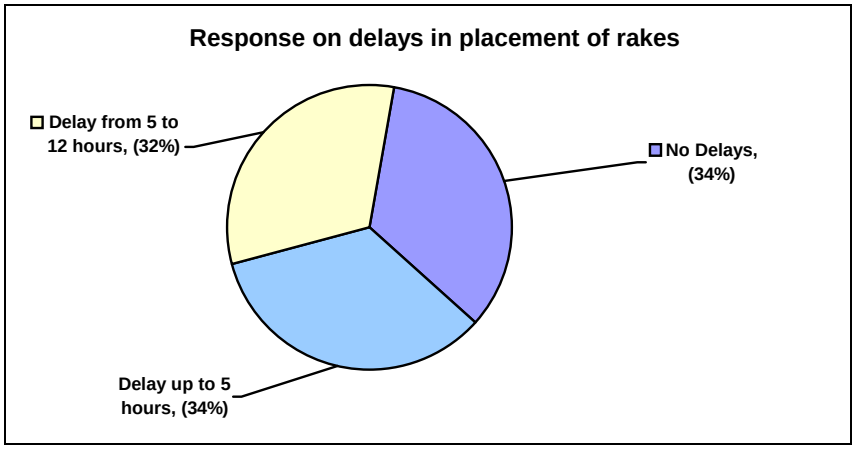
1.9.2.1 Utilisation of assets

Effective utilisation of assets calls for supply of rakes to customers as per demand and delivery of consignments at the destination minimising the enroute detentions to rolling stock. Enroute detention to rolling stock occurs either when the rakes are stabled or when the interchange commitments between zones and other operational agreements are not efficiently regulated. A review disclosed the following:-

Supply of rakes

Effectiveness of supply of rakes to customers assessed by the feedback received from terminal/siding owners indicated that:-

- Though a substantial 66 per cent of the respondents to the survey felt that information on availability of rakes were provided by IR, 52 per cent felt that on most occasions the rakes were not placed in the terminals for loading at the time preferred by customers. The respondents also felt that rakes were placed belatedly as shown below.



Forty eight per cent of the respondents, however, expressed satisfaction on the quality of rakes supplied, while another 55 per cent felt that rakes were moved by IR within a reasonable time after completion of loading.

IR in its reply (March 2010) conceded that IR would have to maintain extra cushion in rolling stock to ensure timely supply of rakes to customers and that at present there was a shortage of rolling stock. IR, however, added that maintenance practices were rationalised to reduce the ineffective time of the wagon fleet**.**

Some of the zonal initiatives for managing the supply of rakes to customers indicated that:

- Due to improper planning, WR continuously supplied 10,423 wagons in excess of demand to Mundra Port and Special Economic Zone Limited during the period September 2007 to March 2009, which were detained for 4,651.52 wagon days. As per the terms of the agreement, wagon hiring charges for such detention of wagons supplied in excess of demand was also not recoverable from Mundra Port and Special Economic Zone Limited and WR was losing out.
- Conversely, SCR carried bagged consignments of cement from five cement sidings in open wagons instead of in the normal covered wagons during 2006-07 to 2008-09 by offering concession in freight, which enabled the zone to earn revenue of Rs.88.06 crore.

Stabling of rakes

Rakes get stabled at various locations due to inadequate powering, non availability of path and inefficient management of crew adversely affecting freight operations. A test check of the extent of stabling of rakes in 32 out of the 68 divisions over IR revealed that:

- A substantial 15 percent of 4,32,634 rakes and 2,79,110 rakes booked during 2007-08 and 2008-09 respectively had to be stabled enroute on account of inadequate powering and non-availability of path. The average detention to rakes on account of in-adequate powering ranged from 2.19 to 17 hours during 2007-08 in six zones (CR, ECoR, NCR, SECR, SER and SWR), which marginally improved and ranged from 2.62 to 15 hours in 2008-09.

- Enroute stabling of rakes occurred even in zones which had adequate locomotives, due to inefficient management of locomotives. Out of 21,023 rakes that were stabled in 2008-09 due to inadequate powering, WCR alone accounted for 12,214 rakes, while three zones (NR, NCR and NWR) accounted for 6,116 rakes.

- Though the overall stabling of rakes for want of crew was not significant, NCR alone accounted for 68 and 72 per cent of the stabling cases during 2007-08 and 2008-09 respectively, indicating that the crew management in the zone was not efficient.

Interchange commitments and other agreements

Interchange commitments are commitments entered into on a day to day basis between contiguous zones for provision of a specified number of wagons/rakes at interchange points (where one zone hands over the rakes to the other zone). The interchange commitments between zones are vital for smooth and efficient operation of freight services, since freight trains transverse across zones to different destinations. The interchange commitments between the zones at selected interchange points were reviewed and disclosed that:-

- Shortfall in provision of the required number of rakes vis-à-vis the commitments was noticed in six (ECoR-21.09, NFR-16.34, NWR-8.32, SR-13.07, SER-1.53 and SECR-7.72 per cent) out of the 10 zones. Details of commitments made by the other six zones (ER, NR, SCR, WR, CR and NER) were not made available. Average detention to rakes at the selected interchange points ranged from three to 276 hours. Out of these, in three zones (ECoR, NCR and SWR) detentions to rakes were regularly in the range of 32 to 41 hours, which was substantial and required attention. Failure to meet the interchange commitments was mainly due to non-availability of path and precedence accorded to coaching trains, which warranted enhancement and/or decongestion of the route network.

  IR stated (March 2010) that passenger trains have substantially higher speeds than freight trains. In the existing operating system, it was inevitable to detain freight trains to give precedence to passenger trains due to their importance and speed differentials of the rolling stock. This reinforces the need to accord priority to enhance and/or decongest the route network**.**

- The agreement between WR and Kutch Railway Company Limited was not being efficiently managed. Periodic traffic plans estimating freight

traffic to be moved by rail on Kutch Rail project, though envisaged in the agreement, were not being prepared. As such, in Mundra Port Trust siding alone, WR lost 33,216 wagon days between July 2008 and March 2009, due to detention of rakes for want of power. The zone maintained that consolidated power plan was only prepared and that a separate power plan for Kutch Rail was not prepared.

IR in its reply (March 2010) has stated that power allotments are made on a day-to-day basis prioritizing areas that give maximum returns. The fact, however, remained that in the absence of traffic plans estimating freight traffic movement as envisaged in the agreement, detention of rakes for want of power could not be contained**.**

Thus inefficient supply of rakes to customers, frequent stabling of rakes and inefficient interchange commitments between zones mainly due to congestion of path were leading to heavy enroute detention of rakes, which was adversely affecting efficient delivery of freight services.

Recommendations

IR needs to ensure adequate availability of power to haul the freight train, besides curtailing stabling of rakes enroute and improve the interchange commitments between zones to minimise enroute detentions and to enhance the efficiency of freight services.

1.9.2.2 Maintenance of assets

To ensure regular availability, enhance reliability and productivity of locomotives and wagons, efficient maintenance is essential in sheds and workshops respectively. Preventive maintenance is carried out in IR through periodic overhauls. Efficient periodical maintenance of locomotives and wagons reduces the incidence of unscheduled maintenance. Under the existing scenario where the assets are already strained, scheduled maintenance was imperative. The quality of maintenance was reviewed and findings are brought out below.

Locomotive maintenance

Railway Board had advised zones to keep the movement of dead locomotives (locos that have failed) to the minimum. A review of the maintenance of locomotives in the selected divisions indicated that:

- Under the existing mechanism locomotives failing enroute in a run are brought to its home shed for repairs irrespective of the nature of repairs. Such movement of dead locomotives from the location of failure to the home shed, even for minor repairs, instead of to the nearest available shed results in extra expenditure on haulage apart from the loco being out of service for a longer period. During the period 2007-09, 463 electric locomotives and 876 diesel locomotives, which failed enroute in 27 divisions, were hauled back as dead to home sheds involving avoidable haulage of 6,81,098 kilometers. Of these, only 124 diesel locomotives pertaining to eight zones[9] had come for major repairs.

[9] ECoR-38, WR-42, NFR-2, NER-1, SER-11, SCR-11, SWR-6 and CR-13

- A test check of the quality of maintenance of locomotives in 42 diesel and electric locomotive sheds in 28 divisions for the years 2007-09, disclosed that several locomotives failed on account of poor workmanship in the sheds as tabulated below. Locomotives were also increasingly failing within a short span of six months of the periodic overhaul (POH), aggravating the shortage of locomotives in the zones.

Year	Traction	Locos on line (Nos)	Number of locos failing due to		Nos. of locos given premature POH	Locos failing with in short span of POH
			Bad workmanship	System failure		
1	2	3	5	6	7	8
2007-08	Diesel	3156	803	148	15	264
2007-08	Electric	2716	618	59	26	137
2008-09	Diesel	2927	683	71	7	136
2008-09	Electric	2606	699	46	26	122

Further locomotives were detained in workshops for want of spares. Nine locomotives were detained for periods ranging from 53 to 233 days in Krishnarajpuram Diesel Shed in SWR for want of power pack. The total detention, after allowing for seven days towards each replacement of power pack worked out to 1,386 days resulting in potential productivity loss of Rs.13.77 crore.

IR in its reply (March 2010) accepted failures of locomotives on account of poor workmanship in sheds/workshops and mentioned that the shortcomings in maintenance due to these failures were taken care of. The fact, however, remained that the quality of maintenance of locomotives in sheds required improvement especially in a scenario where locomotives are already in short supply and failures due to bad workmanship and equipment failures would aggravate the shortage further**.**

Maintenance of wagons

Primary maintenance of wagons is carried out in the wagon maintenance depots. Train examination (TXR examination) in wagon maintenance depots is periodically carried out to assess the condition of wagons and the TXR examination in freight terminals certifies the fitness of wagons for the next run. Analysis of records maintained in 53 wagon maintenance depots in 38 divisions and in 80 freight terminals across IR disclosed that:

- Out of the 9,632 wagons that were found defective with in a short span of their periodical overhaul during 2007-08 and 2008-09, 6,341 belonged to three zones (ECoR-2,818, SCR-2,312 and SR-1,211), indicating that the quality of maintenance in these zones required improvement.

- Railway Board advised (June 2008) the zones to bring down the total detention of freight trains for examination (from its arrival to its departure after TXR examination) from the IR's average of 14 hours (of which placement of trains for examination, the TXR examination and departure after examination accounted for 23 per cent, 32 per cent and

45 per cent of detention time respectively) to 11 hours. A test check of 53 wagon maintenance depots disclosed that in many depots the detention continued to be beyond the envisaged norm as shown below.

Year	No of depots where average arrival to placement time was beyond 2 ½ hours (23 per cent of 11 hours)	No of depots where average TXR examination time was beyond 3½ hours (32 per cent of 11 hours)	No of depots where average departure time after TXR check was beyond 5 hours (45 per cent of 11 hours)
2007-08	16	24	25
2008-09	34	23	23

While the delays in placement of trains for examination was mainly on account of lack of information on arrival of trains, inadequate infrastructure and operational delays, the TXR examination was primarily delayed in the depots due to inadequate manpower and deficient infrastructure leading to undue detention of rolling stock.

- TXR facilities were not available in 58 out of the 80 terminals selected. In the absence of TXR facility at the terminals /sidings, the rakes had to be hauled to the nominated depots located at the distance ranging from 1 to 400 kms. On CR and SECR alone, TXR facility was not available on 21 out of the 30 terminals booking traffic. Consequently, several rakes had to be hauled to a distance of 70 to 400 kms for TXR examination leading to detention of rakes for which incidentally no record was available with the Railway Administration.

- Further in SWR, due to deficient supervision the private agencies engaged by the consignors of iron ore for loading /unloading operations were extensively damaging the railway wagons due to reckless operations. Consequently, the damaged wagons (one to 30 wagons in a rake) were hauled in empty condition often for three to four trips before the rake returned to depot for primary maintenance and no deterrence mechanism was in place in the zone.

  The supervisory mechanism in freight terminals warranted review across zones since the defective wagon arising was showing an increasing trend. While 16,345 wagons out of 61,009 rakes were found defective in TXR examination in 2007-08, 18,375 wagons were found defective in 51,598 rakes booked during 2008-09 from the selected terminals.

Thus the quality of periodic maintenance in locomotive sheds was poor and warranted improvement. TXR examination in wagon maintenance depots continued to be beyond the envisage norm due to manpower and operational constraints apart from deficient infrastructure. Further non availability of TXR examination in all freight terminals was leading to avoidable haulage of rakes. Supervision of loading and unloading operations by private parties in freight terminals was also deficient in the zones.

IR in its reply (March 2010) contended that wagon ineffective percentage was around 2.7 per cent for the current year, which was below the laid down target of four per cent. IR's contention is not tenable as in 59 wagon maintenance

depots test checked by Audit in 38 divisions, IR failed to bring down the detention of freight trains for examination (from its arrival to its departure after TXR examination) to the stipulated 11 hours.

Recommendations

IR needs to enhance the quality of locomotive maintenance and address the infrastructural and operational constraints to strengthen the TXR examination at wagon maintenance depots. IR should provide TXR facility at all freight terminals to prevent avoidable empty haulage of rakes. IR should strengthen its supervisory mechanism over loading /unloading operations by private parties and institute effective deterrence on defaulting parties.

1.9.2.3 Performance parameters

Various performance parameters are a vital index to judge the performance of IR in the various facets of freight operations. Indices such as Net Tonne Kilometerage per engine hour and per wagon day, wagon kilometers per wagon day and wagon turn round have improved in most of the zones, indicating better asset utilisation. The reported wagon turn round statistics were, however, unreliable. Even though most of the zones reported wagon turn round ranging from 1.37 to 3.6 days in 2007-08, the All India Average stood at 5.23 days. Further the following indices registered a decline in some zones as shown below.

- The hours worked per day per engine in use is an index that indicates the per day utilisation of a locomotive in use. While the per day utilisation of locomotives was in excess of 20 hours in some zones, in many others (diesel-SR, ECoR, SER and WR, Electric- ECR, ECoR, SR, SCR, SWR, WR and SECR) the utilisation ranged from 13 to 17 hours only, indicating that locomotive utilisation in these zones required improvement.
- Similarly, the engine kilometers per day per engine in use on diesel traction declined in 2008-09 in five zones (SR, NWR, SWR, WCR and CR) when compared to 2004-05. On SECR, SWR and SR the decline was 19, 27 and 39 per cent respectively. A similar trend was seen on electric traction in three zones (SR, CR and SECR).
- Inspite of various capacity augmentation works under over IR, the average speed of freight trains did not show any perceptible increase. The average speed rose from 23.8 kilometers per hour in 2004-05 to 25.4 kilometers per hour in 2008-09 as against the maximum permissible speed of 60 kilometers per hour, which hampered efficient delivery and adversely affected their turn around.

IR accepted (March 2010) that traffic increased substantially in the zones without substantial commissioning of major throughput works and resultantly inefficiencies crept into running of trains due to which utilisation declined and speed did not substantially improve**.**

Recommendation

IR needs to review and improve maintenance and utilisation of locomotives and wagons, which would reflect on the performance parameters.

1.9.3 Improvement of freight market share

The freight market share of IR is driven by seasonality of demand. During the traditional busy season, the demand for movement of traffic peaks sharply putting considerable stress on the existing infrastructure. On the other hand, during the lean season, the demand falls sharply resulting in under utilisation of transport capacity. IR recognised that for some commodities such as iron ore and other minerals where it provides door to door service, IR had a competitive edge over other modes of transport. However, for other commodities, especially that of finished goods, which are transported either from siding to stations or from station to station, IR was losing out to road. IR had launched various freight incentive schemes to improve the market share and planned development of multi modal parks and other schemes to capture the road traffic. A review of these initiatives disclosed that these initiatives were either not evaluated or not implemented at all. This apart, zones were unable to achieve the loading potential as shown below.

1.9.3.1 Freight incentive schemes

The overall objective of the schemes was to enhance IR's revenue though they were also intended to project a customer sensitive image make over of IR. The schemes introduced in 2006 were broadly divided into three categories:-

S. No.	Freight Incentive Schemes	Brief description
1	Volume Growth Incentive Schemes	Aimed at promoting higher rail share of the existing users traffic
2	Cargo Aggregation Schemes	Aimed at capturing traffic not amenable to bulk movement in block rake. IR offers aggregation of cargo through warehousing facility
3	Consignment volume based schemes	Transportation options differentiated by volume of consignment booked to a single destination or two or multiple destinations

A review of performance of the schemes introduced revealed the following:-

- The freight schemes were operating sporadically in some zones and some schemes such as incentive scheme for rail co-efficient (a volume growth incentive scheme) was not operational in any of the 16 zones. Amongst the cargo aggregation schemes, the 'Freight Forwarder' scheme was in operation in NR only, while the 'Two Leg' scheme was in operation on NR and NFR only. The marketing strategy of IR aimed at capturing piece meal traffic was, therefore, only partially achieved.
- Neither was the scheme wise data maintained nor was the incremental loading on account of the various freight incentive schemes monitored by the zones. IR has maintained that its marketing efforts translated into freight incentive schemes and contributed to the average annual increase in freight loading. However, in the absence of scheme wise data the

extent of patronage and the effectiveness of the individual schemes were not verifiable.

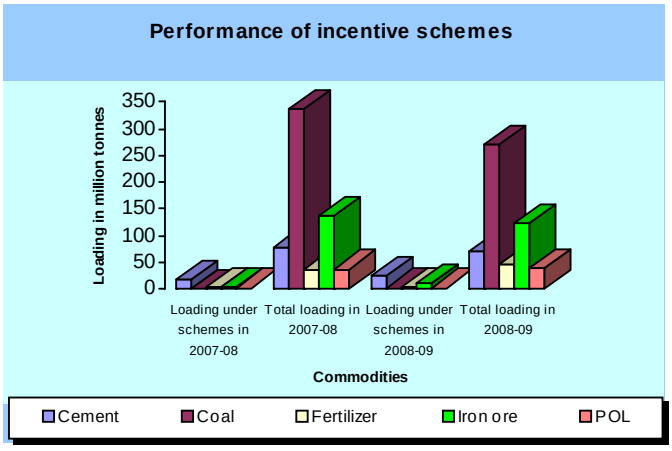
- The overall freight traffic booked under the various freight incentive schemes was 22.79, 38.41 and 46.34 million tonnes, which constituted only 3.02, 4.59 and 6.55 per cent respectively of the total traffic carried during 2006-07, 2007-08 and 2008-09. The commodity wise loading under freight incentive schemes vis-à-vis the total loading achieved for the commodity during 2007-08 and 2008-09 indicated that loading under the freight incentive schemes contributed to less than 10 per cent for all commodities except cement where the freight incentive schemes contributed to 23 to 33 per cent. Further, the overall annual growth of 8.1 per cent in physical loading was more or less corresponding to the average annual Gross Domestic Product growth of eight to nine per cent during the aforesaid period. Thus the incentive schemes at best contributed to retention of IR's market share and were not successful in improving the market share.
- Instances have also come to notice (NWR) where the customers misused the schemes by changing their names in the agreement with railways and misinterpreting the Board's orders. Further, the 'Two Leg' scheme allows 15 days' time for loading of goods in the second leg which was on the higher side considering that average wagon turnaround of IR was about six days.

IR mentioned (March 2010) that zones were directed to give wide publicity of the freight incentive schemes and to provide regular feedback so that the schemes could be modified periodically and that comprehensive guidelines were again issued in January 2010. IR also contended that its marketing strategy was not aimed at capturing piecemeal traffic since that role could be discharged more effectively and efficiently by container train operators.

IR's contention was not tenable as recapturing of piecemeal traffic, through aggregation of container and wagon load traffic to be moved in rake loads was one of its stated marketing strategy of the 10th Five Year Plan of IR**.**

1.9.3.2 Other marketing initiatives

To attract road traffic IR planned to develop multi modal parks under a Public Private Partnership initiative for aggregation of freight for onward transport by road. IR also envisaged development of Roll – On-Roll-Off (RoRo) door to door service to provide the facility of



transporting trucks loaded on a train to provide door to door multi modal service with greater customer satisfaction. These initiatives envisaged in 2005 have still not materialised. Respondents to the survey felt that apart from providing door to door service, transporting by road provided greater operational flexibility, lesser intermittent handling and consequential damages. Majority of the respondents, however, expressed concern over the pilferage of cargo enroute and IR's efficiency in settling their claims, implying that IR would have to address these issues as well to effectively capture road traffic.

IR mentioned (March 2010) that the initiatives such as Special Freight Train Scheme, Automobile Hub, Kisan Vision Project for attracting investments in PPP mode for logistics parks and in wagons were still in the policy formulation stage**.**

1.9.3.3 Loading targets and loading potential

A review of the freight loading achieved by zones vis-à-vis the targets fixed by Railway Board and the loading potential available disclosed shortfalls in achievement of targets and loading potential in some zones as shown below.

- Shortfall in achieving the loading targets was observed in eight out of the 16 zones in one or more commodities as tabulated below.

Commodity	Year	Per cent shortfall w..r.t. targets (average)	Zones in which the loadings fell short of the targets
1	2	3	4
Coal	2006-07, 2007-08	9.03	SER, ER
Cement	2006-07 to 2008-09	8.06	SCR, WCR, ER
Fertiliser	2007-08, 2008-09	6.57	SR, SWR, WCR, NFR
Food Grains	2005-06 to 2007-08	20.52	NR, NFR, ER
Iron Ore	2005-06 and 2008-09	14.96	SCR, SWR, ECoR
Pig Iron & Steel	2008-09	9.65	SER, SWR, ER

- An analysis of the freight loading achieved by the zones during the years 2006-07 to 2008-09 vis-à-vis the loading potential available based on the number of wagons available and wagon turn round revealed that the loading potential was not fully utilised in some zones (CR, NR, SCR, SER, SR and WCR). The under utilisation ranged from 18 per cent in SR to 44 per cent in CR.

Thus the performance of freight incentive schemes was not assessed and the marketing strategy to improve the market share of piece-meal traffic was not fully achieved considering that the overall growth in freight loading corresponded with the growth in GDP. IR's initiatives of capturing the road traffic through development of multi modal parks, Roll on Roll off schemes have not yet materialised though four years have lapsed since it was envisaged. Zones were not able to achieve loading targets and were not fully utilising the loading potential available.

Recommendations

IR should evaluate the incremental loading derived from incentive schemes and modify the schemes suitably to enhance the freight market share.

IR needs to expedite all the Public Private Partnership projects to effectively harness private investment. The other initiatives aimed at capturing the road traffic also needs to be quickened. Alternatively, IR should explore other means of capturing such traffic in the short and medium term.

IR needs to monitor the loading potential available in the zones and ensure that they are optimally utilised.

Chapter 2

Freight Operations Information System in Indian Railways

Executive summary

Freight Operations Information System (FOIS) was implemented in Indian Railways as an initiative to leverage the use of Information Technology in the freight segment as an aid to decision making and to ultimately improve the freight services. After successful completion of trials and its implementation in Northern Railway, the system comprising two modules- Rake Management System and Terminal Management System- was rolled out to all the zones over Indian Railways. This was an ambitious project introduced, inter alia, to enhance the accuracy and reliability of operating data to provide a real time view of transactions and to serve as a decision making tool in allotment of rakes to customers and improved asset turnaround.

The Information Technology Audit conducted to assess the comprehensiveness of system design, accuracy and timely availability of reliable data apart from the adequacy and effectiveness of IT security disclosed several deficiencies. Indian Railways has since incorporated several features and developed additional software to strengthen the system and has addressed some of the issues pointed out by Audit. Indian Railways was of the view that the initial difficulties of field staff had considerably reduced and railway management responsible for planning and operation of trains was now maintaining checks at various activity points to ensure timely and sequential input of data.

However, much more needs to be done as system design still did not incorporate all the business rules relating to freight operations and interface mechanisms were not fully established. The input validation controls were inadequate and deficient leading to numerous errors in the master databases. FOIS required extensive manual interference and accounting of freight revenues also continued to be done manually in the field locations. The system, in its present state, was unable to provide an updated and reliable 'real time' information to assist the operating/ commercial management and field supervisors in short term planning as envisaged.

2.1 Highlights

The system was not comprehensively designed to incorporate all the relevant business rules relating to freight and posed operational constraints. Consequently, the perceived objectives of Freight Operations Information System were not fully achieved even after more than seven years of its implementation.

(Para 2.9.1.1)

Interface mechanisms with weighbridges and other applications were yet to be established limiting the utility of the application. Some processes were performed manually exposing the system to the risk of input and processing errors.

(Para 2.9.1.2)

The master data bases contained numerous errors and validations were either absent or deficient which adversely affected reliability of data. The operating data was also being input in the system belatedly due to weak monitoring mechanism in the zones. The system was, therefore, not geared to provide a real time view of the freight operations.

(Paras 2.9.2.1 to 2.9.2.3)

Decisions on rake allotment were being taken manually in the zones, defeating the objective of capturing elaborate details on registration of demands of customers in the system.

(Para 2.9.2.3)

Both physical and logical access controls were weak and maintenance of back up data was defective. Network security was inadequate exposing the system to increased Information Security risk.

(Paras 2.9.3)

2.2 Gist of recommendations

Indian Railways should rectify the system to incorporate all the relevant business rules relating to levy of freight.

Integration of the system with weighbridges and other applications needs to be expedited to eliminate manual interventions and attendant risk of data entry errors.

Inaccuracies in master data need to be rectified on priority. Indian Railways should institute appropriate checks for input and process validation as also for updating master data to enhance reliability.

The monitoring mechanism needs to be strengthened to ensure that field locations input the transaction details promptly so as to provide a real time view of operations and to facilitate decision making as envisaged.

Indian Railways should strengthen the physical and logical access controls to monitor and prevent unauthorised access. Effective off-site storage of back-up data needs to be maintained and network security needs to be strengthened.

2.3 Introduction

Indian Railways (IR) depends on freight traffic for the bulk of its revenues. Freight is subject to frequent changes based on the freight marketing policies and initiatives launched from time to time. The sheer size and complexity of

operations, lack of continuous cargo visibility and end-to-end commitment to freight customers necessitated development of a system for availability of information on freight operations as an aid to decision making. Freight Operations Information System (FOIS) was initially sanctioned in 1983-84. The application software -Traffic Reporting and Control System- procured from Canada, customised as centralised application for FOIS at a cost of Rs.74.38 crore (up to March 1996) failed at the trial stage as an interface could not be established with the subsystems indigenously developed by the Centre for Railway Information System (CRIS) and was abandoned in 1996.. Subsequently, IR developed and implemented FOIS with the help of M/s Computer Maintenance Corporation (CMC) Limited and CRIS.

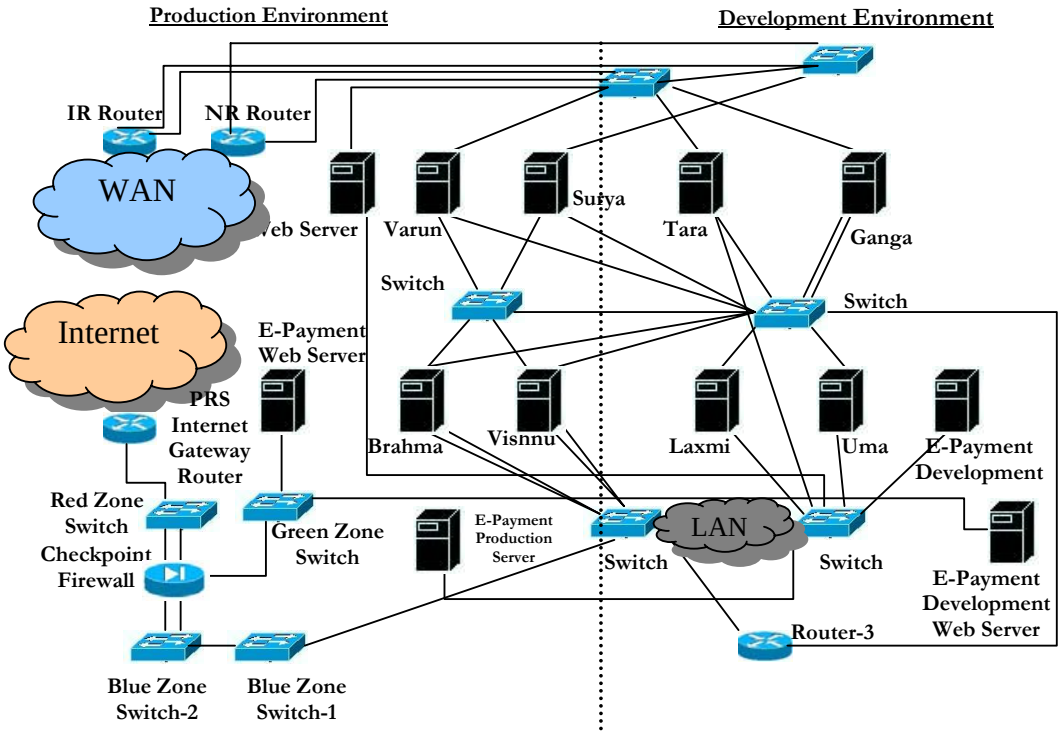
A prototype of FOIS application software comprising Rake Management System (RMS) and Terminal Management System (TMS) was developed and implemented in Northern Railway in 2000. RMS covered various operational functions relating to routing, tracking and yard activities and had seven sub-modules while TMS covered the commercial activities pertaining to goods' sheds such as generation and accounting of Railway Receipts etc and had 11 sub-modules. Subsequently, M/s CMC developed an upgraded production version of RMS and TMS to make it apposite for IR.

2.4 System architecture

The design conforms to the state of the art client server technology using middleware and a Relational Data Base Management System (RDBMS). Application servers at the CRIS are networked and linked to a central database for global level transactions. The central database acts as the repository of all current and historical data. The application is interface-ready for web-based services like connectivity to customers and e-payment gateway interface.

The hardware includes two Compaq/HP Alpha server ES-45, two Compaq/HP Alpha server DS-20 having RA-8000 storage system (3.2 TB storage space) with DAT drives, 16 ports SAN switch, personal computers (Client/Console machines), printers, UPS, Routers, Dial up modems, Switches, VSAT etc. System software includes Oracle 9.2.0 RBDMS as backend on TRU-64 UNIX 5.1B PK4 cluster platform with BEA Tuxedo 8.1 as middleware and Visual Basic as presentation layer, Pro-C as front end, PL-SQL for business logics and XML for MIS reports. The FOIS network plan utilises a mix of the available terrestrial network of IR, leased BSNL lines and a satellite network (V-SAT) to ensure reliability.

System architecture of FOIS



2.5 Objectives of computerisation

The objectives of computerisation of freight operations included:

- enhancing the accuracy, reliability and timely availability of basic operating data pertaining to events in the field locations;
- providing a wide range of information updated in 'real time' facilitating operating management for better planning, direction and control of freight operations and revenue accounting;
- efficient scheduling and quick turnaround of rakes to enable effective and optimum utilization of the assets and resources;
- facilitating acceptance of customers' orders, billing and cash accounting of freight traffic from identified nodal customer centers, which might not be the handling terminals; and
- global tracking of consignments in real time and seamless availability of pipeline of consignments for timely planning and just in time inventory management

2.6 Organisation structure

The organisation of Chief Administrative Officer (CAO), FOIS was created in 1994 for implementation of FOIS on Indian Railways. CAO (FOIS) works under administrative control of the General Manager, Northern Railway. The accounts and finance work is dealt with by Financial Advisor and Chief

Accounts Officer (Construction), Northern Railway. Field units for implementation of FOIS exist in all zones under Chief Operating Managers.

The RMS terminals in the divisions are managed by operating staff – train clerks and guards at yards, by controllers in divisional control office and are monitored by Senior Divisional Operating Manager. Similarly, the TMS terminals are managed by commercial staff- goods clerks/supervisors in goods sheds and by assistant officers in commercial branch in divisions and are monitored by Senior Divisional Commercial Manager.

2.7 Audit objectives

The IT Audit on Freight Operations Information System was conducted with a view to assessing whether the:

- System design was comprehensive and effective in providing information on freight operations and revenue accounting for review, coordination and monitoring;
- Mechanism to enhance accuracy, reliability and timely availability of basic operating data at locations was adequate and effective; and
- IT security was adequate and effective

2.8 Audit scope, criteria and methodology

The scope of audit covered audit of project management covering IT Plan, system analysis, design, development, implementation and post implementation review. Apart from the general controls covering change management mechanism, system and network security, disaster management and business continuity plan, the application controls covering input, processing and output controls were evaluated.

The rules and provisions contained in Indian Railway Conference Association's Goods Tariffs, Indian Railway Stores codes, decisions, guidelines and orders issued by Railway Board from time to time, procedures defined by FOIS administration and best practices prevalent in IT environment were used as audit criteria.

Audit methodology included scrutiny of records at CAO (FOIS) office, CRIS office at New Delhi and at different field units of various zones, online queries, discussions with concerned officials. Simulation tests were also conducted and FOIS data was analysed using Computer Assisted Audit Techniques (CAATs). The audit findings and recommendations were discussed in an exit conference held in February 2010 with Member (Traffic) in Railway Board, who stated that FOIS had been of great help to IR and the deficiencies pointed out in the system by Audit are being taken care of.

2.9 Audit findings

The audit findings are given in the following three sections:

- System design
- Data reliability
- Information System security

2.9.1 System design

The system was developed to computerise freight operations and to provide a wide range of information to enable planning, direction and control of freight operation. Additional features such as identifying nodal customer centers to facilitate acceptance of customers' orders, billing and cash accounting of freight traffic from other than handling terminals were also planned. For effective utilisation, it is essential that the system is comprehensively designed encompassing all the relevant rules and providing interface mechanisms to eliminate or alternatively minimise manual intervention. Audit observed deficiencies in the system design due to improper mapping and updation of rules and inadequacies in interface mechanism as brought out below:

2.9.1.1 Improper mapping of business rules

Business rules governing levy of freight were not fully incorporated while designing the system requiring frequent manual interventions. The system also imposed operational constraints as brought out below:

- **Generation of Railway Receipts**: The system did not have a provision to generate all types of RRs and to cancel a prepared RR as shown below:
  - Multiple RRs could not be generated in cases where customers were entitled for a number of RRs for booking multiple commodities under the Freight Forwarding scheme requiring manual intervention (SR).
  - In colliery sidings, destinations are changed even after issue of RRs due to operational reasons. There was, however, no provision to cancel the prepared RR and issue a fresh one. Despite repeated requests of the TMS locations at Asansol and Andal, Durgapur Steel Exchange Yard of ER to CRIS**,** the system was yet to be rectified (ER).
  - In sidings with inadequate capacity to accommodate an entire rake formation, loading was done in piecemeal and the system could not generate RRs until the entire work of loading or unloading was completed. Consequently, the system was not recognising the placement or withdrawal timings of wagons in such sidings and various charges leviable towards inadequate capacity of sidings could not be charged through TMS, requiring manual interference (New Jalpaiguri CS siding and Food Corporation of India/ NGC siding in NFR).
  - As a corollary, in most of the zones (NR, NER, WR, NFR, SECR, CR, SER, ER, SR, SCR, SWR, NWR and ECoR) manual corrections had to be carried out by the operators on the printed RRs due to generation of erroneous RRs.

  IR in its response (January 2010) stated that the manual interference in RR preparation has progressively come down and accepted that the system does not cancel RRs once issued. IR further stated that the locations where

complete consignment cannot be loaded at one time, rules exist for recording their times of placement and withdrawal.

The mechanism built in for generation of multiple RRs and RRs for consignments loaded in piecemeal was defective as observed in the zones mentioned above, which required rectification**.**

- **Computation of chargeable weight:** IR decided (Rate circular 76 of 20 July 2007) that all Broad Gauge routes would be treated as CC+6 routes (CC+6 tonnes over the carrying capacity allowed on such routes) with the exception of certain routes on which the chargeable weight of commodities was different from those on CC+6 routes. The logic was improperly built into the system and consequently freight charges were improperly levied as per CC+6 routes even on exempted routes resulting in refund claims from customers[10].

  IR mentioned (January 2010) that the business logic was built into the system and the process of updating the referential data was being followed. However the fact that cases of improper levy were detected in three zones indicated that the logic was improperly built in the system**.**

- **Levy of terminal charges:** As per extant provisions (Rate circular 58 of 29 May 2007), **a** terminal charge at the rate of Rs.10 per tonne (revised to Rs.20 per tonne for all traffic other than iron ore and container traffic with effect from 1 February 2008) was leviable for loading/unloading of loose or bulk commodities at both railway owned originating and destination terminals. The rule was not properly incorporated in the system and terminal charges were incorrectly levied on terminals/sidings owned by private parties and the RRs were manually modified to ensure correct levy of charges[11]. Conversely, terminal charges were not levied in some locations where both the originating and destination terminal were owned by Railways (e.g. Kalamboli in CR).

  IR mentioned (January 2010) that there was a provision in the system to periodically monitor the correct status of terminals and that the cases pointed out could pertain to sidings whose status were not corrected in the system. Though regular exercises have been done to update the data base in case of omission, users in the field have instructions to correct RR's before and after printing.

- **Levy of Busy Season surcharge**: Busy Season surcharge was imposed on the applicable base freight rates from 1 November 2006 to 31 March 2007 for certain classes of commodities. Due to an improper

[10] (Ambala to Simogha on NR, Fertilizer Siding, Rashtriya Chemical Factory, Trombay to Kadur via Miraj, Hubli and Kalamboli goods shed to Kalmeshwar on CR, BCSW/Satna to Raxaul via Manikpur Junction, Allahabad City, Varanasi and Chapra Kacheri, Jaypee Rewa Cement siding, Satna to Warshliganj, National Fertilizer siding, Vijaipur to Sharsa and Khageria on WCR)

[11] (Rajbandh of ER, Chambal Fertiliser Chemical Limited, Bhanora and BCSW/Satna of WCR, Bharat Petroleum siding Trombay, Associated Cements Company siding Wadi and Godhani locations of CR, BRPN siding of NFR, PGFC, Bargarh Road, Indian Oil Corporation siding Barauni of ECR, Food Corporation of India sidings in SEWR-ECoR, NR, and Hubli- SWR, GRPB/Bajva of WR, LIPL of SECR and Rudrapur City of NER)

logic built in, system computed the surcharge on total freight, instead of the base freight rate (SWR).

IR mentioned (January 2010) that application of the business logic was monitored. However, the monitoring mechanism was inadequate as the logic continued to be defectively implemented and the busy season surcharge levied by the system was incorrect.

- **Adjustment of Wagon Demand Registration fee:** There was no-provision for adjustment of the refundable portion of the Wagon Demand Registration Fee against the freight charges on the freight paid consignments (SCR, ER, ECR and WCR)**.** Similarly, though some customers were exempted from payment of this fee, the system did not have the provision to process the exemption. As such, the fee was shown as collected while booking the consignment and after loading of wagons it was shown as refunded though no real transaction had taken place (JVSL siding of SWR).

  Accepting the deficiency, IR mentioned (January 2010) that the business logic was being developed in consultation with CRIS**.**

- **Availing Train load benefit:** Though a minimum of 10 wagons should be loaded for each destination for availing Train load benefit, the system allowed this benefit to loads with less than 10 wagons (SR, ER and NWR). System also could not calculate freight on train load rates in case of mixed composition of rakes resulting in overcharges (SECR).

  IR **stated** (January 2010) that the provision of giving train load benefit **had been** incorporated in the system. However, it was seen in Audit that the system allowed the benefit to loads less than 10 wagons, which was contrary to extant rules**.**

- **Levy of demurrage charges:** Demurrage charges are levied when goods are not loaded into or unloaded from the wagons. At FOIS locations across all zones, the facility to compute demurrage charges were not provided in the system and were being manually calculated**.** IR replied (January 2010) that the feature would be incorporated in the system.

- **Availability of data for mining:** At present, FOIS data of the last 15 days could only be retrieved by the zones. In the absence of mining of data, the zones were unable to compile data for analysis. Further, accounts department in the zones was capturing the data again from RRs to prepare Machine Prepared Abstract and for other accounting purposes resulting in duplication of work.

  IR mentioned (January 2010) that the module for data warehouse and e-working was sanctioned, which would also address the provision for data mining**.**

- **Inbuilt help:** For providing a mechanism of error handling, error messages are displayed by the system. A review of the error message file revealed that multiple error codes were allotted to same error message.

Eleven error messages had multiple error codes. Thus, error handling procedure was not effective.

IR mentioned (January 2010) that all application based errors had a different code but accepted that for errors pertaining to database several error messages could have the same code**.**

2.9.1.2 Lack of an interface mechanism

The system did not have the planned interface mechanisms and was not integrated with other applications leading to manual calculations as shown below:

- **Interface with weighbridges:** As per Railway Board instructions, all wagons/rakes should be weighed before preparation of RRs and the system was to capture details of weighment of wagons from the weighbridges at the time of calculation of freight and generation of RRs. No interface was, however, developed between the TMS terminals and weighbridges. Consequently, the operators at TMS terminals were required to input the wagon details into the system manually exposing the system to the risk of data entry errors IR while accepting audit contention (January 2010) **stated** that such interface mechanism was being developed.

- **Integration of FOIS with other applications:** Integration of FOIS with other applications like Crew Management System, Integrated Coach Management System, Control Charting Operations and Web enabled Claim Application was not done in the zones**.** Similarly, despite specific instructions of Railway Board (June 2006), accounting freight earnings and its apportionment to the zones could not be achieved due to non–integration of FOIS with Advanced Financial and Railway Earnings and Expenditure System (AFRES) and as such the exercise was being carried out manually and input into AFRES .

  IR in its response (January 2010) accepted the audit contention and added that the Control Office application was proposed to be integrated with FOIS and the e-working module envisaging freight accountal using data generated by FOIS was under implementation**.**

Thus, the system was not comprehensively designed to incorporate all the relevant business rules and posed operational constraints. The system also did not have a mechanism to interface with weighbridges and other applications, which limited its utility. Consequently, the perceived objectives of FOIS were not fully achieved even though more than seven years have lapsed since FOIS became operational. Some processes are still being performed manually exposing the system to the risk of input and processing errors.

Recommendations

IR should rectify the system to incorporate all the relevant business rules relating to levy of freight.

IR needs to expedite integration of the system with weighbridges and other applications to eliminate manual interventions and attendant risk of data entry errors.

2.9.2 Data reliability

In order to achieve the perceived objectives of enhancing the accuracy and reliability of basic operating data pertaining to events in the locations, availability of a wide range of 'real time' information for better planning and monitoring of freight operations and global tracking of consignments in real time, the database needs to be complete with a high level of integrity and the events in the field need to be captured immediately on their occurrence. Further the successful functioning of FOIS - an input intensive system-largely depends on the effectiveness of the input control system. Audit observed that the master data contained errors, inputs were delayed and incomplete preventing real time view and input controls/validations were either absent or deficient as brought out below:

2.9.2.1 Deficiencies in the master data bases

Generation and updation of master data (i.e. geographical data/station booking profile, siding data etc.) suffered from weak validation controls, which led to discrepancies in the data maintained in the system as brought out below.

Wagon master

The wagon master contained master data of the total availability of wagons in the railway network. Deficiencies observed in the master wagon database were as follows:

- Even though Railway Board had adopted (2003) a system of allotting numbers to new wagons consisting of 11 numerical digits, which was subsequently revised to 10 numerical digits (first two digits indicating the type of wagon, the next two the owning railway, the subsequent two the year of manufacture, the next three the individual wagon number and the last digit indicating the check digit for validation), incorrect wagon numbers consisting of less than the prescribed 10 digits or inadmissible characters were present in the Wagon master (SCR, ER, WR, SR and SER) due to deficient validation control in the wagon number field. Instances of wagon numbers with the pre revised 11 digits were also seen in the computerised database at WCR (Jaypee Rewa siding).

  A review further revealed that when the wagon number was not found in the master, the TMS locations were allowed to prefix/suffix characters 'A'/'D" before/after the wagon numbers while generating RRs and releasing wagons with consignments. While this was solving the operational issue of clearing consignments, such cases were not validated/ reviewed before updating the master. As a result, the master data was inflated and did not reflect the actual wagon holding. A test check in four zones (ER, NR, CR and SR) alone disclosed that the database indicated an inventory of 65,630, 39,408, 54,907 and 25,125 active wagons against an

actual holding of 37,615, 17,563, 48,219 and 11,155 active wagons owned by these zones respectively.

- Details of tare weight and carrying capacity of wagons were incorrectly shown for 15,644 and 848 wagons respectively. In some cases these details were kept blank in the master file (NR, ER, CR, SR, SER, SCR, NFR and NWR).
- New types of wagon like BRNHE, BTAL and TORXC introduced in Railways was not updated in the Wagon master and the master file was therefore incomplete (ER, CR, NFR and ECoR).

IR in response (January 2010) mentioned that a pilot project on fitting RFID tags to the referential data base of wagons was being carried out in ECoR to facilitate automatic input of wagon details through reading of RFID tags by strategically placed readers.

Distance tables

Commercial Inspector and Traffic Inspector of Accounts are jointly responsible for entering the chargeable distances at a TMS terminal both for inward and outward traffic. The following irregularities were noticed regarding the authenticity and completeness of distances entered in the system:

- Users at TMS locations had the facility to directly feed routes/distances in the master tables which was not authenticated at supervisory levels leading to discrepancies in database.
- For several entries in the station index master table, the actual distances were not entered. Though freight calculations are generally based on chargeable distance, for routes falling in the ghat section freight is based on the actual distance. In the absence of actual distance figures, freight charges for such routes could not be calculated by the system requiring manual intervention. (SCR).
- A test check of a sample of ten pairs of stations indicated that the distances available in the database varied from two to 1,149 kilometers from their actual distance (SR). Similar discrepancies were noticed in other zones also (SCR, NWR, NR, SER and NFR). Further, discrepancies were noticed in the distance between pairs of stations in the 'Up' and 'Down' directions (NWR). The chargeable distance was also shown as zero against various cases (SCR and NWR).

IR in response (January 2010) stated that with the introduction of Rates Branch Software and its integration with FOIS, the chargeable distance was now calculated by the system and that timely updation of data was ensured. However, due to weak monitoring mechanism discrepancies with reference to the actual distance continued to exist in the system.

2.9.2.2 Inadequate input validation controls

Deficiencies in the input validation controls were observed as brought out below:

- Instances of inconsistencies in placement and release time of rakes were noticed in the zones (ER, CR, NR, SR, WR, SER, NWR, WCR and NFR) indicating that the information was either incorrect or deficient. In 24,005 cases it was observed that the commercial placement time (the time at which the operating department has placed the train for loading/unloading)and release time(the time at which the rake has been dispatched) of wagons were the same Further, in 294 rakes it was seen that the commercial placement and release times had a difference of one hour or less while in 30 rakes the difference was of five minutes, indicating that the entire train was loaded/unloaded in less than one hour /five minutes, which was impossible.

  IR in reply (January 2010) mentioned that with the proposed integration of Control Office application with FOIS the discrepancies between reporting of time would be eliminated**.**

- 'To-Pay' surcharge as applicable from time to time is to be levied in all cases where the freight exceeds the Credit Note Cum Cheque limit (CNCC limit- the monthly limit fixed for freight acceptance based on lumpsum deposits made with IR). Due to lack of input of basic data like "Lump Sum account of Customer" the system failed to levy 'To-Pay' surcharge amounting to Rs.0.16 crore (OCL Siding at Rajgangpur of SER). Similar cases were also noticed in ER, ECR and NER (Rudrapur City).

  IR mentioned (January 2010) that the CAO FOIS and the zones were responsible for feeding data in the data base. The reply only reiterated the defined responsibility without indicating the quality of implementation. Audit observed that the responsibility was not effectively discharged in the zones and the monitoring mechanism was weak.

- Instances of incorrect input were also noticed. Out of 42 BOST empty wagons placed at DSEY location of ER, only 17 were shown as loaded from DSEY and the rest were shown as loaded at some other location(s). Similarly, in NWR it was seen that out of 599 wagons loaded on 22 July 2008 for STPB, 238 were incorrectly shown in the system as diverted to some other station (Birdhwal), while the wagons were physically delivered at STPB.

  IR mentioned (January 2010) that regular update of referential data base and scrutiny of MIS reports served as internal checks for timely detection and correction of such mistakes. The fact, however, remained that incorrect input could be entered into the system due to inadequate input validation controls**.**

- Invalid transaction data were noticed in the zones. It was observed in NR that, in respect of 3,591 transactions, the delivery date was prior to RR date. The system even accepted future date for forwarding note such as dates for the years 2019 and 2021 (NR). Further, fields to capture details of forwarding note, invoice id, commodity code, RR notes etc contained either 'zeros' or were left blank in many records (SR, ER and NR).

IR mentioned (January 2010) that the system was built on the concept of sequential reporting and therefore delivery of goods could take place only after it was booked on the system against **a** particular RR. The response was partial**.** Inadequate validation controls **were** evident as the system accepted invalid values in date and other fields**.**

- All cash transactions done at FOIS locations/stations should be accounted for at locations and be reflected in monthly station balance sheets. A review of station balance sheets revealed that the opening and closing balances of different stations in the zones (NR- Patiala, Ambala, Chandigarh and SCPD, SCR-Ranajitpura, SR- Chettinad Cement siding, SER-Muri, ER-Dankuni) varied from the actual balances. In some Balance Sheets the balances were incorrectly shown as zero or as minus figures (SR and NR). Therefore manual cash records and balance sheets were being maintained at FOIS locations/stations. As such, financial data produced by FOIS system was not used for financial accounting.

  IR mentioned (January 2010) that the functionality was being developed as a part of e-working module and Chandigarh goods shed of NR was identified for conducting the pilot project**.**

2.9.2.3 Delayed and incomplete inputs

To enable the system to provide a real time view it is also essential for the field locations to update the system as and when the transactions take place. Deficiencies were observed in the process of updating data. These are brought out below:

- Various transactions were being input in the system after considerable delay. The system in fact accepts back reporting up to five hours (at present reduced to four hours). As such data pertaining to rake formation, wagon details, loco particulars etc. are not always entered in the system on real time basis. Therefore, one of the main objectives of FOIS- Global tracking of consignments in real time was not effective. Additionally instances of missing or unconnected wagons and payment of compensation continued to persist in the zones (SCR, SR and NER), which bear further evidence that the global tracking of consignments in real time was not fully achieved. IR mentioned (January 2010) that with integration of Control Office application, details of running of trains would be available on real time basis.

- Moreover, Railway Board's master policy circular of 14 January 2005 envisaged registration of demands received from customers in the system by capturing details such as load (rake/piecemeal), single or multi party consignor(s), rake commodity, traffic type, priority class, rake type, stock type etc to enable assessment of requirement and to facilitate a decision on allotment of rakes with the aid of FOIS. The demands were, however, initially recorded in a manual register and were input into the system only after a decision on allotment of rakes was taken manually, defeating the very objective of capturing such exhaustive details in the system.

IR mentioned (January 2010) that instructions already existed for registration of demands as soon as forwarding note is received at TMS locations. This, however, was not being ensured in the zones**.**

Thus, the master data bases contained numerous errors and validations were either absent or deficient which adversely affected reliability of data and reports generated by the system. The operating data was also input in the system belatedly due to weak monitoring mechanism in the zones. Further, decisions on rake allotment were being taken manually in the zones, defeating the objective of capturing elaborate details on registration of demands of customers in the system. The system was, therefore, not geared to provide a real time view of freight operations.

Recommendations

IR should initiate necessary action on priority to rectify the inaccuracies in master data and institute appropriate validation checks while updating master data to enhance reliability. Necessary checks and validation controls need to be incorporated to ensure that only correct data is entered and processed.

The monitoring mechanism needs to be strengthened to ensure that field locations input the transaction details promptly so as to provide a real time view of operations and to facilitate decision making as envisaged.

2.9.3 Information System security

The system which manages the railways' core activity of freight operations should have an efficient and time tested security in place to ensure Confidentiality, Integrity and Availability of information and communication system that store, process and transmit data. Though the system was equipped with a security module encompassing password and backup policies, Audit observed that the system suffered from security deficiencies posing unacceptable risks as shown below:

- **Physical access:** Access of unauthorised persons to the FOIS locations was not restricted. There was no mechanism for preventing any unauthorised physical movement of customers and for continuous surveillance, indicating that the physical access controls were weak (ER, SER and SR)**.**

  IR mentioned (January 2010) that instructions would be reiterated to zones to ensure segregation of areas and to prevent unauthorised access in both TMS and RMS locations**.**

- **Logical access:** Logical access controls protect the application and underlying data files from unauthorised access, amendment or deletion. The logical access controls were weak as shown below:

  - As per the defined procedure, usernames were to be created in the system only after assigning a specific role to the user depending upon the functions performed while Audit observed that the role of the users were not defined as per actual requirements and users had no logical

linkage with the actual functions entrusted. A common single user was defined in the system for various locations.

- Further, common User ID and password with all privileges were allotted to/shared by all level of users at various locations.
- The passwords were stored as plain text instead of in hash values in system tables. The User IDs and passwords were sent as open text through messages, which was not in consonance with good security practice. Further even though the system provided for changes of password periodically, the system accepted the same password repeatedly (SR).

- **Offsite back up:** There was no procedure for back-up of data in the zones. Off site back ups were not being maintained out of CRIS headquarters. Security of DAT tapes containing daily/ weekly/ monthly onsite backups was not ensured as it was not kept in a fire protected environment and the tapes were not properly labeled. Backups were never tested for restoration.

  IR mentioned (January 2010) that FOIS keeps off site back up of the application. The reply does not address the issue of back up of data. Audit had observed that off site back up of data was not ensured. Further, on site back ups were not secure and were never tested.

- **Disabling proxy location:** The system was designed to operate from a proxy location in case of a disruption to the original designated location. It was, however, seen that the proxy location had to be manually disabled when the original location was restored, which had an inherent risk of the proxy location remaining active for an indefinite period of time (NR and ER).

- **Network security:** Network security management encompasses deployment, maintenance and monitoring of the effectiveness of network security controls to safeguard information and information systems and protect supporting network infrastructure. Effective network security management practices also require established and documented procedures that provide instructions for system to restart and recover in the event of system failure in a short time. Network security was inadequate in the zones as shown below:

  - Anti-virus software was either not installed in terminals or not updated regularly at various locations of NR (Shakurbasti, Patiala, Ambala, Jallandhar City, Firozepur, Chandigarh, BPHT and Thuglakabad mineral siding) NER and SECR.
  - FOIS terminals were found infected with virus/Trojans at locations (TMS Chandigarh and Patiala) and were frequently shutting down at very short intervals due to virus, thus interrupting the smooth functioning at locations (NR).
  - The computers used at CRIS for database administration and software development for FOIS application had internet facility, in violation of

the Railway Board's orders (October 2004), exposing the system to the risk of external threats (NR).

IR mentioned (January 2010) that FOIS intranet was secure and there was no direct connection to the internet and that CRIS intranet was totally segregated from FOIS intranet. IR also mentioned that it was the responsibility of the zones to maintain the antivirus software through AMC contracts. However, FOIS terminals were found infected by virus and antivirus software were either not installed or not updated in locations, which required effective monitoring**.**

Thus, both physical and logical access controls were weak and maintenance of back up data was defective. Network security was inadequate exposing the system to increased Information Security risk.

Recommendations

IR should strengthen the physical and logical access controls to monitor and prevent unauthorised access. Effective off-site storage of back-up data needs to be maintained and network security needs to be strengthened.

Chapter 3

Implementation of Corporate Safety Plan in Indian Railways

Executive Summary

The primary requirement of train transportation is to ensure safe, speedy, reliable and punctual movement of passengers and goods to various destinations in the country. Over the years, various safety review committees have recommended the formulation of a Corporate Safety Plan indicating the policy/objectives and strategies for achieving the objectives and to set bench marks for safety achievements.

Accordingly the Indian Railways formulated the Corporate Safety Plan for the period 2003 to 2013, with a fund outlay of Rs.31,835 crore. This envisaged a safety action plan directed towards continuous reduction in risk level to its customers. The Corporate Safety Plan was divided into two phases, the first phase to be completed by 2008 and the second phase by 2013.

The progress in achieving the objectives of Phase I of the Corporate Safety Plan and the action plan laid down for implementing Phase II, other than Signalling & Telecommunication and Disaster Management, which were covered earlier, were reviewed in the Performance Audit.

The study revealed that the Indian Railways could not fully achieve the target of Phase I in providing ballast, improvement works at level crossings for road users' safety etc. Target for replacement of overaged locomotives technological improvement on maintenance of track and bridges, upgradation of freight train examination facilities etc. also could not be achieved.

The development of various new technologies for improvement in rolling stock, permanent way etc., that reduce the risk level to Rail users, which was entrusted to the Research, Design and Standards Organisation (RDSO), was behind schedule.

The targets fixed for conducting safety audits and drives by multi disciplinary teams at zonal and Railway Board level could not be achieved in many zones and records of such audits and drives conducted were also not maintained properly in many zones.

Targets fixed for reduction in various defects on track, rolling stock, overhead equipments were also not achieved by many of the zones.

While the overall accident figures have come down over the years, a few types of accidents like level crossing accidents, collisions etc. increased in some zones.

Though human error proved to be the major cause of many accidents and resultant loss of life, the Indian Railways failed to provide improved facilities for the running staff, modernization and upgradation of training facilities. Indian Railways were also not able to fill all the safety category staff vacancies.

3.1 Highlights

- **Execution of track renewal work on MG line identified for gauge conversion resulted in infructuous expenditure of Rs.48.26 crore in SCR.**

(Para 3.9.1.1)

- **There were 223 overaged BG diesel locomotives on line over Indian Railways.**

(Para 3.9.1.2)

- **Utilisation of funds allocated for undertaking road safety works under Railway Safety Fund was less than 65 percent during the period from 2003 to 2009. The progress in replacement of level crossings with ROB/RUB was very slow. Only 12.62 percent of the identified level crossings have been replaced so far. Progress of other improvement works at level crossings as proposed in CSP was also very slow.**

(Para 3.9.1.3)

- **Preventive rail grinding works to tackle the problem of gauge corner cracking of rails could not be carried out due to non availability of Rail Grinding Machines. These machines are yet to be procured.**

(Para 3.9.1.4)

- **20 percent of the wagons weighed at way side weigh bridges were found overloaded and such wagons were allowed to proceed endangering the condition of the track. Further, targets for reduction in defects on track, rolling stock and overhead equipments could not be achieved in most of the zones.**

(Para 3.9.1.5)

- **Progress of modernization and upgradation of training centres was very slow. There were vacancies in safety category posts in all the zones.**

(Para 3.9.1.6)

- **No mid term review has been conducted in the zones except in ECR and NER.**

(Para 3.9.2)

- **No specific action plan has been drawn in eight zones and Metro Railway, Kolkata for implementation of Phase II of CSP.**

(Para 3.9.3)

3.2 Gist of Recommendations

- Better planning needs to be done before undertaking the track renewal works of MG/NG sections so that no expenditure becomes infructuous while taking up the gauge conversion works later on. Adequate ballast hoppers should be provided to the zones so as to clear the deficiency of ballast on the track which is vital for safety of train operations. Overaged locomotives need to be replaced on priority basis.

- Since most of the accidents with maximum casualties are taking place at level crossings, Indian Railways should strictly implement all the

improved safety features at the LCs as recommended in the CSP. Indian Railways needs to take proper action to curtail the undue delay in adoption of improved technology to strengthen track safety as proposed in the CSP.

- Indian Railways and RDSO need to accelerate the research work so as to implement the new technology for speedy and safe train operations.
- Indian Railways needs to focus on implementation of the recommendations of CSP for inspection and management of bridges. Necessary data regarding the defects detected on various items of track, rolling stock, OHE etc. should be maintained for making comprehensive evaluation of the safety risks. Defects should be brought down to the minimum. Overloaded wagons should not be allowed to run on track.
- Indian Railways should take necessary action to complete the periodic safety drives and audits of safety installations and take corrective actions. The monitoring mechanism of Indian Railways should be geared up so as to achieve reduction in accidents and casualties on all zones and also to achieve the overall objectives of Corporate Safety Plan.
- Indian Railways should fill up all safety category posts and also take necessary steps to reassess the requirement of staff, in view of introduction of modern technology, to bring down the requirement to a realistic level.

3.3 Introduction

The primary requirement of train transportation is to ensure safe, speedy, reliable and punctual movement of passengers and goods to various destinations in the country. During the last four decades, four Safety Review Committees have investigated the deficiencies and suggested reforms for improving safety of the Railway system. The Railway Safety Review Committee (RSRC - 1998), which was the last one in the series, in Part-I of its report recommended that Indian Railways (IR) should immediately formulate a comprehensive Corporate Safety Plan which will, interalia:- i) clearly state the safety policy/objectives and strategies for achieving them; ii) unambiguously enunciate the basic tenets and requirements of safety; iii) prioritise the safety related works and indicate the timeframe as also investments proposed; and iv) set bench marks for safety achievements.

Accordingly the IR formulated the Corporate Safety Plan (2003-2013) in August 2003 which envisaged a safety action plan directed towards continuous reduction in risk level to its customers, implementation of suggested system reforms, imbibing better safety culture, enhancement of asset reliability etc. Though the Corporate Safety Plan (CSP) was made for 10 years, most of its achievable targets were divided into two phases. Phase-I covered the period between 2003-08 and Phase-II the remaining period up to 2012-13. This was done to have a mid-term assessment with changed circumstances, advancement of technology and assimilation of devices. The funds required for safety enhancement works, including SRSF, outlined in the CSP were Rs.31,835 crore.

3.4 Organisation Structure

Though the Railway Board retains the ultimate responsibility for ensuring safety, various departments like Civil Engineering, Mechanical, Electrical, Signalling and Telecommunication were responsible for implementing the CSP with the Safety Department being the nodal department to monitor the implementation. At the Zonal Railway level, the General Managers were ultimately responsible for achieving the safety objectives and all the above departments at Zonal Railways were responsible for implementation of the CSP with safety department being the nodal department for monitoring the implementation.

3.5 Audit objectives

The objectives of the Performance Audit were to assess:-

- Whether the targets of the CSP (Phase-I) up to the period 2008 have been achieved?
    - Whether the replacement / renewal of assets have progressed as planned?
    - Whether the introduction of new technology / improved design has taken place as planned?
    - What has been the progress in the areas identified for research for safety improvement?
    - Whether the steps identified, for improving maintenance practices/ improving asset reliability and thereby inculcating a safety culture, have been taken?
    - Whether the planned investment in human resources has taken place?
- Whether the progress of the CSP has been reviewed through a mid term review at the zones / Railway Board?
- Whether any action plan has been laid down for the items to be implemented in the latter half of the CSP?

3.6 Audit criteria, methodology and scope

Scope: Phase-I of CSP was to be implemented from 2003 to 2008. Hence the Performance Audit covered the five year period 2003-08. However the aspects in respect of Signalling and Telecommunication and Disaster Management in the CSP have been excluded from the scope as they have already been covered in Report No. 26 of 2008-09 and Report No. 8 of 2008 respectively.

Criteria: The criteria adopted was the benchmarks indicated in the Corporate Safety Plan (2003-13), RSRC (1998) Report, guidelines and instructions issued by the Railway Board and relevant codes and manuals of the IR.

Methodology: The audit methodology followed was examination of records at the Railway Board, Zonal/Divisional Headquarters and field offices. Data collected from Zonal/Divisional Headquarters was verified with that of basic

records available in field offices. Physical Inspection, surveys and interviews were also used wherever found necessary. Entry and exit conferences were held in zones and Railway Board to obtain the views of the Railway executives.

3.7 Sample Selection

At the macro level data was collected from all Divisions, Workshops and Zonal Headquarters. For micro analysis of specific issues the sample selection was made as detailed in Annexure III.

3.8 Acknowledgement

The audit objectives, scope, methodology and findings were discussed by the Principal Directors of Audit in the zones with the respective General Managers/concerned departmental heads in entry and exit conferences. The input provided on various aspects including suggestions and support provided by railway officials while conducting the audit is acknowledged with thanks. The co-operation extended by Railway Board during the course of audit is also appreciated. The findings presented in this review were discussed with the Railway Board in an exit conference held in February 2010 and their suggestions/remarks are included in the report.

3.9 Audit Findings

The results of audit are given in the following sections:

3.9.1 Achievement of Targets of Phase I of Corporate Safety Plan for the period up to 2008

3.9.1.1 Track related works

A. Track Renewals

Periodic renewal of the railway track is necessary to ensure its continued ability to withstand the expected traffic. IR assessed the total track renewal at the beginning of April 2003 as 10705 km and provided an amount of Rs. 4894 crore (net) for the purpose under SRSF. The work was to be completed by March 2007 as envisaged in the CSP. A review of track renewal works under SRSF revealed that by March 2008 two zones (NWR and ECR) could not achieve the target in spite of exceeding the final grant of expenditure. This was mainly due to increase in cost of material, delay on the part of contractors in execution of work etc. It was also noticed that in eleven out of sixteen zones (CR, ER, NR, NWR, SCR, SER, NER, ECR, SECR, SWR and WCR) the expenditure exceeded the final grant under SRSF, whereas remaining five zones could not fully spend the funds allotted to them. At the end of March 2008 an amount of Rs.597.73 crore remained unutilized in SRSF which was later transferred to DRF. It was further noticed that in CR, funds worth Rs.19.75 lakh were diverted for other than track renewal works.

IR in February 2010 stated that as the ground reality differs on each Railway the progress cannot be uniform and there has been a complete track renewal on almost 100 percent of the identified track, because of which there has been

a vast reduction in number of derailments. The track renewal works under SRSF were almost completed and the funds allocated under SRSF were fully utilized. However the fact remains that IR almost completed the track renewal only by March 2008, i.e. after a delay of more than one year, and still a small portion of track is yet to be completed.

B. Track renewals/maintenance of MG/NG sections

CSP identified 9000 kms of Metre Gauge/Narrow Gauge (MG/NG) track for conversion to Broad Gauge (BG) which would take up to the year 2013. It was further proposed that track renewal works on these tracks would be done using mixed gauge PRC sleepers so that at the time of gauge conversion, no part of expenditure becomes infructuous. During the review it was noticed that in WR three works of track renewal on the section identified for gauge conversion were taken up. In NER, fourteen works on the identified sections were taken up. Similarly in ECR three works were taken up and in NFR ten works were taken up, where gauge conversion was proposed. However mixed gauge PRC sleepers were being used only on two sections of NFR. This would render the expenditure on sleepers used on other sections infructuous when gauge conversion is carried out by the year 2013.

Railway Board directed (June 2003) that where gauge conversion work is sanctioned and is likely to be completed by March 2007, keeping in mind the economy measures and financial interest of the Railway along with the safety parameters, heavy investment should not be made on the lines which have already been included in the Gauge Conversion Plan. In SCR it was noticed that gauge conversion was sanctioned on Guntakal-Dharmavaram-Pakala section in April 2003. Despite the above orders, track renewal work was taken up and completed in 2006-07. The stretches of track between Kalluru-Dharmavaram was abandoned within three months after completion of work rendering an expenditure of Rs.6.05 crore infructuous. This has already been commented in the Railway Audit Report No.CA 19 of 2008-09. Later the entire section of Guntakal-Dharmavaram-Pakala was also closed within seven months after completion of track renewal works, for taking up gauge conversion work rendering an expenditure of Rs.48.26 crore infructuous.

C. Provision of Ballast

Provision of adequate ballast is very essential for proper up-keep of track. To wipe out huge arrears of ballast deficiency it was proposed under CSP to procure 3800 Hopper wagons by 2008 through Rolling Stock Programme. Though most of the zones placed indents with the Railway Board for ballast hoppers, the combined total of hoppers received by the zones was only 3036 as of March 2008. The deficiency in provision of ballast as of March 2008 was 1148839 CUM over IR and the deficiency over zones ranged from 4000 CUM (0.50 percent) in SER during 2005-06 to 614867 CUM (58.06 percent) in SR during 2004-05.

IR in February 2010 stated that recently in view of higher axle load running and universalisation of CC+6+2 tonne load running, track standards have been upgraded. Large deficiency of ballast was mainly due to this upgradation.

Every year more than 100 lakh CUM ballast sufficient for 10,000 track KM is being taken and progress of deep screening and ballast supply has been consistently good and targets were almost achieved in procurement. However the fact remains that despite achieving the target of procurement the deficiency of ballast over IR was 11.49 lakh CUM as of March 2008 mainly due to non availability of adequate ballast hoppers, which affects the safety of track.

Recommendation

Better planning needs to be made before undertaking the track renewal works of MG/NG sections so that no expenditure becomes infructuous while taking up the gauge conversion works later on. Adequate ballast hoppers need to be provided to the zones so as to clear the deficiency of ballast on track which is vital for safety of train operations.

3.9.1.2 Rolling Stock – Replacement of overaged locomotives

CSP proposed the replacement of overaged locomotives by new locomotives with enhanced safety features. Year-wise replacement plan was also drawn up by the CSP. The replacement of overaged diesel locomotives, which were 213 as on March 2003 and estimated to go up to 819 by the year 2013, was planned to be 90 locos per year from 2003 to 2008 and 74 locos per annum from 2008 to 2013.

During the review of records at zonal Railways it was noticed that after replacing 382 locomotives, IR was holding 223 overaged BG diesel locomotives as against a total stock of 4163 locomotives as of March 2008. In case of MG Diesel locomotives, after replacing 31 locomotives during the review period, IR was holding 82 overaged locomotives as against a total of 444 locomotives on line as of March 2008. Though many of the overaged locomotives were reported to be used for inferior services such as shunting operation etc., IR was compromising the safety of Railway users by engaging the overaged locomotives for Railway operations as possibility of derailments/accidents remain.

IR in February 2010 stated that locomotives are expensive assets which are the backbone of train running. It is therefore a policy that the locomotives are replaced on age-cum-condition basis, instead of only on age basis. Production capacity is being increased in the locomotive production units to replace the over-aged rolling stock and to meet the future condemnation requirements. However the fact is that IR will have overaged locomotives on line, compromising the safety aspects, till the above steps materialize.

Recommendation

As the stock of overaged diesel locomotives was very high and its replacement was very minimal, IR needs to look into this area to replace the entire overaged rolling stock.

3.9.1.3 Improvement works and introduction of new technology/improved design as per plan

A. Improvement works at Level Crossings for Road Users' safety

In order to curb accidents at Level Crossings (LCs), CSP envisaged a multi-pronged strategy of widening of roads in Railway land at high density locations, modified design of stop boards in retro-reflective sheets at unmanned LCs, provision of manned LCs in the next five years at unmanned LCs as per revised criteria for manning etc. As per the revised criteria, wherever the Train Vehicle Units (TVUs) are more than one lakh per day, the LCs are to be replaced with Road Over Bridges/Road Under Bridges (ROBs/RUBs) on the basis of cost sharing with State Governments.

The table below shows the target and actual work of ROB/RUB done as of March 2008 at LCs with more than one lakh TVUs.

Particulars	Target	Actual as of March 2009
Physical (Nos.)	1252	158
Financial (in Crore)	8000	1050.87

From the above table it is seen that out of the 1252 ROBs/RUBs targeted to be completed by 2013 only 158 (12.62 percent) have been constructed as of March 2009, indicating very slow progress. It was noticed that work of ROB/RUBs has been planned/undertaken only at 438 LCs over 11 zones (SR-74, CR-71, ER-33, WR-5, SCR-126, SER-10, NCR-39, ECR-26, ECoR-31, and SWR-23). The reason for the slow progress of construction work was attributed to unwillingness of the State Governments to share the cost of construction, public agitation in acquiring the land, delay in acquisition of land etc. It was further noticed in ER that replacement of LCs was being planned only when proposals were initiated by the concerned State Government agreeing to share the cost and accepting the Railway's stipulations.

Trespassers after closing the level crossing at Diva Station (CR) endangering their lives

Out of the 171 LCs test checked (92 manned and 79 unmanned) by Audit on the zones, it was noticed that many of the safety features were not provided at the LCs. Reflectors on stop disc on both sides of gate for the road users were provided only at 80 LCs and interlocking was done only at 62 LCs. Wicket gates or stiles for pedestrians have been provided only at 47, lamps were provided only at 83 and locking arrangements were provided for both gates only at 90 LCs. It was further noticed that the distance of lifting barriers from centre of track was less than five metres in respect of 65 manned LCs. In NWR and SER the distance of lifting barriers was less than five metres at all the LCs test checked. It was also found that in ER four manned LCs were not provided with telephones (Annexure IV).

The table below shows the year-wise funds allocation and utilization under Railway Safety Fund for undertaking road safety works for the period 2003-04 to 2008-09.

(Figures in crores)

Year	Total Grant	Actual Expenditure	Saving	Percentage of saving
2003-04	433.00	166.19	266.81	61.62
2004-05	401.03	201.58	199.45	49.73
2005-06	711.39	262.87	448.52	63.05
2006-07	710.94	360.28	350.66	49.32
2007-08	1050.69	533.55	517.14	49.22
2008-09	1300.28	565.57	734.71	56.50

It is seen that in all the years the Railway Administration was surrendering about 50 percent or more of the funds allotted for road safety works. This was mainly due to slow progress of works, delay in land acquisition, non completion of detailed estimates and formalities before making payment to State Governments towards the cost of road approaches in respect of various ROBs/RUBs etc. Surrender of funds shows that the Railways are not carrying out all the works planned at level crossings where most of the accidents take place with maximum casualties. The fatality numbers on level crossing accidents were 454 out of the total 714 fatalities for the period from 2005-06 to 2007-08.

IR stated in February 2010 that most of the unmanned LC accidents, which constitute 45 per cent of the total number of consequential train accidents, are caused due to negligence of road users. IR have therefore started comprehensive social awareness programmes and publicity campaigns through electronic and print media to educate the road users about the precautions to be observed while negotiating the unmanned LCs. They further stated that the criteria for manning have been reviewed and in order to wipe out all arrears, IR has taken steps to increase the pace of manning and the target for manning has been substantially raised, sanctioning process for manning has been simplified to increase the pace. State Governments are being interacted at a higher level for expeditious decisions regarding sharing of cost of construction of ROB/RUB, timely acquisition of land etc. Limited

height and normal height subways are being constructed in lieu of level crossing gates, traffic being diverted to adjacent level crossings to reduce the number of level crossings. For the purpose of manning the unmanned level crossings, efforts such as recruitment of new gateman, re- engaging retired employees etc. are being taken. While admitting the points raised by Audit, IR stated that instructions are also being issued to provide basic infrastructure at the level crossings and adequate measures would be taken to overcome shortcomings.

B. Improved Thermit Welding

Thermit welding, carried out in open line, generally suffers from poor quality. It was proposed in the CSP to acquire the latest technology of Thermit welding and the most modern equipment for testing each weld. As early as in April 2000 Railway Board asked RDSO to study the quality of rail welding and the technology of Ultrasonic flaw detection (USFD) and accordingly a Technology Development Group (TDG) was formed. They submitted the report in October 2001 in which it was stated that the specification of AT welding on IR was of international standards and no changes in the present specification were warranted. They further stated that emphasis should be given for training of welders and availability of adequate equipments. Despite this Railway Board insisted for adoption of improved technology and allocated Rs.30 crore under SRSF for the project. Accordingly RDSO in February 2003 identified two international firms and trial kits were obtained in May 2004 and February 2005 from them. A team of officers also visited the firms' works in France and Germany to study the aspects of new AT welding technology. Based on the study and various tests with the trial kits, RDSO framed specification for acquiring the new AT welding technology. Though the Railway Administration called for international bids with the new specification, the same was not successful as the technology offered by the international firms were not conforming to the bench mark set by RDSO. Thus the Railways are still continuing with the existing thermit welding technology and even after nine years since April 2000 and spending an amount of Rs.12 lakh for the trials etc. the improved technology could not be adopted in IR so far.

While accepting the delays, IR in February 2010 stated that keeping in view the sensitivity of welds in safety scenario, long drawn trials, lab evaluation, tests, analysis, extended trials, time consumption in the process are unavoidable before introduction of the same into field.

C. Reduction in thermit welds by mobile flash butt welding

It was planned in CSP that as the Alumino-Thermit welds are weak links in track, its population was to be gradually reduced and replaced by Flash Butt welds to be executed with the help of mobile flash butt welding plants. As a first step this was to be introduced in construction projects by the year 2004 and gradually extended to other areas in the next five years. However it was noticed during the review that the use of alumino thermit welds, due to which tracks are prone to frequent weld failures, is still widespread and the use of mobile flash butt welding is yet to be introduced in open line in eleven out of sixteen zones (SR, ER, WR, NWR, SER, NER, NCR, ECR, SECR, SWR and

WCR) and in Metro Railway Kolkata. In three zones (CR, NR and SCR) where the mobile flash butt welding was introduced, the use of the same is negligible. Reason for slow progress in introduction of mobile flash butt welding was stated to be that mobile flash butt welding plants are bulky and consume more space and require traffic blocks of long spells.

IR while furnishing figures of weld joints using alumino thermit welding and weld joints at departmental flash butt welding plants stated in February 2010 that the figures furnished by Audit appear to be incorrect. However the comparison made by IR is incorrect as IR has adopted the details of weld joints done through stationary departmental welding plants and not the weld joints done on open line with the mobile flash butt welding plants. The comparison should have been made between the alumino thermit weld details and mobile flash butt weld details of open line. The number of weld joints executed by mobile flash butt welding plants in four zones (SR,SWR, SCR and NWR) for the period from January 2006 to March 2008 against the Railway Board's contract was only 49696 joints as stated by IR which is negligible as compared to the figures of alumino thermit weld joints during the two years 2006-08 which was 838748.

Recommendation

Since most of the accidents with maximum casualties are taking place at level crossings, IR should strictly implement all the improved safety features at the LCs as recommended in the CSP. Further, IR should put greater efforts to bring in the State Governments' co-operation in construction of ROB/RUBs wherever necessary. IR needs to take proper action to curtail the undue delay in adoption of improved technology so as to strengthen track safety.

3.9.1.4 Progress in the areas identified for research for safety improvement

A. Preventive Rail Grinding

Because of the heavier loads and also to minimize wear from the harder steel used for the cast wheels especially for the new BOXN wagons, 90 UTS (Ultimate Tensile Strength) rails were being used on IR. Though these rails have greater hardness, they have a tendency of gauge corner cracking due to rolling contact fatigue. Gauge corner cracking can result in accidents due to rail fractures. Gauge corner cracking can be prevented by rail grinding to remove the fatigued top layer of rail metal. Out of the four Rail Grinding Machines proposed for procurement, contracts have been awarded by the Railway Board in February 2009 for procurement of two machines which are expected to be received by July 2010. Thus IR was not able to tackle the problem of gauge corner cracking which can lead to rail fracture accidents.

IR stated in February 2010 that they are making all the efforts after careful consideration of suitable technology to tackle the problem of gauge corner cracking.

B. Role of RDSO in adopting new technology

For testing and conducting applied research for development of railway rolling stock, permanent way etc., Research Designs and Standards Organisation

(RDSO) was established in Lucknow in 1957 by integrating the then Central Standards Office and Railway Testing and Research Centre. The primary quality policy of RDSO is to develop safe, modern and cost effective Railway technology complying with statutory and regulatory requirements, through excellence in research, designs and standards and continual improvements in quality management system to cater to growing demand of passenger and freight traffic on the railways. The CSP envisaged development and implementation of certain new technologies in improving the safety in train operations, which were entrusted with RDSO to develop them within a time bound programme. However it was noticed in audit that the following technologies could not be made operational even after one year of completion of phase I of CSP.

(i) **Lubrication of gauge face and friction modifier on top of rails** – though these were to be completed by 2005-06, only the rail mounted lubricators were commissioned in April 2008, whereas no action was initiated for friction modifier by RDSO stating that the technology has not matured globally so far.

(ii) **Development of trackside bogie monitoring system** – A pilot project with an estimated cost of Rs.4.36 crore was sanctioned in September 2005 and the system was procured from abroad at a cost of Rs.3.47 crore in March 2009. However, the commissioning work has been completed (August 2009) after delayed arrangement of power supply at nominated site and extensive trials are being conducted.

(iii) **Development of test track facility** – Though the project was sanctioned way back in 1985, the same was abandoned after spending Rs.3.16 crore but again proposed in September 2001. The project could not be started due to non finalisation of proper site for the testing facility.

(iv) **Vibration signature analysis and development of rail vehicle based testing car** – the project for assessing the bridge condition quickly by using vibration signature technique was sanctioned in March 2005 and was to be carried out through IIT Mumbai. However due to delay in finalizing contract the work could not be completed so far.

IR stated in February 2010 that IR and RDSO are continuously working towards identifying new projects and adopting the advanced technology to match with those of other countries, as and when required, to suit the Railways' requirement. However the pace of adoption of new technology does not match with the safety requirements.

Recommendation

Since innovation in technology is necessary under the changing conditions of train operations where speedy operation and maintenance would be inevitable, IR and RDSO should accelerate the research work so as to implement the new technology for speedy and safe train operations.

3.9.1.5 Steps identified for improving maintenance practices/improving asset reliability and thereby inculcating safety culture

A. Modern Bridge Inspection and Management System

Modernization of bridge inspection and assessment system was contemplated in the CSP by implementing a modern bridge management system with the following focused areas:

a) Underwater Inspection of bridges
b) Mapping of unknown foundations and integrity testing of foundations.
c) Non-destructive testing techniques like Ultra Sonics, Acoustic Emission, Strain Gauging and Radar etc.
d) Fatigue life and residual life assessment techniques
e) Bridge management system.

Mobile Bridge Inspection Unit manufactured at RCF, Kapurthala

Only Projects from (a) to (d) above were approved by IR (2003). After their completion, the technologies were to be adopted over the entire system in a period of three to four years thereafter. Mobile Bridge testing laboratories with some Non-Destructive Testing (NDT) were also approved (2003) for 16 zonal Railways and these laboratories were to be implemented on the zonal Railways in the next five years with the balance complement of essential NDT equipment like Impact Echo testers etc.

It was however noticed in Audit that while two mobile bridge inspection units manufactured at RCF, Kapurthala are under commissioning, mapping of unknown foundations was not being done in any of the zones except Northern Railway where it was carried out through an outside agency as a pilot project. In other zones this is yet to be arranged as training is still to be provided to the staff for this job. Similarly fatigue life and residual life assessment technique was also not being adopted in 10 out of 16 zones (SR, NWR, SCR, SER, NER,

NCR, ECR, SECR, WCR and NFR). Computerisation of information about bridges was not done in 11 zones (CR, NWR, SCR, SER, NCR, ECR, SECR, ECoR, SWR, WCR and NFR); while in Southern Railway it was computerized. Delay in provision of the modern system was on the part of COFMOW, who were to arrange the mobile bridge testing laboratories to zones. Various items of testing for nine initial zones for which contracts have been placed are still under procurement (October 2009).

It was further noticed in Audit that there was a huge shortfall in under water inspection of bridges. Out of the 209 bridges on which under water inspection was required to be done over Indian Railways, the inspection was done only on 128 bridges leaving a shortfall of 81 bridges (38.76 percent). NDT technique was not adopted in six zones (ER, NR, SCR, SWR, WCR and NFR) on 61 of the 128 bridges inspected. In WR though one mobile bridge-testing laboratory with NDT technique was commissioned in 2003 with one set of structural scanning equipment, staff was not trained to operate the equipment, leading to non-functioning of the laboratory costing Rs.0.98 crore.

While accepting delay in modernization of bridge management system, IR in February 2010 stated that the two mobile bridge inspection units have been commissioned in NR and CR. Under water inspection of bridges has been carried out in 269 bridges out of 327 bridges identified as of March 2009. This shows that still there is a shortfall of 58 bridges (17.74 percent).

B. Upgradation of freight train examination

Upgradation of freight stock maintenance infrastructure at some major Routine Overhauling (ROH) depots, freight train examination points and sick lines was proposed in the CSP to be completed during the plan period for which funds were to be arranged through the normal plan outlay. However it was seen that out of the 137 freight train examination points in IR, 86 were identified for upgradation, of which only 27 (19.71 percent) were upgraded as of 2007-08. Out of the 45 ROH depots, 34 were identified for upgradation, of which only 12 (26.67 percent) were upgraded so far. Similarly, out of the 120 sick lines, 59 were identified for upgradation, out of which 18 sick lines (15 percent) were only upgraded as of 2007-08. Slow progress in upgradation work was resulting in taking more time for attending to sick wagons and rectification of defects. Reasons for delay in upgradation were reported to be delay in completing the ancillary works such as electrical connection etc.

IR stated in February 2010 that there have been several reasons for delay including funding and award of contracts. They further stated that the upgradation of infrastructure is being expedited.

C. Way side detection of overloaded rolling stock by in-motion weigh bridges

A number of rail/weld failures are caused by over-loaded wagons. In motion-weigh bridges help detection of over-loaded wagons. CSP therefore proposed to install in-motion weigh bridges selectively on identified routes at originating points and ensure the functioning of these weigh bridges. It was noticed in Audit that while 93 weigh bridges were installed at various locations over IR, the proper functioning of these weigh bridges was not being

ensured. None of the weigh bridges was working on all the days of the year during 2005 to 2008. Further, 50 percent of the weigh bridges were not installed at originating points (46 locations out of 93) defeating the purpose of detection of over-loaded wagons. It was further noticed that out of 92.60 lakh wagons weighed on these weigh bridges during the three year period from 2005 to 2008, 18.57 lakh wagons (20.05 percent) were detected as overloaded. Even after detection of overloaded wagons, they were allowed to proceed without adjustment of the load as noticed in SR, which has serious repercussions for the track. In SER, overloading was detected in 30.62 percent of wagons weighed at the in-motion weigh bridges during 2005 to 2008. The rail fracture and weld failure cases reported in 2007-08 were also on the higher side in SER as compared to the previous year. The impact of enhanced loading on infrastructure is being covered separately in the Performance Audit on Freight services.

IR stated in February 2010 that the weighbridges do remain under repair and calibration and due to some operating constraints unloading of overloaded wagons cannot always be carried out en route. They further stated that the 20 percent overloaded wagons calculated by Audit do not seem to be correct and no scientific study has related weld failures to overloading of wagons. The remarks of IR are not tenable. The figures of 20 percent arrived at by Audit shows the percentage of overloaded wagons to the total number of wagons weighed on way side weigh bridges and not the percentage of the entire fleet of loaded wagons carried by IR. Further the fact remains that overloaded wagons could be detrimental to track life.

D. Integrated maintenance blocks

For implementing the concept of preventive maintenance, granting of adequate time for maintenance of assets – both fixed and movable – is absolutely essential. To over-utilise an asset and temporarily neglect its maintenance is bound to be counter-productive in the long run. It was therefore proposed in the CSP that efforts be made to make optimum use of all maintenance blocks (suspension of traffic in a specified period for maintenance purposes). Following actions are proposed in the CSP:

Computerised database to be maintained at divisional level for keeping accurate record of all aspects of working connected with maintenance blocks. Each maintenance block granted to be simultaneously utilized by all departments as granting of maintenance blocks is an expensive proposition. Integrated maintenance vehicles on the pattern of accident relief train (ART), have to be procured so that staff and materials of all departments can move together. Working of maintenance staff is to be geared up to ensure that they are in a position to avail of night maintenance blocks also, especially on over-saturated sections.

During the review of records it was noticed that the concept of integrated maintenance block was not in vogue in eleven out of sixteen zones (ER, NR, NWR, NER, NCR, ECR, SECR, ECoR, SWR, WCR & NFR). Computerized data was being maintained in CR and maintenance blocks were being used by all departments simultaneously in Mumbai Division. However in Nagpur

Division the allotment of blocks was always less than the demand. In SR computerized database on maintenance blocks was not being maintained. Though corridor blocks are stipulated in the working time table which are to be used by all departments simultaneously as per zonal arrangements, blocks are also granted separately to each department outside these corridor blocks during exigencies and night maintenance blocks are also granted on over saturated sections. However no integrated maintenance vehicle on the pattern of ART has been procured in SR and SCR. In Ahmedabad Division of WR, the allotment of maintenance blocks were less than demanded and in SER out of the two divisions test checked the integrated maintenance blocks was being availed in one division only.

While accepting the above IR stated in February 2010 that the shortcomings are identified and measures are being taken for the full utilization of integrated maintenance blocks.

E. Safety Audit and safety drives

Inspections generally single out individual failures. Safety audits are expected to identify system failures and generic shortcomings. CSP proposed that periodic safety audits be undertaken at various levels for making an in-depth assessment of safety systems. These safety audits were to be done by multi-disciplinary team from Railway Board, inter-Railway, multi-disciplinary headquarters team, inter-divisional etc. During the review of records of zonal Railway it was noticed that no records indicating the safety audit conducted by the multidisciplinary team from Railway Board were available in any of the zones other than NWR, where only once it was done during the period from 2005-06 to 2007-08. On a specific query the Safety Directorate of Railway Board stated that the multi disciplinary team from Railway Board conducted the safety audit and the shortcomings identified have been pointed out to the zones for rectification. However no records were provided by the Directorate to Audit in this regard stating that the issue was very elaborate and Safety Directorate does not get all the correspondence. The safety audit by inter divisional team has also not been conducted in the zones except in SER and SECR.

IR in February 2010 stated that Railway Board directed zonal railways to constitute a team of five Senior Administrative Grade officers from various departments along with similar number of inspectors to audit/inspect at least one unit of their Railway for at least two consecutive days bi-monthly. They further stated that they have evolved the concept of inter-railway safety inspections to have better security, objectivity and comprehensive enrichment of field practices.

F. Defects on Track and Rolling Stock

CSP had proposed a reduction in track defects from the level of 10.58 defects per billion GTKM as of August 2003 to 6.35 defects as of 2007-08. It was noticed that:-

(i) while eight zones (NWR, SCR, SER, NCR, SECR, ECoR, SWR and WCR) have achieved the reduction proposed in CSP, in three zones, SR,

NER & NFR, the defects were above 12 and showed an upward trend. In other zones (CR, ER, NR, WR, ECR and Metro/Kolkata) the figures were not made available.

(ii) Targets were also included in the CSP for reduction in various Rolling Stock defects such as Coach defects, Wagon detachments, Poor Brake power (Goods), incidence of train parting (Goods), Diesel loco defects, Electric loco defects, OHE defects etc. It was noticed that the actual coach defects/failures were more than the target in NER, NCR, SECR and NFR, whereas data was not made available in four zones (CR, NR, WR and ECR) and Metro Railway, Kolkata.

(iii) The targets for wagon detachments/failures were achieved by twelve zones (SR, ER, SCR, SER, NER, NCR, ECR, SECR, ECoR, SWR, WCR and NFR), whereas the data was not made available in other zones.

(iv) The incidences of Poor Brake Power were significantly higher than the target in ECR, data was not made available in four zones (CR, NR, WR and NWR) and Metro Kolkata while in remaining zones the target was achieved.

(v) Incidences of Train Parting were higher than the targets in SR, NER, ECR and SECR, while data was not made available in four zones (CR, NR, WR and NWR) and Metro Kolkata while other zones achieved the target.

(vi) Motive Power defects (Diesel locos) were higher than the target in seven zones (SR, NWR, SCR, NER, SECR, ECoR and NFR) whereas data was not made available in three zones (CR, NR and WR). Motive Power defects (Electric locos) were more than the target in SCR and SECR, while data was not made available in CR.

(vii) It was noticed that in six zones (SR, ER, NR, SER, ECR and SECR) the incidents of Overhead Equipment (OHE) defects as of 2007-08 were more than the level of August 2003. In two zones (NCR and SWR) the incidents of OHE defects were slightly higher than the proposed level, while the figures were not made available in CR, WR and Metro Kolkata. Only three zones (SCR, ECoR and WCR) could achieve the proposed target of reduction in OHE defects.

IR stated in February 2010 that the data for coach failures is maintained and available for individual zonal Railways as well as consolidated position for IR, adequate measures are being initiated to overcome the various equipment failures and there has been a consistent improvement in the reliability of the equipments. However the fact remains that there were cases in many zonal Railways where the target could not be achieved in various equipment failures, which affect the safety performance.

G. Accidents

The table below shows the number of accidents during the period 2003-08.

Type of Conseq-uential accidents	(Average of 3 years from 2000 to 2003)	Extent of reduction proposed	Accidents during the year					
			2003-04	2004-05	2005-06	2006-07	2007-08	Average of five years
Collisions	22	--	9	13	9	8	7	9
Derailments	282	60%	197	136	130	95	100	132
LC accidents	90	No change	95	70	75	79	77	79
Fire accidents	14	80%	14	10	15	4	5	10
Misc.	5	--	5	3	4	8	4	5
Total	413		320	232	233	194	193	235

While the overall accident figures of IR have come down considerably, figures of accidents in a few zones increased during 2007-08 as compared to the figures of 2002-03. Level crossing accidents increased in WR and NWR and collisions increased in SER.

Collision accident near Mathura Station (NCR) on 21.10.2009 in which 22 persons were killed

IR stated in February 2010 that accidents are caused due to failure of a combination of factors. All these accidents are analyzed and various remedial measures taken to stop recurrences. They further stated that the level crossing accidents in WR remained at the same level of 9 accidents in 2008-09 as in 2002-03. However it was noticed from the data maintained in Chief Safety Officer's office in WR that the number of level crossing accidents was 21 (consequential – 10 and non consequential – 11) in 2008-09 and 14 (8 + 6) in 2002-03.

Recommendation

Necessary data regarding the defects detected on various items of track, rolling stock, OHE etc. should be maintained for making comprehensive evaluation of the safety risks. Defects in track and rolling stock should be brought down to the minimum so as to improve safety. IR should also ensure that whenever overloading of wagons is detected, the load in such wagons is adjusted so as to avoid adverse impact on the track.

Further, since safety audit and safety drives are important features of the CSP, IR should take necessary action to complete the periodic safety drives and audits and take corrective actions on the safety installations, wherever necessary. The monitoring mechanism of IR therefore needs to be geared up so as to achieve reduction in accidents and casualties in all zones and also to achieve the overall objectives of Corporate Safety Plan.

3.9.1.6 Investment in human resources as planned

A. Constitution of Human Resource Cell

To promote devotion, dedication and sincerity towards duties, it was proposed in the CSP to constitute Human Resource Development (HRD) cells at zonal and Divisional headquarters involving dynamic and knowledgeable supervisors to study – working habits of ground level staff, factors leading to short cuts and to reduce fatigue, minimize monotony and improve safety consciousness. It was noticed in Audit that no HRD cell was formed in any of the zones except in WR, where it was formed in zonal headquarters and in Mumbai Divisional headquarters which has not yet started functioning. Non creation of HRD cell in other zones implies that human resource development was not getting proper attention as envisaged in CSP.

B. Modernisation and upgradation of training centres

Main training centres over IR have been granted Rs.73.50 crore under SRSF for upgradation. Remaining centres including Basic Training Centres spread over IR under various departments were also proposed in the CSP to be modernized with provision of necessary infrastructure at an overall outlay of Rs.220 crore (inclusive of allotment already made under SRSF).

It was noticed in audit that out of the 96 training centres identified for upgradation/ modernization, work on 20 training centres only has been completed so far. While work was in progress on 59 centres, no work was sanctioned on four training centres.

C. Strength of staff and vacancies

It was proposed in the CSP that staff requirement would be worked out afresh for zero based assessment of manpower. Based on such exercise, sanctioned strength of staff is to be revised and made uniform. It was further envisaged that all safety category vacancies would be filled up on urgency basis. A review of staff position in zonal Railways revealed that vacancies existed in all departments under safety category in all zones. The vacancy ranged from 3.68 percent (in Mechanical Dept. of NWR) to 37.10 percent (in Civil Engineering Dept. of SWR) (Annexure V).

IR stated in February 2010 that the number of vacancies remained static over the past several years, with constant upgradation on technology the efficiency of the man-power is increasing, the assets renewed under SRSF require miniscule maintenance in the initial years and the vacancies have not resulted in any decline in the safety performance of the IR. This is not tenable, if the vacant posts are not required to increase efficiency of the performance of machinery assets, there is need to reassess the requirement of manpower to bring it to a realistic level and to surrender excess posts.

D. Crew friendly cab in locomotives

It was stated in the CSP that an ergonomic design of loco cab has been developed to provide easy approach to various control handles/buttons. Providing new features would ensure fatigue-free driving for long hours. However, it was noticed that while Diesel Locomotive Works (DLW), Varanasi turned out almost all the locos with crew friendly cab during the period from 2003 to 2008, Chittaranjan Locomotive Works (CLW) lagged behind. The locos turned out with crew friendly cab ranged from 18.6 to 51 percent in CLW during the above five years. No reasons were found on record for the slow progress in providing crew friendly cab in all locomotives.

IR stated in February 2010 that the slow progress was due to the fact that modification of crew cab required re-location of various equipments, reducing size of silicon rectifier, redesign of equipment panels etc.

E. Upgradation of running rooms and crew lobbies

It was stated in the CSP that the existing running rooms are being upgraded on an urgent basis and the new running rooms would be built with improved lay out and proper amenities. It was also proposed that crew lobbies also need to be upgraded by providing basic amenities, facility for proper display of various instructions, computer and software package for proper booking of crew and ensuring adequate rest for running staff. In a test check it was noticed in audit that out of the 187 running rooms available in selected divisions on all zones 70 have been upgraded and 44 are under upgradation. While 27 are proposed for upgradation, no action has been taken for remaining 46 running rooms. Similarly out of 165 crew lobbies test checked 95 have been upgraded. While 32 are under upgradation and 15 are proposed for upgradation, no action has been taken on remaining 23 crew lobbies (Annexure VI).

IR stated in February 2010 that adequate measures are being taken to expedite the upgradation of balance running rooms and lobbies.

F. Crew Management

It was proposed in the CSP that to assess the actual problems faced by the running crews, proper record would be maintained at crew lobbies and follow up action taken within 24 hours of observations made by drivers. The deficiencies noted during crew runs would be identified and corrected expeditiously. A test check of records maintained in selected divisions revealed that though registers to record the defects noticed by drivers were being maintained in crew control offices and defects were communicated to the respective department through control office for corrective actions, feed

back was not available on record in crew control office, hence the corrective action taken could not be monitored.

IR stated in February 2010 that the delays on this process are being plugged.

G. Coaching Maintenance Terminals

The CSP envisaged zero based review of sanctioned strength of staff at all existing coaching maintenance depots, specification of time in terms of man-hours per coach for primary and secondary maintenance, provision of adequate pit lines for proper maintenance of all rakes and computerization of coach history. However during the test check in Audit on few coaching terminals in each zone it was noticed that zero based review of sanctioned strength was not being done in four zones (ER, SER, SECR and ECoR) and Metro Railway Kolkata. In some other zones (NR, NER and NFR) the review was not done at all the depots. Similarly computerized database of coach history was not available in any of the depots in NER, NCR, SECR, ECoR and SWR. In few other zones (ER, NR, NWR, SCR, ECR, NFR and Metro Kolkata) the computerized data base was not available in some of the depots. Time for primary maintenance was not laid down in three zones (ER, NR and ECR) in some depots and for secondary maintenance it was not laid down in six zones (ER, NR, NER, NCR, ECR and ECoR).

IR stated in February 2010 that instructions for carrying out a zero based review of sanctioned strength of staff at all coaching maintenance depots have been reiterated to the Railways for compliance.

Recommendation

Since human error contributes to a major part of accidents, IR should strictly ensure that the modernization and upgradation of training facility to the staff is completed on time. Further IR should take immediate action to fill up all the vacancies in safety category posts and also take necessary steps to reassess the requirement of staff, in view of introduction of modern technology, to bring down the requirement to realistic level.

3.9.2 Review of Progress of Corporate Safety Plan through Mid Term Review

Though the Corporate Safety Plan was formulated for the period up to the year 2013, most of its achievable targets were divided into two phases. Phase I was to cover the period 2003-08 and Phase II would span its safety activities up to the year 2012-13. This was done to have a mid-term assessment with changed circumstances, advancement of technology and assimilation of devices. However it was noticed in audit that even though periodical progress of the implementation of CSP was being monitored and action plan was being drawn every year, no specific suggestion for modification of the already chalked out programme has been made by the Railway Administration. No mid term review has been conducted in the zones except in ECR and NER where no mid course correction has been suggested in the mid term review.

IR stated (February 2010) that the Ministry of Railways is monitoring works with the zonal Railways. Safety directorate is the nodal directorate for

consolidating progress and Chief Safety Officers of zonal Railways have been advised to monitor the works of CSP concerning their Railway.

3.9.3 Action Plan for the items to be implemented in Phase II

The CSP had envisaged a broad action plan for all the works to be carried out for the entire plan period (2003 to 2013). While in eight zones (SR, CR, ER, WR, NER, NCR, ECR and NFR) specific action plan has been drawn for undertaking the proposed work in the phase II, in other zones and Metro Railway Kolkata no such action plan has been drawn up so far.

IR stated in February 2010 that by 2008 there has been overall 62.2 per cent of financial progress, which is more than pro-rata and considered satisfactory and therefore 100 per cent achievement in stipulated works under CSP can be assumed. They further stated that there may not be a need to prepare emergent plans to give focus on certain lacking items in view of substantial overall progress. However, zonal Railways have been advised to prepare an action plan with revised targets for all those works where the progress is not satisfactory.

(NARENDRA SINGH)
New Delhi **Deputy Comptroller and Auditor General**
Dated:

Countersigned

(VINOD RAI)
New Delhi **Comptroller and Auditor General of India**
Dated:

Annexure I
(Para 1.6)
Survey Questionnaire on Freight services in Indian Railways

Date: Time: Location:

GENERAL

1 **Name of the siding**:_____ Contact number:

(i) Outward traffic (commodity): From: To:

(ii) Inward Traffic (commodity) From: To:

(iii) Rail Customer Since (month /year)

(iv) Average Annual Production /Total quantity Handled (MTs):

(v) Average Annual Quantity handled through Railways (MTs):

(Vi) Average Lead (Kms.):

	ATTITUDE OF OFFICERS /STAFF			
2	Does interaction with officers at Divisional /Zonal Headquarter meet with adequate response?			
	Always	Mostly	Some Times	Never
3	Are Railway Staff at field level friendly and responsive?			
	Always	Mostly	Some Times	Never
	RELIABILITY/ TIMELINESS OF FREIGHT SERVICES			
4	Is timely information made available in respect of availability of rake?			
	Always	Mostly	Some Times	Never
5	Are the rakes placed at the time preferred by you?			
	Always	Mostly	Some Times	Never
6	Are rakes supplied to you on time?			
	Always	Mostly	Some Times	Never
7	If you have been experiencing delays in placement of rakes, the average delay ranges			
	Up to 5 hours	More than 5 hours but less than 12 hours	More than 12 hours but less than 24 hours	Beyond 24 hours
8	Are the wagons supplied clean, fit for loading and without damage?			
	Always	Mostly	Some Times	Never
9	Whether your rakes are moved with in reasonable time after the completion of loading?			
	Always	Mostly	Some Times	Never
10	Do the rakes booked by you reach destination timely?			
	Always	Mostly	Sometimes	Never
11	What would make you offer more traffic to Railways?			
	Scheduled running of trains	Door to door service	Timely placement of rakes	Can't say
12	What other changes would you suggest in freight operation of Railways that will make you offer major share of product to Railways?			
	(i)			
	(ii)			

13	Do you have access to FOIS for tracking the freight trains and ascertain its expected time of arrival?			
	Always	Mostly	Sometimes	Never
14	If yes, is the information reliable?			
	Always	Mostly	sometimes	Never
	TERMINALS AND SIDING OPERATIONS			
15	Are adequate facilities such as approach roads, lighting and stacking area available?			
	YES		NO	
16	*If not, the* suggestions to improve the service			
17	Are you satisfied with the working hours at terminals?			
	YES		NO	
18	Any suggestions regarding the working hours at terminals			
19	Are the mechanized loading /unloading facility available at the terminal?			
	YES		NO	
20	Do you feel that that the free time allowed for loading /unloading adequate?			
	YES		NO	
21	Do the existing policies of Railways on investments for improving the facilities at sidings offer adequate incentive?			
	YES		NO	
22	If not, what is your suggestion			
	SECURITY OF CARGO AND COMPENSATION			
23	Is adequate security arrangement against pilferage and theft provided for your cargo at terminal as well as enroute?			
	Always	Mostly	Sometimes	Never
24	Are the claims processing against the damage /pilferage prompt and efficient?			
	Always	Mostly	Sometimes	Never
	GRIEVANCE REDRESSAL			
25	Are you aware of the existing mechanism for redressal of your grievances?			
	YES		NO	
26	Are your complaints with respect to freight operations handled promptly and effectively?			
	Always	Mostly	Sometimes	Never

Annexure II

(Para 1.7)

SAMPLE SELECTION ON FREIGHT SERVICES

Zone	Division	Terminals selected	Interchange point selected	C&W depot selected
NEFR	Katihar Lumding	New Guwahati Jogighopa Bongaigaon refinery Numaligarh Oil Refinery	Katihar Malda Town	-
ER	Howrah Asansol	Durgapur Goods Shed Ultratech Cement Siding Asansol Goods Shed Barkeshwar Thermal Power Plant Siding Pakur Stone Quarry siding	Bhattanagar Asansol	Pakur Sitarampur
NR	Delhi Ambala	GNTP Bhatinda Ghaziabad Shakurbasti Jammu Tawi IFFCO, Aonla	Palwal Bhatinda Rewari Sriganganagar	Tuglakabad Ghaziabad Ambala Khanalampur
SR	Chennai Palghat	Dalmia Cement Siding Kudal Nagar Good shed Salem Market Goods Shed Panambur Goods Shed Kochi Refinery Siding Kurukkupet Goods Shed Tiruchirapalli Goods Shed	Renigunta Jollarpettai Kankanadi Thokkur	Tondiarpet Jollarpettai Kankanadi
SWR	Hubli Mysore	Ranjitpura JVSL, Tornagalu Tinaighat Sasalu New Mysore Good Terminal	Miraj Bellary Kankanadi	Hospet
NWR	Ajmer Jodhpur Bikaner	Jaisalmer Laxmi Cement Siding, Banas Kanakpura STPB-Birdhwal BNGS	Chittorgarh Palanpur Rewari Bandikuin	Madar Abu Road Jaisalmer Jodhpur Jaipur Lalgarh
ECR	*Dhanbad* *Mughalsarai*	Karpurigram Narayanpur Anant Raxaul Fatuha Patherdih Katrasgarh Jarangdish	MGS Up & Down yard Pradhankhunta Mahadiya	MGS Gaya Patherdih Barwadih
NER	Lucknow Izatnagar	Gonda Nakaha Jungle Rudrapur City	Persendi Katra Chamrua Farukkabad	Gonda Gorakhpur
SCR	Secunderabad Vijayawada	Rudram siding , Bhadrachalam Nagarjuna Fertiliser Corporation, Kakinada Port Rajsri Cement Siding, Malkheid Road Ultratech Cement Juturu KTPS, Kondapalli Sanat Nagar	Balharshah Wadi Duvvada Vijayawada	Ramagundam Sanat Nagar Kakinada Vijayawada
SECR	Bilaspur Raipur	Raigarh JSLK siding, Kirodimal Nagar Lafarge India Pvt.Ltd. Bijuri colliery MPSEB Siding Khaparkheda Century Cement, Tilda Ambuja Cement, Bhatapara	Jharsugda IB RVH	BCN Depot AKT P P Yard Bhilai Bhilai Marshalling yard

SER	Chakradharpur Kharagpur Adra	Barajamada Noamundi Roapway Sdg. TISCO Sdg., TATA Bokaro Steel Plant siding (inward) Bokaro Steel Plant siding (outward) Orissa Cement siding, Rajgangpur Bhaga Goods Shed JCP siding TATA RSP Siding, Raurkela Kolaghat TPP siding	Jharsugda Joruli Andal Asansol	Bondamunda TATA Bokaro Adra
WCR	Jabalpur Kota	Kota TP Station Chambal Chemical & Fertilizer Maiher Cement JQSG Prism Cement	Singrauli Manikpur Swaimadhopur Chanderiya	New Katni Jn. Satna KTT-Kota Sakatpura
WR	Ahmedabad Vadodara Ratlam	Mundra Port Siding Kandla Port Good Shed IFFCO Siding, Kandla Wanakbori TPS Sdg. Vikram Cement Siding	Palanpur	Sabarmati Vatva Karachiya Vadodara Yard
ECOR	Khurda Waltair Sambalpur	Cuttak, Jagdalpur Nayagarh, Nergundi, NTPC exchange yard TLHR PPL/PRDP VSKP siding NALCO Siding, Damanjodi Bhusan Power &Steel, Lapange	Duvvada Bhadrak Joruli	Ore Exchange yard/VSKP VSKP Steel Plant Khurda Road, Paradeep
NCR	Allahabad Jhansi Agra Cantt.	Diamond Cement Siding, Parichha IOC, Baad NTPC, Dadri U.P Rajya Vidyut Nigam, Parichha, Yamuna Bridge	Mughalsarai Harduaganj Alwar Palwal	Juhi Baad
CR	Bhusawal Solapur Mumbai Nagpur	Nasik Thermal Power Station Siding Orient Cement Siding MSEB Siding Solapur Goods Shed Ghugas Coal Siding Wani Goods Shed NTPG siding BRSG siding Rajur Goods Shed I Rajur Goods Shed II Nasik Road terminal BPCL siding, Trombay Jalgaon Goods Shed Cement siding, Wadi Pune Goods Shed BSC, Hotgi Turbhe APM Complex RCF siding, Thal-vaishet MPBG siding, Sarni New Mulund Goods shed Umrer Coal siding WCCL, Wani	Jalgaon Manmad Hotgi Wadi Vasai Road Roha Balharshah Nagpur	Bhusawal Daund Wadi Trombay Igatpuri Ajni Amla

Annexure III

(Para No. 3.7)

Statement showing the sample selection made for micro analysis of specific Issues in Corporate Safety Plan

Category	Issues	Extent of sample selection
Zonal Hqrs	Safety related records of all concerned departments	100%
Divisional Hqrs	Safety related records of all concerned departments	Total 28 divisions on IR
Workshop	Safety related works (including POH, upgradation works etc.)	18 workshops on IR
Carriage sheds	Safety related works	17 sheds on IR
Loco sheds	Safety related technological upgradation works	20 loco sheds on IR
RDSO	Research projects & evaluation of new technology	100% of Safety related items
ROH depots	Safety related technological upgradation works	15 Depots on IR
Training Centres	Review of training modules and facilities provided in respect of safety related training	15 Training centres on IR
Works	Track Renewals etc.	A total of 271 works were reviewed
Production Units	Safety related technological upgradation works	100%

Annexure-IV

(Para 3.9.1.3)

Availability of Safety requirements at Manned/Unmanned Level Crossing Gates

Sl.No.	Details of items to be provided	SR	CR	ER	NR	WR	NWR	SCR	SER	NER	NCR	ECR	SECR	ECoR	SWR	WCR	NFR	Total
1	No. of LCs test checked	10	20	10	10	11	10	10	10	10	10	10	10	10	10	10	10	**171**
2	No. of LCs Manned	5	10	5	5	9	5	5	6	5	5	5	5	5	7	5	5	**92**
3	No. of LCs Provided with telephone	5	10	1	5	9	5	5	6	5	5	5	5	5	7	5	5	**88**
4	No. of LCs Interlocked	5	9	2	5	6	1	3	5	5	3	4	4	3	1	3	3	**62**
5	No. of LCs where wicket gates or stiles have been provided for pedestrians.	5	6	3	0	4	0	3	2	5	1	2	3	3	6	1	3	**47**
6	No. of LCs with reflectors provided on the stop disc on both sides of the gate.	4	9	5	5	6	5	4	6	5	5	4	2	5	7	4	4	**80**
7	No. of LCs with lamps provided on the gate on both sides for the road users	5	10	4	5	8	5	4	4	5	4	5	5	5	7	2	5	**83**
8	No. of LCs with speed breaker/bumps provided on either approach (unmanned level crossing only)	7	13	6	5	1	5	5	4	9	10	8	4	5	8	10	8	**108**
9	No. of LCs with warning boards for road users provided on both the approaches at the gate in the case of unmanned level crossings.	6	12	3	5	2	10	5	4	5	10	5	4	7	10	7	8	**103**
10	No. of LCs with locking arrangements provided for both gates.	5	10	5	5	9	5	5	6	5	5	5	3	5	7	5	5	**90**
11	No. of LCs with lifting barrier is less than 5 mtrs from centre of track	3	6	5	1	4	5	2	6	5	5	0	3	5	7	3	5	**65**

Annexure-V
(Para 3.9.1.6 -C)
Vacancy position of Safety category staff as on 31.3.2008.

Zone	Operating Dept.			Civil Engg. Dept.			Mechanical Dept.			Electrical Dept.		
	Sanctioned strength	Vacancies	Percentage of vacancy	Sanctioned strength	Vacancies	Percentage of vacancy	Sanctioned strength	Vacancies	Percentage of vacancy	Sanctioned strength	Vacancies	Percentage of vacancy
1	2	3	4	5	6	7	8	9	10	11	12	13
SR	12059	992	8.23	17824	3967	22.26	4096	362	8.84	610	92	15.08
CR	17355	1226	7.06	19445	2869	14.75	5380	396	7.36	613	161	26.26
ER	14459	690	4.77	17190	5983	34.80	5725	614	10.72	777	154	19.82
NR	21259	3532	16.61	26364	3441	13.05	7835	841	10.73	538	152	28.25
WR	14547	1611	11.07	21543	1856	8.62	2018	419	20.76	636	105	16.51
NWR	9276	917	9.88	12787	2885	22.56	1549	57	3.68	125	27	21.60
SCR	14989	2278	15.20	21086	4296	20.37	2339	444	18.98	30	4	13.33
SER	12832	1457	11.35	16773	4805	28.65	4616	728	15.77	227	49	21.59
NER	7728	620	8.02	10495	1870	17.82	1205	69	5.73	82	17	20.73
NCR	12183	1837	15.08	15401	1873	12.16	2776	169	6.09	1226	150	12.23
ECR	14359	1944	13.54	19525	5596	28.66	4801	571	11.89	428	101	23.60
SECR	9456	2021	21.37	11993	3403	28.37	1464	231	15.78	98	24	24.49
ECoR	7231	1092	15.10	12081	4456	36.88	2339	519	22.19	239	52	21.76
SWR	5886	1157	19.66	8399	3116	37.10	1893	376	19.86	116	43	37.07
WCR	10086	806	7.99	15611	3139	20.11	2090	190	9.09	557	67	12.03
NFR	8117	657	8.09	15882	2023	12.74	2681	338	12.61	208	66	31.73
RPU/ Metro	343	46	13.41	17	1	5.88	0	0	0.00	805	52	6.46

Source: Safety CDO
(Para 7.9 of CSP)

Annexure VI
(Para 3.9.1.6-E)
Upgradation of Running Rooms & Crew Lobbies

Zone	Division	No. available	No.upgraded (out of Col.3)	No. under upgradation (Out of Col.3)	No. proposed for upgradation (Out of Col.3)
1	*2*	*3*	*4*	*5*	*6*
Running Rooms					
SR	Chennai	10	2	2	0
	TVM	8	2	1	3
CR	Pune	4	4	0	0
	Bhusawal	6	6	0	0
	Nagpur	5	2	2	1
	Solapur	3	3	0	0
ER	SDAH	1	0	1	0
	HWH	1	1	0	0
	ASN	2	2	0	0
NR	LKO	10	0	1	9
	DLI	13	3	3	1
WR	Ratlam	4	3	0	1
	Ahmedabad	12	4	1	2
NWR	BKN	5	5	0	0
	JU	3	2	1	0
SCR	SC	10	5	2	0
	GTL	8	3	1	0
SER	Chakradharpur	10	1	4	0
	Kharagpur	5	1	0	1
NER		7	0	4	7
NCR	JHANSI	6	0	1	1
ECR	DHN	13	0	13	0
	MGS	4	3	1	0
SECR	Bilaspur	8	7	1	0
ECoR		4	2	1	1
SWR	Bangalore	8	4	2	0
WCR	Bhopal	8	5	1	0
NFR		9	0	1	0
RPU/Metro		0	0	0	0
Total		**187**	**70**	**44**	**27**
Crew Lobbies					
SR	Chennai	7	0	4	0
	TVM	4	1	1	2
CR	Mumbai	9	1	1	2
	Pune	5	3	0	0
	Bhusawal	7	7	0	0
	Nagpur	3	2	0	1
	Solapur	5	4	1	0
ER	SDAH	9	3	2	2
	ASN	6	4	0	2
	HWH	2	2	0	0
NR	LKO	9	5	2	2
	DLI	12	9	1	1
WR	Ratlam	4	3	0	0
	Ahmedabad	9	8	1	0
NWR	BKN	6	1	4	1
	JU	3	2	1	0
SCR	SC	9	8	1	0
	GTL	6	5	0	0
SER	Chakradharpur	6	1	1	0
	Kharagpur	3	1	0	0
NER		4	0	3	1
NCR	JHANSI	3	1	1	1
ECR	DHN	10	4	6	0
	MGS	4	3	0	0
SECR	Bilaspur	6	5	1	0
ECoR		1	1	0	0
SWR	Bangalore	2	2	0	0
WCR	Bhopal	7	6	0	0
NFR		4	3	1	0
RPU/ Metro		0	0	0	0
Total		**165**	**95**	**32**	**15**

(Para 7.20, 7.21 of CSP)

Abbreviations used in the Report

IR	Indian Railways
CR	Central Railway
ER	Eastern Railway
ECR	East Central Railway
ECoR	East Coast Railway
NR	Northern Railway
NCR	North Central Railway
NER	North Eastern Railway
NFR	Northeast Frontier Railway
NWR	North Western Railway
SR	Southern Railway
SCR	South Central Railway
SER	South Eastern Railway
SECR	South East Central Railway
SWR	South Western Railway
WR	Western Railway
WCR	West Central Railway
RPU	Railway Production Units